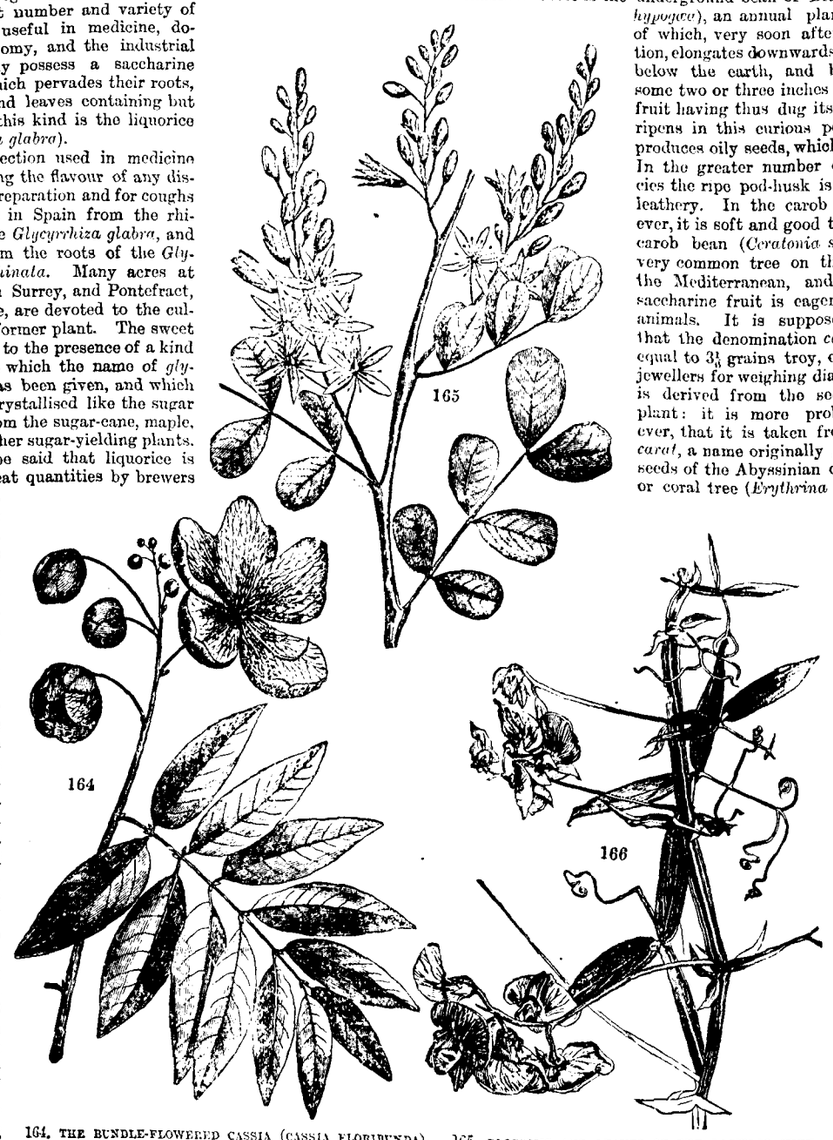
LESSONS IN BOTANY.—XVIII.

SECTION XXXIII.—LEGUMINOSÆ, OR THE LEGUMINOUS TRIBE (*continued*).

THE order Leguminosæ is that beyond all others which furnishes the greatest number and variety of substances useful in medicine, domestic economy, and the industrial arts. Many possess a saccharine principle which pervades their roots, the stem and leaves containing but little. Of this kind is the liquorice (*Glycyrrhiza glabra*).

The confection used in medicine for disguising the flavour of any disagreeable preparation and for coughs is prepared in Spain from the rhizomes of the *Glycyrrhiza glabra*, and in Italy from the roots of the *Glycyrrhiza echinata*. Many acres at Mitcham, in Surrey, and Pontefract, in Yorkshire, are devoted to the culture of the former plant. The sweet taste is due to the presence of a kind of sugar, to which the name of *glycyrrhizin* has been given, and which cannot be crystallised like the sugar obtained from the sugar-cane, maple, beet, and other sugar-yielding plants. It should be said that liquorice is used in great quantities by brewers for giving a dark colour to porter. The leaves of some of the Leguminosæ furnish us with a very valuable medicine.

These are known as the *Cassia officinalis* and its varieties, *Cassia lanceolata*, *Cassia obovata*, and *Cassia acutifolia*, the leaves of which, when dried, furnish the mild purgative called senna. In Fig. 164 we give a representation of the leaves, blossom, and bud of the *Cassia floribunda*, or the bundle-flowered cassia, a pretty annual which bears a yellow flower.



164. THE BUNDLE-FLOWERED CASSIA (CASSIA FLORIBUNDA). 165. BLOSSOMS AND LEAVES OF THE LOGWOOD TREE (HÆMATOXYLON CAMPECHIANUM). 166. EVERLASTING PEA (LATHYRUS LATIFOLIUS).

Certain species possess roots furnished with tubers containing starch and sugar. Of this kind is the alhagi of the Moors (*Alhagi Maurorum*), a native of Asia and tropical Africa. In Persia this vegetable exudes from its stem a delicate manna.

The fruits and seeds of many of the Leguminosæ, such as the haricot bean, gathered before maturity, contain mucilage and sugar, and thus furnish us with an article of vegetable food. If they are allowed to grow quite ripe, the seed becomes highly charged with starch, and is used as food in another form. The peas and beans of our gardens may be considered as exclusively belonging to temperate climates. Tropical regions, nevertheless, have their papilionaceous substitutes. Amongst the most remarkable of these is the underground bean of Brazil (*Arachis hypogæa*), an annual plant, the fruit of which, very soon after impregnation, elongates downwards, penetrates below the earth, and buries itself some two or three inches deep. The fruit having thus dug its own grave, ripens in this curious position, and produces oily seeds, which are eaten. In the greater number of the species the ripe pod-husk is tough and leathery. In the carob bean, however, it is soft and good to eat. The carob bean (*Ceratonia siliqua*) is a very common tree on the shores of the Mediterranean, and its pulpy saccharine fruit is eagerly eaten by animals. It is supposed by some that the denomination *carat weight*, equal to 3¼ grains troy, employed by jewellers for weighing diamonds, etc., is derived from the seeds of this plant: it is more probable, however, that it is taken from the term *carat*, a name originally given to the seeds of the Abyssinian coral flower, or coral tree (*Erythrina Abyssinica*). The seeds of this plant are very small and uniform in size and weight.

Many Papilionaceæ have a mucilaginous saccharine stem, slightly bitter and aromatic, and yielding excellent pasturage. Foremost in this list are the vetches, trefoils, clovers, and lucernes. The fenugreek diffuses a somewhat disagreeable odour, yet its seeds are held in great estimation by Turkish ladies, with whom extreme fatness is considered as the greatest point of personal beauty.

The delicious Tonquin bean (*Dipteryx odorata*) used by perfumers, and also by snuff-makers for scenting snuff, owes its distinctive characteristic to the presence of a sort of volatile oil, named by the chemists *coumarine*.

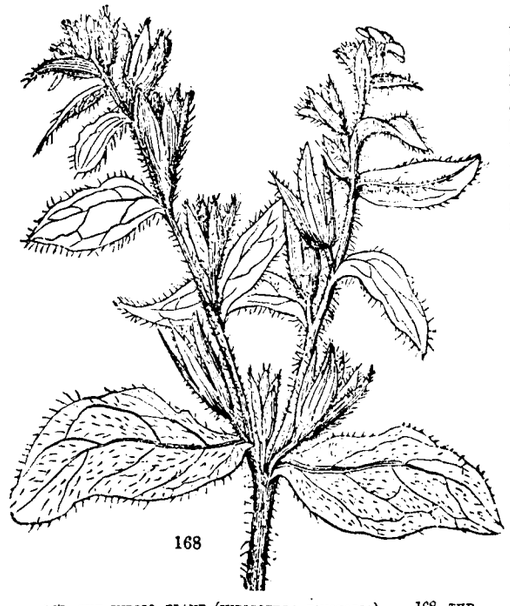
Among the Papilionaceæ that are more ornamental than useful may be named the sweet pea (*Lathyrus odoratus*), a favourite hardy, climbing annual, and the deciduous climber known as

green leaves and pink blossoms of this plant are admirably rendered, as far as their form and manner of growth are concerned, in Fig. 166. The garden peas that are grown for the table are varieties of the *Pisum sativum*, or common cultivated pea.

Many of the Leguminosæ of the Old World contain an astringent juice, which, being caused to flow from incisions and dried, becomes hardened into substances employed in medicine and the arts.

Several American species are used for dyeing; for example, the so-called Brazil or Pernambuco wood is the produce of a leguminous plant, the *Cæsalpinia echinata*. Sappan wood (*Cæsalpinia Sappan*) is another, as in like manner is logwood (*Hæmatoxylon Campechianum*, Fig. 165), and red sandal-wood (*Pterocarpus santalinus*). But assuredly the most important of all the leguminous dye materials is indigo (Fig. 167), the produce of the *Indigofera tinctoria*, a native of tropical Asia, but now cultivated in many other tropical regions. Blue indigo, however, does not exist ready formed in the indigo plant, but is procured from it by submitting the plants to a sort of fermentation. The chemical nature of indigo is very peculiar, differing from all other dye-stuffs, and does not admit of being explained in few words. The method, however, of preparing indigo blue may be described briefly as follows:—The plant, when sufficiently grown for the purpose, is pulled up and steeped in water, as we steep flax for the preparation of linen yarn, until fermentation takes place. A yellow solution is thus procured, which is drawn off from the decaying vegetable matter, and exposed to the air. In course of time a precipitate of a dark-blue colour is obtained—the indigo of commerce—which is dried and pressed into lumps for exportation. Indigo is obtained principally from Hindostan and the islands of the Eastern Archipelago. The plant is also cultivated in Central America.





167. THE INDIGO PLANT (INDIGOFERA TINCTORIA). 168. THE BUGLOSS, OR OX-TONGUE (ANCHUSA OFFICINALIS).

The so-called aloes wood is a resinous aromatic wood furnished by a leguminous tree which grows in certain mountainous regions of Cochin China. Its botanical name is *Aloexylon Agallochum*.

Copal resin, a valuable constituent of many varnishes, is the produce of a leguminous vegetable, of which the name and even the true locality were long unknown. The tree yielding it is now demonstrated to be the *Hymenæa verrucosa*, a native of Madagascar, and called by the natives *Tanrouk-rouki*. Balm of Peru, balsam of tolu, and gum tragacanth, are also the produce of various species of Leguminosæ. This is a long list of products of plants used in medicine and dyeing, but we might fill whole pages in this way, so fertile in medicinal products are the Leguminosæ. Suffice it to say, that tamarinds, cassia, senna, gum-arabic, and catechu (one sort), are all the produce of vegetables belonging to this natural order. None of these medicinal and highly odorous species are natives of our temperate clime, or admit of being grown there except in hot-houses; but we have, at least, the delicate-blossomed, odour-diffusing sweet pea.

SECT. XXXIV.—BORAGINACEÆ, OR THE BORAGE TRIBE.

Although it will be impossible in this work to do more than mention the names of many natural orders of plants, a detailed list of which will be given in a tabular form at the end of these lessons, yet we may find space for a description of the order which contains that universal favourite, the myosotis, or forget-me-not. *Characteristics*: Calyx free, with five divisions; corolla hypogynous, monopetalous, regular five lobed; stamens five, inserted on the tube of the corolla alternate with the divisions; carpels four, style one; seeds one in each carpel, dicotyledonous, little or no albumen; radicle superior.

This is the tribe of plants which Linnæus termed *Asperifoliæ*, on account of the hair-like projections with which their leaves and stems are studded. Prominent among these vegetables is borage; hence the modern term *Boraginaceæ*, now applied to the order.

Remark the peculiar fashion in which the flowers of a forget-me-not grow. The stem which bears them is coiled up like the main-spring of a watch, and as the flowers grow the coils unfold. This kind of inflorescence is denominated by the botanist *gyrate*, from the Latin gyro, *to move in a circle*, and is as distinctive of the borage tribe and certain allies as the minute characteristics enumerated in our definition.

Let us now pay attention to the flower. The calyx consists of five sepals, which remain joined to each other to the extent of half the flower, thus constituting the tube. The border of the corolla is also divided into five lobes. Lastly, we observe five stamens and an ovary, from which springs one style, terminated by a double stigma. In correspondence with four lobes of the ovary, we observe four nut-like bodies which used to be mistaken for seeds, but are really fruits. The peculiarities of the fruit and the inflorescence (*gyrate*) are the grand distinctive characteristics of the borage natural order, the members of which are all harmless, and many of them the sources of valuable dyeing materials. We insert a drawing (Fig. 168) of the bugloss or ox-tongue (*Anchusa officinalis*), a plant belonging to this order.

A decoction of the roots of the bugloss was once much used as a demulcent drink. From the roots of another plant of this order, called the alkanet (*Anchusa tinctoria*), a resinous dye of a red colour is obtained. The borage (*Borago officinalis*), from which, as we have said, the name of the order is taken, is supposed to possess some cooling property, and its leaves and flowers are often put into "cool tankards," or drinks made of wine, water, sugar, and lemons. The young leaves may be used in salads, or they may be boiled and eaten like spinach. The blossoms of plants belonging to the borage tribe are, for the most part, of a beautiful blue of a deeper tint than the flowers of the forget-me-not.

in the world. No modern tongue, except the German, can endure a comparison with the Greek. The Greek language owes its superiority to the richness of its vocabulary, the variety of its inflections, its power of forming compounds, its expressiveness, its adaptability, and its harmony. It was said of old that if the gods were to descend to earth, they would speak the language of Plato, the famous Greek philosopher. The spirit of the saying is borne out by fact. The Greek is a wonderful and beautiful instrument of human thought.

But the study of Greek is worthy of attention, if only as a means of self-discipline. Self-discipline is the true end of education. Nothing better can be given to any mortal than a well-cultivated mind. The man whose faculties are in their highest state of development, and their greatest degree of activity and productiveness, stands at the summit of humanity, and now enjoys what he has reached, namely, the perfection of his earthly being.

The study of the Greek is pre-eminently fitted to educate our mental powers. All linguistical studies are useful for that purpose. Looking at their effects in their several bearings, I am free to declare that the study of languages is of all studies the most useful. But the Greek has the special recommendation of being more subject to rule than other languages. The Greek, too, deals with wider reaches of intellect and subtler distinctions of thought than most other tongues can comprise or define.

But there is a recommendation of the study of Greek which throws all others into the shade, for in Greek are the Scriptures of the New Testament written. Strange is it that, in a Christian country, the records of salvation should be so little read in their originals. What a privilege is the power to do so! How much better are the teachings of the Apostle to the Gentiles understood, when the student applies his mind to the very words which fell from his lips or flowed from his pen! How much more easily, and how much more thoroughly, do we enter into the spirit, and feel at once the beauty and the power of the lessons of the Divine Master, when we have thrown aside the veil of a translation, and reverently with our own eyes look upon his sacred presence!

In connection with the study of theology, we may observe that the word "theology," and almost all our *ecclesiastical* and *theological* terms, are derived from the Greek. The English words *bishop*, *baptism*, *atheist*, *liturgy*, *diocese*, *cathedral*, with a host of others, are all drawn from the Greek.

While, however, the Greek language commends itself very specially to the attention of all who seek an acquaintance with Divine truth, and offers its aid for the general culture and improvement of human intelligence, it is not without a claim which, though more humble, may with some persons be more valid. That claim it lays before all who study or propose to study the sciences. Though some of the sciences existed not, even in rudiments, during the classical days of Aristotle, and though other sciences have been carried far beyond the boundaries where they were left by Euclid and by Galen, yet in general the language of science is Greek; for such is the readiness with which the Greek lends itself to combination, that the moment a new science is elaborated—nay, the moment a new fact is ascertained, or a new elementary substance is discovered—that moment some form or forms of words are produced from Greek elements, which exactly set forth the novelty. Hence these scientific names are so many definitions, and being definitions they describe the objects which they are used to designate; they, I say, describe those objects to such students as are familiar with Greek. Take *photography* as an instance. This word is made up of two Greek words, *φως* (phose), *light*, and *γραφη* (graph'-phee), *a painting*, and so means *light-painting*; that is, a painting made by the *solar rays*. If the student will take the trouble of turning to the *Greek stems* as set forth in the lessons on the English language published in the POPULAR EDUCATOR, he will find many illustrations of the fact that, in English, Greek is the language of science.

As the language of science, Greek is of special service to all men of science; in particular is it of great service to medical men. A vast number of the words with which they have to do in their studies are of Greek origin. Those words, to persons ignorant of the Greek tongue, are so many unknown terms, the meaning of which has to be learnt as a mere matter of routine; but to the proficient in Greek *they define themselves*, and so describe the objects which they represent. Take, as an example, the word *bronchitis*. Now I have never studied medicine, yet, from my knowledge of Greek, I know that *bronchitis* is a disease whose seat is in the *βρογχια*, (bron'-ki-ă), that is, *the extremity of the wind-pipe*.

In proceeding to the study of Greek, you are stopped at the very threshold, for the characters of the letters are not the same as those of your native tongue. The diversity, however, is in appearance more than in reality. In fact, the English alphabet was derived from the Latin, and the Latin alphabet was derived from the Greek. It may be added, that the Greek letters can be traced back to the Phœnician. Thus we learn from this statement that the English and the Phœnician alphabets are related to each other. In the descent of the letters, however, from age to age, and in their passage from one people to another, they underwent considerable changes; so that, at least in some instances, it is only a practical eye that, by supplying the intermediate forms, can discover the identity. Yet scarcely is the difference in any case much greater than exists between what we call *Old English* or *Black Letter*, and the letters now employed in ordinary printing; or those you see when you compare a written with a printed composition.

I have made these remarks in order not only to state an important fact, but to induce you to compare the forms of the Greek letters with the corresponding English forms. By so doing you will be much aided in becoming familiar with the Greek letters.

THE GREEK ALPHABET.

Characters.		*English*		
Capitals.	*Small Letters.*	*Equivalents in Sound.*	*Name in English.*	*Name in Greek.*
Α	α	a	Alpha	Αλφα.
Β	β	b	Bēta	Βητα.
Γ	γ	g (*hard*)	Gamma	Γαμμα.
Δ	δ	d	Delta	Δελτα.
Ε	ε	e (*short*)	Epsilon	Εψίλον.
Ζ	ζ	z	Zēta	Ζητα.
Η	η	e (*long*)	Eta	Ητα.
Θ	θ	th	Thēta	Θητα.
Ι	ι	i	Iota	Ιωτα.
Κ	κ	k	Kappa	Καππα.
Λ	λ	l	Lambda	Λαμβδα.
Μ	μ	m	Mu	Μυ.
Ν	ν	n	Nu	Νυ.
Ξ	ξ	x	Xi	Ξι.
Ο	ο	o (*short*)	Omicron	Ομικρον.
Π	π	p	Pi	Πι.
Ρ	ρ	r	Rho	Ῥω.
Σ	σ ς	s	Sigma	Σιγμα.
Τ	τ	t	Tau	Ταυ.
Υ	υ	u	Upsilon	Ὑψίλον.
Φ	φ	ph	Phi	Φι.
Χ	χ	ch	Chi (like *ki*)	Χι.
Ψ	ψ	ps	Psi	Ψι.
Ω	ω	o (*long*)	Omĕga	Ωμεγα.

Of these five columns the *first* gives the Greek letters in *capitals*; the *second* gives the same letters in *small forms*; the *third* gives the corresponding *English letters*, that is, the forms in English which have sounds similar to the several Greek letters; the *fourth* gives the *Greek name* of the letters; and the *fifth* gives the *same name* in Greek characters. The names, as they appear in the last column, are the designations which you are to assign to the Greek letters; that is, you are to call *α* not *a*, but *alpha*; *β* not *b*, but *beta*, and so on.

Before you can advance another step, you must make yourself thoroughly familiar with these characters—with their names and their values or sounds. In general, you may follow your ordinary English methods of pronunciation; one or two exceptions will be pointed out immediately. Your present business is to acquire a facility of transferring the Greek characters into corresponding English characters, and to read the former in the sounds of the latter. In the requisite application I advise you to employ a slate and pencil. Write the alphabet several times merely in Greek. Then compare together such Greek characters as resemble each other, and carefully mark wherein they differ. Having become familiar with the mere forms, associate with each its own name. Then study the sounds, that is, pronounce each Greek letter in the corresponding English sound. These

LESSONS IN BOOKKEEPING.—IX.

MEMORANDA OF TRANSACTIONS (*continued*).

April 29th.

Accepted a Bill drawn by Ovington and Co., No. 6, payable to Spicer and Co., due at 3 months . £245 8 0

30th.

Sold at Liverpool, per Thomas Jones,
30 bags of Demerara Cotton (on credit)
Net 9218 lbs. at 9d. per lb. £345 15 6
His Commission and other expenses 8 12 10
£337 0 8

30th.

Took out of Cash for my Private Account . . . £9 0 0

May 2nd.

Sold to Lloyd and Co., of Manchester,
16 bags of Berbice Cotton (on credit)
Net 4960 lbs. at 10½d. per lb. £217 0 0
Incidental expenses 0 18 10
£217 18 10

3rd.

Drew out of the London and Westminster Bank . . £340 0 0

3rd.

Paid Bill, No. 2, drawn by Andrews and Co. . . £327 5 0

4th.

Sold at Liverpool, per Thomas Jones,
24 bags of Madras Cotton (on credit)
Net 8484 lbs. at 7d. per lb. £247 9 0
His Commission and other expenses 6 3 10
£241 5 2

5th.

Sold to Powell and Co., of Manchester,
22 bags of Maranham Cotton (on credit)
Net 7166 lbs. at 10d. per lb. £298 11 8
Incidental expenses 1 5 6
£299 17 2

6th.

Received of Thomas Jones, of Liverpool,
The following Remittances in Bills:
No. 6, drawn on Abrahams and Co., due June 6th . £113 1 0
No. 7, drawn on Welch and Co., due May 29th . . 199 0 0

9th.

Received of Lloyd and Co., of Manchester,
Bill No. 8, drawn on Barclay and Co., due June 1st . £217 18 10

10th.

Received in Cash for Bill No. 4, Parker and Co. . . £199 10 6

11th.

Took out of Cash for Petty Cash £10 0 0

11th.

Deposited in the London and Westminster Bank . . £189 0 0

12th.

Received of Thomas Jones, of Liverpool,
The following Remittances in Bills:
No. 9, drawn on Lubbock and Co., due June 16th . £200 0 0
No. 10, „ Payne and Co., „ 18th . 37 0 8

13th.

Bought of Stevenson and Co., of Liverpool,
On account of Perkins and Co., of London,
30 bags of New Orleans Cotton, value . . . £212 6 8
My Commission and other expenses 5 6 8

14th.

Received of Thomas Jones, of Liverpool,
The following Remittances in Bills:
No. 11, drawn on Smith and Co., due June 12th . £200 0 0
No. 12, „ Baring and Co., „ 21st . 41 5 2

15th.

Received of Powell and Co., of Manchester,
The following Remittances in Bills:
No. 13, drawn on Wagnall and Co., due June 26th . £100 0 0
No. 14, „ Margetson and Co., „ 30th . 199 17 2

May 15th.

Received in Cash for Bill No. 2, Warwick and Co. . £120 10 0

15th.

Deposited in the London and Westminster Bank . £120 0 0

16th.

Bought of Stewart and Co., of Liverpool,
On account of Perkins and Co., of London,
40 bags of Sea-Island Cotton, value £610 19 4
My Commission and other expenses 15 19 2

20th.

Drew out of the London and Westminster Bank . . £210 0 0

20th.

Remitted in Cash to Stevenson and Co., Liverpool,
On account of Perkins and Co., London,
For Cotton bought on the 13th inst. . . . £212 6 8

25th.

Received in Cash for Bill No. 3, Thiselton and Co. . £102 19 10

25th.

Discounted and received in Cash for Bills,
No. 8, Barclay and Co., due June 1st . . . £217 18 10
No. 9, Lubbock and Co., „ 16th . . . 300 0 0
Paid for discount on the Bills 1 2 3

25th.

Remitted in Cash to Stewart and Co., Liverpool,
On account of Perkins and Co., London,
For Cotton bought on the 16th inst. . . . £610 19 4

27th.

Sold Brown and Smith, London,
12 bales Madras Cotton, for Cash,
Net 3896 lbs. at 6d. per lb. £97 8 0

27th.

Received of Brown and Smith, London,
For Cotton sold to them this day £97 8 0

29th.

Deposited in the London and Westminster Bank . . £100 0 0

29th.

Received in Cash for Bill No. 7, Welch and Co. . . £100 0 0

30th.

Deposited in the London and Westminster Bank . . £100 0 0

31st.

Received of Perkins and Co., London, 4 Bills, viz.,
No. 15, drawn on Warner and Co., due June 7th . £200 0 0
„ 16, „ Russell and Co., „ 10th . 200 0 0
„ 17, „ Payne and Co., „ 15th . 375 10 0
„ 18, „ Alexander and Co. „ 28th . 47 16 0

June 1st.

Sold to Powell and Co., of Manchester,
24 bags of Demerara Cotton (on credit)
Net 7362 lbs. at 10d. per lb. £306 15 0
Incidental expenses 1 10 0
£308 5 0

3rd.

Received in Cash for Bill No. 5, Baring and Co. . . £36 0 0

3rd.

Drew out of the London and Westminster Bank . . £100 0 0

3rd.

Paid Bill No. 3, Smith and Co. £135 18 9

5th.

Took out of Cash for Petty Cash £10 0 0

6th.

Received in Cash for Bill No. 6, Abrahams and Co. . £113 1 0

6th.

Deposited in the London and Westminster Bank . . £100 0 0

7th.

Received in Cash for Bill No. 15, Warner and Co. . £200 0 0

7th.

Deposited in the London and Westminster Bank . . £200 0 0

10th.

Received in Cash for Bill No. 16, Russell and Co. . £200 0 0

June 10th.

Deposited in the London and Westminster Bank . . £200 0 0

11th.

Received from Powell and Co., Manchester, 2 bills, viz.,
No. 19, drawn on Payne, Smith, and Co., due July 10th £150 0 0
„ 20, „ Lloyd and Co., „ 20th 158 5 0

12th.

Received in Cash for Bill No. 11, Smith and Co. . . £200 0 0

12th.

Deposited in the London and Westminster Bank . . £200 0 0

15th.

Received in Cash for Bill No. 17, Payne and Co. . . £375 10 0

15th.

Took out of Cash for my Private Account . . . £20 0 0

15th.

Deposited in the London and Westminster Bank . . £360 0 0

16th.

Received in Cash for Bill No. 1, Allison and Co. . . £150 0 6

16th.

Deposited in the London and Westminster Bank . . £150 0 0

19th.

Received in Cash for Bill No. 10, Payne and Co. . . £37 0 8

18th.

Deposited in the London and Westminster Bank . . £40 0 0

21st.

Received in Cash for Bill No. 12, Baring and Co. . £41 5 2

21st.

Deposited in the London and Westminster Bank . . £50 0 0

26th.

Received in Cash for Bill No. 13, Wagnall and Co. . £100 0 0

26th.

Deposited in the London and Westminster Bank . . £100 0 0

28th.

Received in Cash for Bill No. 18, Alexander and Co. . £47 16 0

30th.

Received in Cash for Bill No. 14, Margetson and Co. . £199 17 2

30th.

Deposited in the London and Westminster Bank . . £250 0 0

30th.

Made up the account of Petty Cash from January 1st to this day £57 8 9

30th.

Estimated my unsold Cotton at prime cost, as follows, on taking a *General Balance* this day:
12 bags of Madras Cotton
Net 4004 lbs. at 4½d. per lb. £75 1 6

LESSONS IN GERMAN.—XXVIII.

SECTION LIV.—PREPOSITIONS REQUIRING THE DATIVE.

THE prepositions entgegen, gemäß, nebſt, ſeit, etc. (§§ 111, 112), govern the dative, as:—Dem Strome entgegen ſchwimmen iſt nicht leicht, to swim against the stream is not easy. Er erzählt die Sache der Wahrheit gemäß, he relates the affair conformably to the truth. Er, nebſt ſeinen beiden Söhnen, iſt in Amerika, he, together with both his sons, is in America. Seit dem Tage, an dem er ſeine Heimath verließ, iſt alle Freude von ihm gewichen, since the day that he left his country (home), all gladness has forsaken him.

VOCABULARY.

Auf'löſung, *f.* dissolution.
Auf'ſchauen, to look up.
Außer, except, besides.
Bogen, *m.* bow.
Cartha'go, Carthage.
Entge'gengehen, to go to meet.
Entge'genrücken, to approach toward.
Erſt, first.
Fall, *m.* fall.
Fordern, to demand, ask.
Gegenü'berſitzen, to sit opposite.
Gemäß', conformably to.
India'ner, *m.* Indian (of America).
Jagd, *f.* hunt, chase.
Kampf, *m.* combat, battle.
Mehr'ere, several.
Nackt, naked, bare.
Nebſt, together with.
Oberſt, *m.* colonel.
Pfeil, *m.* arrow.
Römiſch, Roman.
Rütli, *n.* Rütli (a mountain in Switzerland).
Sammt, together with
Scene, *f.* scene.
Verab'redung, *f.* agreement.
Verbün'dete, *m.* confederate, ally.
Verlie'ren, to lose.
Ziege, *f.* goat.
Zunächſt', next to.
Zuſam'menkommen, to come together.
Zuwi'der, contrary to, against.

RÉSUMÉ OF EXAMPLES.

Verge'bens ſuchte er ſich dieſe trüben Gedan'ken aus dem Sinne zu ſchlagen.	In vain he sought to drive these gloomy thoughts from his mind.
Bei dieſem Kampfe erwar'ben unſere Waffen wenig Ehre.	At this battle our arms acquired little honour.
Von allen Bäumen zieht die Eiche den Blitz am meiſten an.	Of all trees the oak attracts the lightning most.
Mit dem Verſpre'chen iſt das Halten verbun'den.	With the promising the performing is connected.

EXERCISE 104.

1. Aus dieſem Grunde verließ ich mein Vaterland. 2. Außer dem nackten Leben hatte er nichts gerettet. 3. Bei dem Kampfe verloren mehrere Soldaten ihr Leben. 4. Unſere Truppen rückten dem Feinde entgegen. 5. Dem Freunde gegenüber ſaß der Prediger. 6. Der Verabredung gemäß kamen die Verbündeten in der Nacht auf dem Rütli zuſammen. 7. Nach dem Falle Carthago's ging das römiſche Reich ſeiner Auflöſung immer mehr entgegen. 8. Nächſt dem General kommt der Oberſt. 9. Ich habe Herrn N. nebſt ſeinen Kindern zum Eſſen eingeladen. 10. Wir werden Sie in den erſten Tagen ſammt unſerem Freunde beſuchen. 11. Mit Pfeil und Bogen geht der Indianer auf die Jagd. 12. Seit dem dreißigjährigen Kriege hat es nicht ähnliche Scenen gegeben. 13. Von mir dürfen Sie Alles fordern. 14. Zum Himmel aufſchauend gab der Kranke ſeinen Geiſt auf. 15. Ihm zunächſt ſtand der König. 16. Dem Wunſche ſeines Vaters zuwider trat er in das Heer.

EXERCISE 105.

1. I am going on, according to my former custom. 2. My friend went to meet my enemy. 3. Opposite me sat my mother by the side of my uncle. 4. I rode across the park. 5. He is inquiring after my sister. 6. Since I was there, I have heard nothing more about the affair. 7. I have not seen him since yesterday. 8. I have sent the letter to his house. 9. He went out of the room. 10. I was with my brother. 11. This is against the law.

SECTION LV.—PREPOSITIONS REQUIRING THE ACCUSATIVE.

The prepositions durch, entlang,* gegen, ſonder, um, etc. (§§ 113, 114), govern the accusative, as:—Sie haben mich durch Ihre Großmuth beſiegt, you have vanquished me by your magnanimity. Ich ging mit ihm den Fluß entlang, I went with him along the river. Das Schickſal hat ſich gegen mich empört, (the) Destiny has risen up against me. Alle Hoheit der Erde ohne herzliche Liebe iſt Staub, all the grandeur of the world without heart-felt love is dust. Ich habe dieſen Morgen einen Spaziergang um die Stadt gemacht, I have taken (made) a walk round the town this morning.

VOCABULARY.

An'richten, to cause, do.
Arznei', *f.* medicine.
Auf'opfern, to sacrifice.
Aus'nahme, *f.* exception.
Bereit', prompt, ready.
Beſitz', *m.* possession.
Beſorg'niß, *f.* fear, apprehension.
Beſtra'fen, to punish.
Dazwiſch'enkunft, *f.* interposition.
Ebbe, *f.* tide.
Ein'treffen, to come in, arrive.
Entlang', along.
Erſchie'ßen, to shoot (to kill by shooting).
Gefan'gen, caught, captured (as noun, prisoner).
Gegen, against.
Kaiſerin, *f.* empress.
Krankheit, *f.* sickness.
Küſte, *f.* shore.
Marie', *f.* Mary.
Mode, *f.* fashion.
Oeſtreich, *n.* Austria.
Offen, open, frank.
Ohne, without.
Richten, to direct.
Rüſtung, *f.* preparation, arming, armour.
Schimmern, to glitter, glimmer.
Schle'ſien, *n.* Silesia.
Stück, *n.* part, piece.
Wahr'heit, *f.* truth.
Wider, against.
Zweifel, *m.* doubt.

* Entlang, however, requires the genitive when it precedes the word it governs, as:—Wir hatten den ganzen Tag gejagt, entlang des Waldgebirges (Schiller), we had hunted the whole day along the mountainous forest.

processes you must go over again and again, until you are perfectly master of the whole, and can from memory write down the alphabet, with all its forms and parts, as here given. I advise you to take great pains in this matter, and not to pass on until you have thoroughly accomplished this task. Your attention to this recommendation will save you a world of trouble.

In the commencement, you will do well to confine yourself to the *small characters*; having acquired them, you will readily make yourself familiar with the *capitals*.

In the small characters, you will at once discover similarities between the Greek and the English forms. The Greek *α* and the English *a* are obviously the same. The English *e* and the short *ε* in Greek are very nearly alike. The two *b*'s differ little. The two *i*'s are identical; so are the two *o*'s (*ο* short); and the Greek *o* long (*ω*) is nothing but two short *o*'s (*οο*) put together.

You will notice, in the Greek, two forms of the small letter *s*. These two forms are *σ* and *ς*. Of these, the first occurs at the beginning and in the body of a word; the second stands at the end of a word. This form of the *sigma*, namely, *s*, may also be used in the middle of compound words, when the first of the words of which the compound is formed ends in *s*: for example:—

Ordinary Sigma.	*Sigma at the end.*	*Sigma in Compounds.*
δουλωσω	δρασμος	δυσγενης
σεισμος		προσφερω

Gamma, *γ*, has the sound of *n* before *γ*, *κ*, *χ*, *ξ*: thus, Γαγγης is pronounced gan'-ghees; συγκοπη is pronounced sune'-ko-pe; Κεγχριος, ken'-kri-os; and λαρυγξ, lar-unx.

Chi, *χ*, has a guttural sound, and so differs from *kappa*, *κ*. The letter *χ* is never pronounced like our *ch* in *church*, but always in a way resembling our *k* in *kite*, *kitchen*, *kick*.

Over vowels, *e* in *bēta*, *i* in *epsilon*, etc., this mark ˘ will be observed. It is used to denote a *long* vowel. The force of it you may give by throwing the stress of the voice on the vowel or syllable over which it is placed. Thus *omicron* is to be pronounced *o-mĭ'-kron*. The opposite of ˘ is ¯, as in *omēga*; the mark ˘ denotes a *short* syllable; accordingly, *omēga* is pronounced thus, *o'-meg-a*, with the stress on the *o*. A vowel of doubtful length is marked thus ᾰ, as ᾰ̆. When two vowels come together, the former is generally short, as Ἰλῐον, *i'-li-on*. Diphthongs, however, are long; that is, on them you must throw the stress, as *αυξάνω*, *au'x-a-no*. Syllables are short or long, as they contain a short or long vowel. Syllables containing a diphthong are long.

You may ascertain whether you have mastered the letters, by practising yourself in the following

EXERCISE FOR PRONUNCIATION.

N.B.—Every vowel in Greek, whether at the end of a word or not, is pronounced as a separate syllable.

Κα, κε, κη, κι, κο, κυ, κω. Γε, γο, γη, γω, γα, γι. Χη, χω. Τα, τε, το. Δε, δη. Θη, θι, θεα, θητα. Πι, πω, πας. Βαλλω. Ῥι, φερω. Σα, σον, σιγη. Φυγη, φυγω. Ματερ, μελος. Ψι. Γατηα. Ζητα, ζητεω, ζητησις; Ξανθος; Νυκτες; Χθων.

Αλεξανδρος, Αυλις. Ωλην, Ωκεανος. Ωρωπος. Ψαυμις, Ψαμμετιχος. Βιας. Γη, Γλαυκος, Γοργη. Χαρῖτες, Χάριλαος. ϕωκευς, Φωκίων, Φρυγες. Ὕδρα, Ὕπάνις, Ὕλλος. Δολοψ, Διονῦσος, Διοσκουροι. Ερις. Ζακυνθος, Ζευξις. Ηλεκτρα, Ηχω, Ηως. Κιμβροι. Λυδια, Λυσιας, Λοκρις, Λακεδαιμων. Νικη. Μινως. Ολυμπος. Πλαταια, Πιττάκος. Σαλαμις, Σακας, Σκυθια. Τιτάνες. Ῥοδος, Ῥωμη, Ῥηγιον. Ξανθος.

You will find in the ensuing lessons these three marks or accents, namely, ' above the letter (or to the left of it in capitals), as in *ἵνα*; ˌ under the letter, as in *ϕδη*; and ^ above the letter, as in *οὗς*. The first is called the *spiritus asper*, or *rough breathing*, being equivalent to our aspirated *h*; pronounce, then, as with an *h* syllables before which this aspirate is placed, as Ἅδης, *Hades*. The second mark is called *iota subscript* (*ι ὑπογεγραμμένον*), so termed because the letter *i*, instead of appearing at the end as in λογωι, is written or placed under the *ω* as ῳ. This mark is commonly disregarded in pronunciation. The third mark is called the circumflex, being made up of the acute accent and the grave accent, from the union of which ^ the circumflex is produced. The circumflex denotes a contraction, as in the diphthong *οῦς*, *ou'-s*.

In printed Greek books you will see several marks of accentuation over the letters. These I shall for the most part omit, as the study of them would embarrass the beginner, and as a knowledge of them is not necessary to either the understanding or the pronunciation of Greek. When you have mastered the real and inevitable difficulties of the language, you will readily acquire an acquaintance with these now almost useless signs.

LESSONS IN GEOGRAPHY.—XIV.

ASTRONOMICAL PRINCIPLES OF GEOGRAPHY.

SUPPOSE that you were elevated in the heavens, or in the vast space in which roll all the stars, to a point millions of miles above the sun; and that you were furnished with a telescopic eye so powerful, that from that point you could observe the magnitudes, motions, and distances of all the bodies in the Solar System—that is, the bodies or planets which revolve round the sun in consequence of the laws of attraction and tangential impulse—you would perceive among them a highly-favoured planet called the Earth, accompanied by a satellite (an attendant) in its course, called the Moon.

This earth and her satellite, like all the other planets and their satellites which you would behold in this bird's-eye view, receive both their light and their heat from the sun; the influences of light and heat being invariably distributed to all the planets in the same ratio as the power of attraction which keeps them revolving in their orbits (tracks or paths); that is, in the inverse ratio of the squares of their distances; or, to express it more clearly, the power of the attraction, the light and heat of the sun on one planet, is to that on another planet, as the square of the distance of the latter is to the square of the distance of the former.

In your elevated position you would next perceive that the planets, in their various revolutions, would at some times be nearer to the sun than at other times; and that if the orbit of each were traced by a white line in space, it would appear to your eye, if rightly placed, to have the form of an oval nearly, being in fact, what is called in mathematics, an ellipse.

In order that you may understand the nature of this curve, we shall explain it by means of a diagram. Thus, in Fig. 1, if you

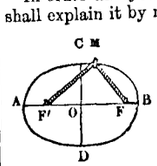


Fig. 1.

fix two pins on a board, at the points F and F′, and fasten a string F M F, of any convenient length, but greater than the distance between the two points, by its extremities, at these points; and if you take a crayon or chalk pencil, and press it on the string horizontally at M, so as to keep it always tense (*i.e.* stretched), and parallel to the board, moving the pencil round and round at the same time, from one side to the other, you will describe the curve A C B D, which is called an ellipse. It is evident that the limits of the form of this curve are the circle and the straight line. If the two points F and F′ are brought close together, the curve will be a circle; if they be separated as much as the string will allow, the curve will become a straight line. The two points F and F′ are called the *foci* (the plural of the Latin word *focus*) of the curve; the straight line A B drawn through them, and terminated both ways by the curve, is called the *major axis*; and the straight line C D drawn at right angles to this axis from its middle point O, and terminated both ways by the curve, is called its *minor axis*. If a straight line be drawn from F′ to C, it will be equal to the straight line A O, or half the major axis. The point O is called the centre of the ellipse, and the ratio of F O to A O—that is, of the distance between the centre and the focus to half the major axis—is called the *eccentricity* of the ellipse. The distance from the focus F to any point M in the curve is called the *radius vector* of the ellipse; it is least at A, and greatest at B. With these explanations, while you are supposed to be looking at the orbit of a planet from your elevated position in space, you will now be able to comprehend the fundamental principles of Astronomy,—namely, Kepler's Laws.

The eminent German astronomer just mentioned, who flourished at the close of the sixteenth century and the beginning of the seventeenth, discovered by laborious observations and calculations, the following remarkable laws, which were afterwards mathematically demonstrated by Sir Isaac Newton:—

1. That the planets all revolve in elliptic orbits, situated in

planes passing through the centre of the sun; the sun itself being placed in one of the foci of the ellipse.

2. That the radius vector, or straight line drawn from the centre of the sun to the centre of the planet, passes over equal areas in equal times in every part of the orbit; that is, whether the planet be in its *aphelion*, or farthest from the sun, in its *perihelion*, or nearest to the sun, or at its *mean distance* from the sun.

3. That the squares of the periodic times of the planets—that is, of the times of a complete revolution in their orbits—are proportional to the cubes of their mean distances from the sun; in other words, that the square of the periodic time of one planet is to the square of the periodic time of another planet, as the cube of the mean distance of the former from the sun is to the cube of the mean distance of the latter from it.

Into the full explanation of these laws we cannot enter until we treat of astronomy; in the meantime it is necessary to give some explanation of the law which we have marked *first*, though it is generally accounted the *second*, in order to clear up some points connected with phenomena relating to the earth, and the circles drawn on the globe, which is the only true representation of the earth's surface. Supposing, then, the ellipse in Fig. 1 to represent the earth's annual orbit round the sun, and the focus F′ the place of the sun's centre; then the point A will represent the position of the earth's centre at mid-winter, when it is nearest the sun, or in its *perihelion*; B will represent its position at mid-summer when it is farthest from the sun, or in its *aphelion*; C will represent its position at the spring or vernal equinox, when it is at its *mean distance* from the sun; and D its position at the harvest or autumnal equinox, when it is also at its *mean distance* from the sun.

We think we hear some of our readers exclaiming, notwithstanding the elevated position in which we have supposed them to be placed, "What! Will you tell us that the sun is the cause of light and heat on the earth's surface, and yet you assert that the earth is nearer to the sun in winter than in summer? How can this be?" Paradoxical as this may seem, it is nevertheless true; and the reason we shall now give. As you are supposed to be looking from a great distance, and to be able to discern all the motions of the planets, if you look narrowly at the earth, you will perceive that besides its *orbitual* or annual motion round the sun, it has a *revolving* or diurnal motion on its own axis. By *axis* here is meant that imaginary straight line passing through the globe of the earth, on which its rotation is supposed to take place, and which is aptly represented in artificial globes by the strong wire passing from one side to the other, at the points called the *poles* (that is, *pivots*), which are the extremities of the axis.

This revolving motion on its own axis may be likened to the spinning of a top, a motion which continues while the top is driven forward in any direction from one place to another. In fact, the analogy would be so far complete independently of the causes of the motion, if the top, while it is spinning or revolving as it were on its own axis, were made to run regularly round in an oval ring on the ground, under the lash of the whip. Thus, the earth has two motions; one on its own axis, performed once every twenty-four hours; and one in its orbit, performed once every 365 days 6 hours. We have stated these periods in round numbers, in order that they may be easily remembered; but the exact period of the earth's daily revolution on its axis is 23 hours, 56 minutes, 4 seconds, and 9 hundredth parts of a second; and the exact period of the earth's annual revolution in its orbit is 365 days, 5 hours, 48 minutes, 49 seconds.

The analogy of the motions of the top, however, to the motions of the earth, as thus described, is incomplete in respect of the position of their axes. The axis of the spinning top is in general upright or perpendicular to the ground, which may be called the plane of its orbit, that is, of the oval ring in which it is supposed to move; but the axis of the earth in its daily motion is not perpendicular to the plane of its orbit, or the ellipse in which its annual motion is performed. In speaking of the plane of the earth's orbit our analogy fails, for there is nothing to represent the ground on which the motion of the spinning top takes place. The mere attraction of the sun, coupled with the effect of an original impulse in the direction of a tangent to its orbit, is sufficient to preserve the earth in its orbitual motion in empty space. Hence the sublimity and truth of the ancient passage in the book of Job: "He stretcheth out the north over the empty place, and hangeth the earth upon nothing" (Job xxvi. 7). This passage is *singularly true* in regard to the first sentence as well as to the second, for the axis of the earth is inclined to the plane of its orbit, at an angle of 66 degrees 32 minutes, that is, rather more than two-thirds of a right angle; so that literally and truly "the north is stretched over the empty place," and not over the body of the earth itself, in either of its motions, whether axial or orbitual. This inclination is preserved during the whole of its motion in its orbit, and is the cause of the variation of the seasons; the preservation of the inclination of this axis has been not inaptly called the parallelism of the earth's axis.

Before explaining the effect of this parallelism and inclination of the earth's axis in producing the seasons, it will be proper to explain what is meant by *tangential impulse*. In Fig. 2, let A C B represent the orbit of the earth, which is nearly circular; let D represent the place of the sun, and A the place of the earth at the moment when it began its revolution in its orbit. At this moment the force of the sun's attraction would begin to act on the earth in the direction A D, and had this alone been allowed to operate, would have drawn it rapidly towards the sun in a straight line, until it had come finally in contact with the sun itself; but at the same moment an original impulse was, or is supposed to have been given to the earth in the direction A E, which is that of a tangent, or straight line touching the circle at the point A; so that the earth, which under the action of the former force would in a certain time have been found at some point in A D, and under that of the latter force would, in the same time, have been found at the point F in A E, would, by the combined action of both forces, be found near the point C in the curvilinear orbit A C B. This original impulse, the effect of which remains to this day unaltered by the action of attraction (seeing it has met with no resistance in empty space, and has been so balanced against the force of attraction as to retain the earth in its orbit), is called the *tangential impulse* or force, which was imparted to it when it began its orbitual revolution. Young, in his "Night Thoughts," alluding to this tenet of the Newtonian philosophy, asks—

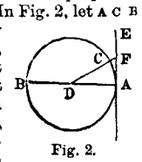


Fig. 2.

"Who rounded in his palm those spacious orbs?
Who bowled them flaming through the dark profound?"
Night IX.

Let us now consider the effect of the inclination of the earth's axis to the plane of its orbit. In Fig. 1 we have supposed the sun to be at the focus F′, while the earth is at the point A in mid-winter. Now, at this point, you would see from your supposed elevated position, that the northern half of the earth's axis is inclined to the major axis A B at an angle of 113 degrees 28 minutes, the supplement of its angle of inclination to the plane of the orbit; so that the North Pole, with the space on the earth's surface around it to a considerable extent, is prevented from receiving the rays of the sun, and consequently the heat of those rays; while the South Pole, with the space around it to the same extent, is made to receive these rays and to enjoy their heat. Hence, while it is winter in the northern or arctic regions of the earth, it is summer in the southern or antarctic regions. While the earth is still in this position, the rays of the sun fall more obliquely upon the illuminated portions of the northern hemisphere than they do upon the southern hemisphere, and thus have less power to produce heat than if they fell perpendicularly; just as a person sitting at the side of a fire-place with a good fire in it, feels less heat than a person who sits exactly in the front of it.

On the other hand, if you consider the earth from your elevated position, when it is at the point B in mid-summer, the reverse of all this takes place. The northern half of the earth's axis is inclined to the major axis (or line of *apsides*, as it is sometimes called; that is, the line of *junction* of the two opposite points A and B) at an angle of 66 degrees 32 minutes, which is its angle of inclination to the plane of its orbit; so that the North Pole, with the space on the earth's surface around it, above-mentioned, is made to receive the sun's rays, and consequently their heat; while the South Pole, with the similar space around it, is prevented from receiving those rays and enjoying their heat. Hence, while it is summer in the northern or arctic regions, it is winter in the southern or antarctic regions. While the earth remains in this position, the rays of the sun fall more directly upon the northern hemisphere than they do upon the

Résumé of Examples.

Durch diese hohle Gasse muß er kommen. (Schiller.)	Through this hollow way must he come.
Es giebt keinen schö'neren Tod, als den für's Va'terland.	There is not a nobler death than that for one's country.
Ohne die Hülfe Gottes vermö'gen wir nichts zu thun.	Without the help of God we are able to do nothing.
Gegen unser ei'genes Herz zu kämpfen ist schwer.	To combat against our own heart is difficult.

Exercise 106.

1. Durch diesen Wald ist nicht zu kommen. 2. Diese Briefe erhielt ich heute Morgen durch einen guten Bekannten. 3. Den Fluß entlang sah man die schimmernden Rüstungen der Feinde. 4. Für einen Freund muß man Alles aufzuopfern bereit sein. 5. Für dieses Betragen bestrafte der Vater den Knaben. 6. Man richtete die Kanonen gegen die Stadt. 7. Du bist in neuerer Zeit nicht mehr so offen gegen mich, als es früher der Fall war. 8. Die Feinde erschossen die Gefangenen alle ohne Ausnahme. 9. Ohne die Dazwischenkunft des Vaters hätten die Kinder ein großes Unglück anrichten können. 10. Ohne Zweifel wird mein Freund heute hier eintreffen. 11. Um die Besorgnisse der Mutter nicht noch mehr zu erhöhen, sagte er ihr nicht in allen Stücken die Wahrheit. 12. Um den Besitz Schlesiens führte Maria Theresia, Kaiserin von Östreich, sieben Jahre lang Krieg mit Friedrich II., König von Preußen. 13. Gegen diese Krankheit gibt es keine Arzenei.

Exercise 107.

1. Nothing is done but through the permission of God. 2. The power of God is known throughout the world. 3. The French revolution in the last century shook the whole of Europe. 4. Several days ago I took a walk along the Rhine from Coblenz to Lahnstein. 5. Without doubt, thou wilt ask me for my opinion. 6. This lady is dressed after the French fashion. 7. I have gained nothing by his losses. 8. They all went into the country except two. 9. The ship in which we were had wind and tide against her. 10. I have seen all the villages about Paris. 11. He undertook the work for me. 12. He walked along the shore.

SECTION LVI.—PREPOSITIONS REQUIRING THE DATIVE OR ACCUSATIVE.

The prepositions auf, hinter, über, etc. (§§ 115, 116) are construed with the dative or accusative; with the dative in answer to the question *where?* with the accusative in answer to the question *where to?* as:—Wir wohnen auf dem Lande, we reside in the country. Der Matrose klettert auf die Spitze des Mastes, the sailor climbs up to the top of the mast. Obgleich er diese Ränke hinter meinem Rücken schmiedete, so kam ich dennoch bald hinter dieselben und vereitelte sie, although he fabricated (forged) these tricks behind my back, I soon got (came) (Sect. XXVIII. 1) behind them (the same) and frustrated them. Ein Gewitter hängt über der Stadt, a thunderstorm is hanging over the town. Ueber diesen Gegenstand möchte ich gern eine Rede halten, upon this subject I would fain make (hold) a speech.

Vocabulary.

An'spannen, to harness (to).	Quelle, *f.* spring, source.	Treffen, to hit.
Arm, *m.* arm.	Rad, *n.* wheel.	Urtheilen, to judge, decide.
Hinter, behind.	Schlachtfeld, *n.* battle-field.	Verber'gen, to hide.
Jünger, *m.* disciple.	Setzen (sich), to seat (one's self).	Verschan'zen, to entrench, fortify.
Knüpfen, to unite, join closely.	Spannen. (See Anspannen).	Vorfall, *m.* event, incident.
Laute, *f.* lute.	Stellen, to place, put.	Vorzüg'lich, excellent.
Lieb, dear, beloved.	Stützen, to lean, repose.	Wohnen, to dwell.
Maschi'ne, *f.* machine.		Zermal'men, to pound, crush.
Mauer, *f.* wall.		
Neben, by, near.		

Résumé of Examples.

Nicht an den Worten, sondern an den Thaten erkennt' man den Menschen.	Not by the words, but by the deeds we recognise the man.
Zufrie'denheit und Freu'digkeit knüpfen sich an das Bewußt'sein, recht gehan'delt zu haben.	Contentment and joyousness unite themselves to the consciousness of having rightly acted.
Meine Schwester ist in der Kirche, und mein Bruder geht so eben in die Stadt.	My sister is at church, and my brother is just going to the city.
Zwei edle römische Jünglinge spannten sich, in Ermang'lung der Ochsen, selbst vor den Wagen, um ihre Mutter nach dem fernen Tempel der Dia'na zu ziehen.	Two noble Roman youths, for the want of oxen, harnessed themselves before the wagon, in order to draw their mother to the distant temple of Diana.

Exercise 108.

1. An der Quelle saß der Knabe. (Schiller.) 2. An diesen Verfall knüpfen sich viele Ereignisse. 3. Auf den Bergen ist die Luft reiner, als in den Thälern. 4. Auf die Menschen soll man sich nicht zu viel stützen. 5. Hinter jenen Mauern verschanzte sich der Feind. 6. Hinter mich stellte sich ein Freund. 7. In diesem Hause sind viele Zimmer. 8. Ein jeder Mensch soll in sein eigenes Herz sehen. 9. Neben dem Hause steht die Scheune. 10. Seine Nichte setzte sich neben mich. 11. Ueber uns erblicken wir den Himmel. 12. Ueber die Vorzüge dieses Mannes kann ich nicht urtheilen. 13. Unter allen Freunden ist mir dieser der liebste. 14. Jesus trat unter seine Jünger und sprach: „Wer Ohren hat zu hören, der höre." 15. Vor meinen Freunden habe ich keine Geheimnisse. 16. Der Kutscher spannt die Pferde vor den Wagen. 17. Der Mond kommt oft zwischen Sonne und Erde, und die Erde zwischen Sonne und Mond zu stehen. 18. Der Arm des Unglücklichen kam zwischen die zermalmenden Räder der Maschine. 19. Von einem Gegenstand kamen sie auf den andern. 20. Sie spannten die Ochsen an den Pflug.

Exercise 109.

1. He climbed up a tree. 2. Virtue dwells in thee. 3. I saw him in church. 4. The town lay behind me. 5. My friend was at my side. 6. My sister played on the pianoforte. 7. His speech lasted over two hours. 8. A counsellor is above an advocate. 9. He hides himself behind the tree. 10. He had done it in a passion. 11. Let us go into the house. 12. He wished to be introduced to the family of Mr. N. 13. He got greatly into debt in a short time. 14. They went over the ice. 15. You have spilt the water over the carpet.

KEY TO THE EXERCISES IN LESSONS IN GERMAN.

Exercise 21 (Vol. I., page 135).

1. Carpenters, joiners, tailors, and masons are mechanics. 2. Miners work in the depth of the earth. 3. The English are a quiet people. 4. Industrious mechanics earn much money in America. 5. The rich man has a good coat, and the beggar a bad one. 6. The virtuous man shuns (the) vice. 7. The fortunate (man) pities the unfortunate. 8. The unlearned (woman) envies the learned. 9. The learned is not always the useful. 10. Mr. N. is in the room. 11. Madam N. is at the theatre. 12. I go with you, Sir. 13. I wish you a good morning, Miss. 14. I was yesterday in a company of ladies. 15. Mrs. N. is very lively. 16. I do not see the lady ambassadress. 17. The minister is likewise there. 18. The wife of the councillor of the court is in mourning. 19. Good evening, Professor. 20. Where are your wife, your son, and your daughter? 21. They are at the concert. 22. From the sublime to the ridiculous is only one step. 23. The rich (man) has two houses, three men-servants, four horses, twelve oxen, and eighty sheep. 24. This huntsman has five dogs, and that (one) has eight.

Exercise 22 (Vol. I., page 135).

1. Die Deutschen sind ein fleißiges Volk. 2. Mein Vater kennt einen gelehrten Professor, aber einen unglücklichen. 3. Die Ungelehrte meinet die Gelehrte. 4. Der Sterbende hat ein Buch in seiner Hand. 5. Er verehrt das Schöne und das Erhabene. 6. Das Gold ist ein edles Metall, Silber ist es auch, aber Kupfer und Eisen sind es nicht. 7. Haben Sie den armen Heinrich und die kleine Helene gesehen? 8. Ihr Freund, der Capitain, war in dem Theater. 9. Ich sehe den Herrn Oberst dort in dem Garten. 10. Guten Morgen, Herr President. 11. Ist Ihre Frau Mutter zu Hause? 12. Guten Abend, mein Herr, wo ist Ihre Fräulein Schwester und Ihr Herr Bruder?

Exercise 23 (Vol. I., page 151).

1. I love the neighbour's child. 2. The father has sent this letter to me. 3. I shall warn the friend. 4. I have watched the whole night by the sick brother. 5. The huntsmen were hunting yesterday morning in the forest, and will hunt this afternoon in the vicinity of the village. 6. My friend loved fame and glitter. 7. He has plucked a rose, and presented it to his (lady) friend. 8. A clever mason of this city has built this beautiful house. 9. Napoleon esteemed the brave soldier, but not the esquire or the nobleman. 10. The labours of my youth have strengthened my body. 11. Conscience warns people from (the) sin.

HISTORIC SKETCHES.—XVIII.

HOW ENGLAND AND SCOTLAND BECAME ONE.—PART I.

"While an hundred Scots are left to resist, they will fight for the liberty that is dearer to them than life." Thus spoke the Scottish nation by the mouths of eight earls, thirty-one barons, and all the great officers of the Crown, assembled at Arbroath, in April, 1320, when they sent a letter to the Pope of Rome (John XXII.), in answer to his bull requiring them to yield obedience to that English king (Edward II.), whom they had driven with shame and confusion from Bannockburn. With words expressive of the same indomitable liberty have the Scottish people ever spoken, when it has been a question of their freedom, political, social, or religious; and may the day be far distant when they shall abate one iota of the high-mettled courage which enabled them thus to speak to the most powerful and most dreaded potentate at that time on the earth. Let us examine the circumstances under which the words above-mentioned were spoken, and then trace out the history of the nation which spoke them, until it became blended in the history of its southern neighbour, England.

We have only to look at the earlier ballads of England and Scotland to see how continuous and bitter was formerly the hostility which existed between the two countries. The most spirit-stirring of them are those in which the feats of arms of favourite heroes on both sides are commemorated—with how much exaggeration on the one hand, and unfriendly depreciation on the other, it is not necessary to say. When international rancour, unmeaning as it was violent, ran high, and was handed down from father to son as a sacred flame which was never to be allowed to go out; when feuds were family property, and were cherished with as much tenderness as the family honour, it is only to be expected that some signs of them should find their way into the popular songs and ballads. And in effect the popular songs and ballads are full of such signs, of stories how this chief "drove a prey" into Northumberland, and of how "the stout Earl of Northumberland" returned the compliment by harrying the border with as many rough-riders as could be induced to bear the loose discipline of the northern wars. Who has not heard or read of Chevy Chase, of Otterburn, of Adam Bell and Clym of the Clough, of William of Cloudesley, and many more whose names are enshrined in the deathless ballads of their respective countries? These are all signs of the bygone times, of days which are happily past for ever; days of great trial and tribulation, but days also in which was nursed with steady care that spirit of bold courage and of fearless outspokenness which breathed in the words at the head of this article.

The two people contiguous, yet essentially distinct, it must needs have been that in barbarous times their essential distinctiveness should be shown barbarously. Springing from different races, or at least from different branches of the same race, with scarcely anything in common except their form of government and their religion—and even here there was not perfect uniformity—there must have been frequent occasions on which the national feelings of hostility found vent. The histories of England and Scotland for many years are taken up with little else than detailed accounts of those scenes in which the heroes commemorated in the ballads took part. The border land, indicated by the Cheviot Hills, and extending from Berwick-on-Tweed on the one side, to the Solway Frith on the other, was a theatre of never-ending war. The Scotch Earl Douglas was guardian of the border on the Scottish side, and the Percys, Earls of Northumberland, were wardens of the Marches on the English side; and these noblemen, without waiting for any ceremonious declaration of war, were wont, whenever they felt disposed to the exercise, to try conclusions for the honour of their country, themselves, their lady-love, or anything or anybody else, to open unexpectedly a little war on their own account. Thus does Shakespeare make Prince Henry (afterwards Henry V.) speak of Percy, "The Hotspur of the north; he that kills me some six or seven dozen of Scots at a breakfast, washes his hands, and says to his wife, 'Fie upon this quiet life! I want work.' 'O my sweet Harry,' says she, 'how many hast thou killed to-day?' 'Give my roan horse a drench,' says he, and answers 'Some fourteen,' an hour after; 'a trifle, a trifle.'" Lesser chiefs, living in strongholds, some of which remain to this day, followed suit: and, moved by less noble instincts—by hunger, by greed, by bloodthirstiness pure and simple—inflicted enormous injury in their expeditions, which often extended far into the limits of either country. The damage done by these freebooters was not confined to the death and destruction which ever marked their advance or retreat; it was impossible that any sense of security, or that any of those national blessings which are attendant upon it, could have place while such things were done; and each new raid only furnished material for new disturbances by arousing in the minds of the spoiled a spirit of revenge and a sort of lust for retaliation, which were the fruitful source of bitter troubles to be. There was always war upon the border, which was a nursery for soldiers, and where the discipline among those who were nominally in the king's service must have been pretty severe. At least it must have been so in the time of Henry VIII., if we may judge from the order which was sent from the Privy Council to the general commanding in the north, when the Council wanted to punish Alderman Reed, citizen of London, for refusing to subscribe to a forced loan. The alderman was sent down to Sir Ralph Ewer, Henry's general, with a letter in which Sir Ralph was directed, in order to punish the man for resisting an illegal tax, to subject him to "the strong discipline militar of the northern war."

Though war was constantly going on at the border, it was, unfortunately, not confined to it. Whenever the Plantagenet kings of England had time; whenever they had no other big foe on hand—no Frenchmen, Flemings, or Spaniards to fight; whenever they had an exchequer that would bear the cost; whenever they wanted to divert into a foreign channel activity and energy that would have been troublesome to them at home, they picked a quarrel with the King of Scotland, and invaded his kingdom. Pretexts were never wanting, whether they arose out of incidents connected with the border warfare, or whether they had an origin more general and national; and the war, when undertaken, was always of the bloodiest and most ruinous kind, both to assailant and defender. One pretext there was to which a semblance of right attached, after the treaty made at Falaise in Normandy, in December, 1174, between King William of Scotland and Henry II. of England, a pretext of which the kings of England always availed themselves when all other excuses failed. The Scottish kings were nominal lords of Cumberland and Northumberland, by virtue of a grant made in Anglo-Saxon times by the earl of those parts, and for the two counties the king of England required his royal neighbour to do homage and swear to be his liegeman. Whenever this demand, because made roughly by design, or because it was disputed, was not complied with, the English king declared his vassal contumacious, and led an army into his territory to reduce him to obedience. Sometimes the fortune of war inclined to one side, sometimes to the other; but the more frequent course was for the English king or his lieutenant to march a certain distance into Scotland, killing, burning, and destroying *en route*, and then the Scotch having taken to the hills, whither the enemy could not follow them, but from which they could easily annoy and harass the enemy, the English troops would return, with little to compensate them for having gone so far into a poor and unsubduable country. Sometimes the Scotch king procured that the English should retreat by conceding the point which by right he should never have questioned—the English king's right to homage for the English honours held by the Scottish king. But this pretext for invasion was unhappily much strengthened by the disgraceful treaty of Falaise, already mentioned.

Up to December, 1174, there had never been a question of homage for more than the Anglo-Scotch possessions, but in that year Henry II. of England took ample revenge for the injury William the Lion had done him by fomenting his domestic troubles, and by entering into engagements with the King of France adversely to the interests of England. William was captured in a foolhardy combat into which his courage precipitated him at Alnwick, and being brought to Northampton, was kept close prisoner till he would agree to the terms imposed by Henry. These terms included not only the render of homage for Northumberland and Cumberland, but for the whole of Scotland, over which kingdom Henry was to be acknowledged lord paramount. At York the homage was rendered, so eager was the Scotch king to be free, so eager was the Scotch nation to see him so. Soon after Henry II.'s death, Richard Cœur de Lion renounced the claim which had been wrung from William

southern hemisphere, and thus have more power to produce heat than if they fell obliquely, according to the illustration given above. Now, as we in this country are inhabitants of the northern hemisphere, and of that part which is within the *circle of illumination* all the year round, we experience the vicissitudes of the seasons just described as belonging to it, and we are consequently colder in winter than in summer, although the earth be actually nearer the sun in winter than in summer.

But we must explain more fully what we mean by the *circle of illumination*. It is plain that the rays of light falling from the sun upon the *opaque* or dark body of the earth in straight lines, can never illuminate more than one-half of its surface at a time; as may be seen by the very simple experiment of making the light of a candle fall upon a ball at a distance from it. Now, as the earth revolves on its axis once every 24 hours, it is evident that the illuminated half, and consequently the *circle of illumination* which is the boundary of that half, is perpetually changing, so that almost all parts of the globe receive light for several hours in succession, and that they are also enveloped in darkness for several hours in the same manner. If the axis of the earth, instead of being inclined at a certain angle to the plane of its orbit, which we shall hereafter call the *Ecliptic*, were at right angles to that plane, and preserved its parallelism, then the circle of illumination would continually extend from pole to pole, and all places on the earth's surface would enjoy light for 12 hours in succession, and would be enveloped in darkness for exactly the same period the whole year round.

On the other hand, if the axis of the earth were coincident with the plane, and preserved its parallelism, this would happen only twice a year; and each hemisphere would at opposite periods be in total darkness for a whole day, while the variations between these extremes would be both inconvenient and injurious. In the former case the seasons would be all the same, that is, there would be perpetual sameness of season all the year round; in the latter case, the seasons, instead of being four only, would be innumerable, that is, there would be perpetual change.

Here, then, creative wisdom shines unexpectedly forth. The inclination of the earth's axis is such as to produce the four seasons in a remarkable manner, and to permit sufficient time for the earth to bring her fruits to perfection, as well to let her lie fallow for a period that she may renew her fruitfulness.

In Fig. 1, when the earth is supposed to be at the point C, she is at her mean distance from the sun at the *vernal equinox*, which is the *first* time of the year when day and night are equal, which happens on or about the 21st of March. Now, at this point the inclination of the earth's axis to the minor axis of the ellipse is a right angle, and as the focus F′, in the case of the earth, nearly coincides with the centre O, the rays of light proceeding from the sun nearly in the straight line O C, fall upon that axis nearly perpendicularly, and illuminate the globe from pole to pole, so that the *circle of illumination* passes through the poles, and the days and nights are equal all over the globe, each consisting of 12 hours, while the earth is in this position. In the opposite position at D, the earth is again at her mean distance from the sun at the *autumnal equinox*, which is the *second* time of the year when day and night are equal, which happens on or about the 22nd of September. At this point the circumstances of the globe and the *circle of illumination* are exactly the same as we have just described. At these four points, A, C, B, and D, in the orbit of the earth, are found the middle points of the four seasons of the year, viz., at A, mid-winter; at C, mid-spring; at B, mid-summer; and at D, mid-autumn. At the point A, or mid-winter, which is on or about the 21st of December, we have the shortest day in the northern hemisphere and the longest day in the southern hemisphere; and at the point B, or mid-summer, which is on or about the 22nd of June, we have the longest day in the northern hemisphere and the shortest in the southern hemisphere.

"Thus is primeval prophecy fulfilled:
While earth continues, and the ground is tilled;
Spring time shall come, when seeds put in the soil
Shall yield in harvest full reward for toil;
Heat follow cold, and fructify the ground,
Winter and summer in alternate round;
And night and day in close succession rise,
While each is regulated by the skies.
Supreme o'er all, at first, Jehovah stood,
And, with creative voice, pronounced it good."

LESSONS IN ARITHMETIC.—XXIV.

1. From the tables given in Lessons XXI., XXII., XXIII. (Vol. I., pp. 366, 379, 394), it is evident that any *compound quantity* could be expressed in a variety of ways, according as we use one or other of the various units, or *denominations*, as they are called, which are employed. Thus the compound quantity £2 3s. 6d. could be indicated as here written, or by 522 pence, or again, by 43½ shillings, etc. The process of expressing a compound quantity given in any one denomination in another, is called *reducing* the quantity to a given denomination. The process is termed

REDUCTION.

2. Example 1.—Reduce £5 2s. 7¾d. to farthings.

Since there are 20 shillings in a pound, in 5 pounds there are 5 × 20, or 100 shillings; and therefore, in £5 2s., 100 + 2, or 102 shillings. Since there are 12 pence in a shilling, in 102 shillings there are 102 × 12, or 1224 pence; and therefore, in £5 2s. 7d., 1224 + 7, or 1231 pence. Since there are 4 farthings in a penny, in 1231 pence there are 1231 × 4, or 4924 farthings; and therefore, in £5 2s. 7¾d. there are 4924 + 3, or 4927 farthings.

The process may be thus arranged:—

£5 2s. 7¾d.
20
100 + 2 = 102s.
12
1224 + 7 = 1231d.
4
4924 + 3 = 4927 farthings.

Example 2.—In 4927 farthings how many pounds, shillings, pence, and farthings are there?

4927 divided by 4 gives a quotient 1231, and a remainder 3; hence 4927 farthings are 1231 pence and 3 farthings. 1231 divided by 12 gives a quotient 102, and a remainder 7; hence 1231 pence are 102 shillings and 7 pence. 102 divided by 20 gives a quotient of 5, and a remainder 2; hence 102 shillings are 5 pounds and 2 shillings. Therefore 4927 farthings are 1231¾ pence, which is 102s. 7¾d., which is £5 2s. 7¾d.

The operation may be thus arranged:—

4) 4927
12) 1231 ... 3f.
20) 102 ... 7d.
£5 2s. 7¾d.

In dividing by 20, note the remark (Lesson VII., Art. 7).

The same method would apply to compound quantities of any other kind.

Hence we get the following

Rule for the Reduction of Compound Quantities.

(1.) To reduce quantities in given denominations to equivalent quantities of *lower* denominations.

Multiply the quantity of the highest denomination by that number which it takes of the next lower denomination to make one of the higher; and to the product add the number of quantities of that lower denomination, if there are any. Proceed in like manner with the quantity thus obtained, and those of each successive denomination, until the required denomination is arrived at.

(2.) To reduce quantities of given denominations to equivalent quantities of *higher* denominations.

Divide the number of quantities of the given denomination by that number which it takes of quantities of this denomination to make one of the next higher. Proceed in the same manner with this and each successive denomination, until the required denomination is arrived at. The last quotient, with the several remainders, will be the answer required.

Obs.—It is manifest that the correctness of an operation performed in accordance with either of the foregoing rules may be tested by reversing the operation—that is, by reducing the result to the original denomination.

Example 3.—Reduce 52 tons 3 cwt. 1 qr. 25 lbs. to pounds.

52 tons
20
1040 + 3 = 1043 cwt.
4
4172 + 1 = 4173 qrs.
28
33384
8346
116844 + 25 = 116869 pounds.

Proof of Correctness.

28) 116869 (4173 qrs.
112
48
28
206
196
109
84
25 pounds.

4) 4173
20) 1043 ... 1 qr.
52 tons 3 cwt. 1 qr. 25 lbs.

Hence the process has been correctly performed.

Exercise 42.

1. *Work* the following examples in Reduction, bringing each quantity, whether simple or compound, to the denomination or denominations required.

1. £7 10s. 6d. to pence.
2. £71 13s. 6¾d. to farthings.
3. £90 7s. 8d. to farthings.
4. £295 18s. 3¾d. to farthings.
5. 95 guineas 17s. 9¾d. to farthings.
6. 24651 farthings to pounds, shillings, etc.
7. 415739 farthings to pounds, shillings, etc.
8. 67256 farthings to guineas, etc.
9. £36 4s. to sixpences and to groats.
10. £75 12s. 6d. to threepences.
11. 29 lbs. 7 oz. 3 dwts. to grains.
12. 37 lbs. 6 oz. to pennyweights.
13. 175 lbs. 4 oz. 5 dwts. 7 grs. to grains.
14. 12256 grs. to pennyweights, ounces, etc.
15. 42672 dwts. to ounces and pounds.
16. 15 cwt. 3 qrs. 21 lbs. to pounds.
17. 17 tons 12 cwt. 2 qrs. to ounces.
18. 52 tons 3 cwt. 1 qr. 25 lbs. to pounds.
19. 140 tons 17 cwt. 3 qrs. 27 lbs. to drams.
20. 16256 oz. to hundredweights, etc.
21. 267235 lbs. to stones, quarters, hundredweights, etc.
22. 563728 drams to tons, pounds, etc.
23. 95 lbs. (apothecaries' weight) to drams.
24. 130 lbs. 7 oz. to scruples and to grains.
25. 6237 drams (apothecaries' weight) to pounds, etc.
26. 25463 scruples to ounces, pounds, etc.
27. 27 miles to yards, to feet, and to inches.
28. 45 leagues to feet and inches.
29. 3,000 miles to perches and to yards.
30. 290375 feet to furlongs and miles.
31. 1875343 inches to miles, and also to leagues.
32. 15 m. 5 fur. 31 r. to rods and to yards.
33. 1081080 inches to yards, furlongs, and miles.
34. The earth's circumference (25,000 miles) to feet.
35. 160 yards to nails and quarters.
36. 1,000 English ells to quarters and yards.
37. 102345 nails to yards, etc.
38. 223267 nails to French ells.
39. 634 yds. 3 qrs. to nails and to inches.
40. 12256 pints to barrels of 30 gallons.
41. 475262 quarterns to gallons.
42. 50 tuns of 250 gallons each to pints.
43. 45 pipes of 120 gallons each to pints.
44. 25264 pints to barrels of 30 gallons each.
45. 136256 quarts to hogsheads of 63 gallons each.
46. 45 hogsheads 10 gallons to pints.
47. 15 bushels 1 peck to quarts.
48. 763 bushels 3 pecks to quarts.
49. 56 quarters 5 bushels to pints.
50. 45672 quarts to bushels, etc.
51. 260200 pints to quarts, pecks, etc.
52. 25 days 6 hours to minutes, and also to seconds.
53. 365 days 6 hours to seconds.
54. 847125 minutes to weeks, etc., and to days, etc.
55. 5623480 seconds to days, etc.
56. A solar year to seconds.
57. 30 Julian years to seconds.
58. The time from 9 o'clock a.m. Jan. 2, to 11 p.m. March 1, 1868, to seconds.
59. 110 days 20 minutes to seconds.
60. 27½ degrees to seconds.
61. 7654314 seconds to degrees, etc.
62. 1,000,000,000 minutes to right angles, degrees, etc.
63. 1728 sq. rods 23 sq. yds. 5 sq. ft. to square feet.
64. 100 acres 37 sq. rods to square feet and to square inches.
65. 832590 sq. rods to square inches.
66. 25363896 sq. feet to acres, etc.
67. 150 cubic feet to cubic inches.
68. 97 cubic yards 15 cubic feet to cubic inches.
69. 49 cubic yds. 23 cubic ft. to cubic inches.
70. 84673 cubic inches to cubic feet.
71. 39216 cubic feet to cubic yards.
72. 65 loads of rough timber to cubic inches.
73. 4532100 cubic inches to tons of hewn timber.
74. 700 lbs. of silver to pounds, etc., avoirdupois.
75. 840 lbs. 6 oz. 10 dwts. to pounds, etc., avoirdupois.
76. 1000 lbs. Troy to pounds, etc., avoirdupois.
77. 1500 lbs. Troy to pounds, etc., avoirdupois.
78. 48 lbs. avoirdupois to pounds, etc., Troy.
79. 100 lbs. 10 oz. avoirdupois to pounds, etc., Troy.
80. 5656 carats to pounds, etc., avoirdupois.
81. How many sq. yds. in a room 4 yards long and 3 wide?
82. How many sq. ft. in a floor 20 feet long by 18 feet wide?
83. How many acres in a field 50 rods long by 45 wide?
84. How many sq. yds. in a ceiling 35 feet long by 28 wide?
85. How many acres in a field 420 rods long and 170 wide?
86. Find the area of a field 80 rods square.
87. How many yards of carpeting, yard wide, will cover a room 18 feet square?
88. How many yards of painting will cover the four walls of a room 18 feet long, 15 feet wide, and 9 feet high?
89. Find the area of a pitched roof whose rafters are 20 feet and ridge-pole 25 feet long.
90. How many cubic feet in a box 5 feet long, 4 wide, and 3 deep?
91. How many cubic inches in a block 65 inches long, 42 wide, and 36 thick?
92. In 10752 cubic feet how many imperial bushels?
93. In 1155 cubic feet 33 inches how many imperial gallons?
94. How many bushels in a bin 5 feet long, 5 wide, and 4 deep?
95. How many cubic feet in a 100 bushel bin?
96. How many yards of carpeting ¾ yard wide will cover a room 25 feet long and 18 feet wide?
97. How many cubic inches in a *mass of earth 40 yards long*, 5 yards wide, and 3 yards deep?
98. Reduce 93756 cubic yards to inches.
99. How many pieces of paper 12 yards long, and 2 feet 3 inches wide, will it take to cover a room 20 feet long, 16 feet wide, and 13 feet high, allowing for 3 doorways, each measuring 8 feet by 3 feet 9 inches?
100. The moon is about 240,000 miles from the earth: if it were possible to go there in a balloon, how many days would it take to accomplish the journey, moving at the rate of 12½ miles per hour?

LESSONS IN DRAWING.—XIV.

Winter, as we have said before, is the best time for studying the ramifications of trees; close observation at that period of the year is very necessary, and much profitable information may be gained. A country walk, if only to the extent of a mile, will afford abundant material for observation; the mind may then be exercised in comparing one tree with another, for by comparison only will their characteristic differences be made apparent, and facts will be revealed which the mind can store up for future use. To employ the pencil only in noting down the forms and growth of trees would be of little service, unless the mind is doing more than the pencil can perform. There are innumerable peculiarities and points of difference which distinguish trees, and enable us to recognise them independently of their foliage, and close observation will make that easy which at first sight might seem to be difficult; for although we advise the pupil to make good use of his pencil whenever he is engaged in studying trees divested of their leaves, yet we must at the same time remind him that it will be more to his advantage to reflect without drawing than to draw without reflecting.

From the observations we have made, it will be understood that we fully intend the pupil should take Nature for his guide, yet we can assist him in this part of his study by introducing some examples, which he must copy as well as compare. Copying will not only be a practical benefit, but also a means for establishing in his own mind the facts and principles we have endeavoured to make clear to him. Let him compare the outline of the oak (*Fig. 98*) in the last lesson with the lime (*Fig. 100*). His attention must also be given to the bark, which in some trees—

in captivity, and the kings of Scotland were remitted, so far as that kingdom was concerned, to the same position they had held before the treaty of Falaise.

But the right to homage survived, in the estimation at least of ambitious and interested men, the renunciation of it, and Edward I. availed himself of the first opportunity to re-assert his right in the most absolute and positive way.

It was at this juncture that the most popular heroes in Scottish history came upon the stage, and it was at this period that the Scottish nation began to show forth that spirit of enthusiastic patriotism which has been their chief characteristic ever since. The alliances which the Scots made with France, and from time to time with other occasional enemies of England, were only short-lived, and were entered into by those enemies quite as much in their own particular interests as out of a desire to do a service to Scotland. Indeed, though the first thing a Continental prince did, when about to declare war on England, was to secure the help of the Scots, so as to make a diversion of the English forces in his favour, the same prince was ever unwilling to help the Scots when their interests alone were concerned. Foreign alliances were therefore of little use to Scotland, and alone it was felt she was no match for her powerful southern neighbour—no match, that is to say, as France was a match—either in wealth, population, or resources. But when the element of desperation was added to the contest, when the Scots had the alternative of subjection or freedom, it was felt by the Scots at least, whatever other men thought, that they were fully equal to the warlike game, for they were ready to fight to the death, every man of them, rather than lose the "liberty that was dearer to them than life."

Such were the men, such was the spirit which Edward I. proposed to himself to conquer. That great warrior and statesman looked with an evil eye upon the existence of an independent kingdom so close to his own. He saw in it a refuge for all the insurgent spirits, and there were plenty of them, among his own subjects, and saw in it also an excellent assailing point for any of his enemies who chose to make an alliance with the Scots. He could not bear to be at the mercy of the Scots for the safety of his northern boundaries, and he believed, probably, that the demoralising and injurious border warfare could be stopped only by abolishing the difference of jurisdiction which was the cause of the warfare. Add to this the desire for conquest and possession which seems to be natural to all princes of any worth, and we have a fair notion of the motives which induced King Edward to set about the conquest of the kingdom of Scotland.

The foundation, flimsy though it was, upon which he rested his claim, has been already pointed out. Let us see the occasion of which he availed himself to put his claim forward.

When Alexander III. died in 1284, Margaret, his granddaughter, known in history as the Maid of Norway, was sole and undoubted heir to the Scottish throne. She was a child at the time, and Edward I. conceived the idea of marrying her to his own son Edward, and so to join the two kingdoms. Arrangements were made for that purpose by consent of the barons of Scotland, safeguards being insisted on, however, for the due preservation of the distinct privileges and immunities of the Scotch nation. At Bingham, in July, 1290, the conditions of the marriage and of the international union were agreed upon. There seemed to be opening a fair prospect of concord and prosperity for the whole island, when the Maid of Norway unexpectedly died, and the union of the nations was postponed for nearly three centuries and a quarter.

With Margaret's death, the line of Alexander III., on which the Scottish crown had been settled, became extinct, and the crown was to be won by him who could show the closest connection with the Scotch royal family.

Many competitors, as might be supposed, appeared to contest so great a prize as the crown of Scotland; but the question really lay between two, John Baliol and Robert Bruce, noblemen of Norman extraction. The ground on which they founded their respective claims to the Scottish throne was as follows: William the Lion died, leaving a brother David, who was created Earl of Huntingdon on his marriage with King Edward's sister. This earl had three daughters: the first, Margaret, who married Alan, Lord of Galloway; the second, Isabella, who married Robert Bruce, of Annandale; the third, Adama, who married Lord Hastings. At the time of the death of Alexander III., John Baliol, the grandson of Margaret, Lady Galloway, claimed the crown, as nearest descendant of the elder branch; and Robert Bruce claimed it by what he asserted to be a better title, in that he was the son of Isabella, the second daughter of David, and was thus one generation nearer to the original stock. Lord Hastings claimed, somewhat absurdly, a third of the kingdom, on the assumption that it must be divided equally between the three branches, as private property might have been. The last claim was never seriously entertained by any one; but though modern law and custom would have found no difficulty in deciding in favour of John Baliol, the question between him and Bruce was, in the then state of law, by no means an easy one to answer. Both claimants determined to support their pretensions by force of arms, and were gathering their friends for that purpose, when they were persuaded to refer their dispute to the arbitration of the King of England.

Now Edward saw his opportunity, and resolved to seize it. He claimed a right to decide the matter by virtue of his being lord paramount of Scotland, a dignity the value of which has already been given. He ransacked the abbeys and other depositories of records for proof of his right, and though he found little encouragement by so doing, he none the less boldly advanced his pretensions. In answer to the reference made to him as referee, he directed the claimants to meet him at Norham, whither he marched with a large force, which was meant to overawe the Scotch Parliament or Council, assembled at the same place.

In May, 1291, the meeting took place accordingly at Norham, the Scots being drawn up in a green plain opposite the castle, in pursuance of the demand they made to be allowed to deliberate in their own country; the English king and his followers being stationed on the English side of the Tweed. To the Scotch camp went the English Lord-Chancellor Burnel, and asked in his master's name "whether they would say anything that could or ought to exclude the King of England from the right and exercise of the superiority and direct dominion over the kingdom of Scotland, which belonged to him, and that they would there and then exhibit it if they believed it was expedient for them;—protesting that he would favourably hear them, allow what was just, or report what was said to the king and his council, that what justice required might be done." No dissentient voice having been raised, a notary who was present formally registered the right of the King of England to decide the controversy as to the Scottish crown; and then the chancellor inquired of all the competitors, beginning with Robert Bruce, "whether, in demanding his right, he would answer and receive justice from the King of England as superior and direct lord over the kingdom of Scotland." Bruce answered, "that he did acknowledge the King of England as superior and direct lord of the kingdom of Scotland, and that he would before him, as such, demand, answer, and receive justice." In like words the other claimants answered the chancellor's question, and signed and sealed a solemn instrument to the same effect. Commissioners were then appointed to represent the competitors, and sittings were held forthwith at Berwick, where the whole matter was solemnly gone into.

Judgment was given in favour of John Baliol, who was ready to acknowledge himself the vassal of the English king; but the Scottish lords of parliament, who attended the conference, expressly declined to do this, saying that they would not answer such a question until they had a king, at the same time reminding the English that the claim once recognised under duress had been expressly and solemnly renounced, and that on several occasions their kings had refused to lend the help which as feudatories of English honours they really owed, unless their independence so far as Scotland was concerned was formally and distinctly recognised. Eventually, however, their unwillingness was overcome; they swore fealty to Edward as lord paramount, and acquiesced in the surrender of the principal Scotch fortresses into his hands. English domination was complete, and to show that it was so, King John was six times summoned to the English Parliament as one of the vassal peers.

Even Baliol, indolent and wanting in self-reliance as he was, rebelled at this, and the Scotch people, chafing under the idea of being in bondage, resolved to back him on the first opportunity that he should attempt to throw off the English yoke. This opportunity presented itself in 1294, when war broke out between

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France and England. That war had raged for some time with varying success, when in 1296 Edward called on John to help him against France, and to surrender certain strongholds as security for his doing so. John refused both demands, and Edward immediately marched with a strong army to the north, glad of the pretext he had long sought of bringing Scotland under his own personal sway by conquest. At Berwick and Dunbar the Scots were beaten with dreadful slaughter, after which Stirling, Edinburgh, Roxburgh, and all the southern part of the kingdom, fell into Edward's hands. Bruce and his son, with many more of the Scotch nobles, were in the English camp, the unhappy country was divided against itself, and it fell with a great fall. Everywhere submission was made to the conqueror, the hare-hearted Baliol resigned his crown to Edward, who returned to the south undisputed lord of the whole of Great Britain. Baliol was imprisoned and afterwards died in banishment, and Earl Warenne was appointed viceroy or lieutenant of Scotland.

For eighteen months things went on drearily in Scotland; the people lacked leaders; those who should have led them were afraid, incapable, or actually on the enemy's side; the iron heel of English dominion pressed heavily on the land, and entered into its soul. But there was a secret determination to make use of the first opportunity for throwing off the oppressor's yoke. Men bided their time, nursing up their wrath against the day of slaughter, waiting as patiently as they might for their natural leaders to come to their aid. At the end of eighteen months the opportunity came. King Edward was absent with his army in Flanders, and Earl Warenne was obliged by ill-health to leave Scotland. The strong men were away, and the tyrannical conduct of the under rulers, especially that of Cressingham and Ormesby, served to irritate the Scots into taking advantage of the circumstance.

In the mountains and forests there had lived ever since the English came a number of so-called outlaws—men of independent spirit, trained to rough life, and imbued with the freedom of the air they breathed—men who never would acknowledge the English rule. Chief of them was William Wallace, a man of whom probably his friends have said too much, as his enemies undoubtedly have said more than enough; a rough soldier, in whose breast the unrefined spirit of liberty had a home, and who acted both according to his roughness and according to his love of liberty. This man put himself at the head of the malcontents, and issuing from his cover, raised the standard of revolt against the foreign king. Hundreds and thousands flocked to the rallying post, and in a few days after he had declared himself Wallace was at the head of an army respectable for its numbers, and for the thoroughly good stuff of which it was composed.

RECREATIVE NATURAL HISTORY.

THE OSTRICH.

THE ostrich feather which adorns a lady's hat is a thing of beauty, and, moreover, of interest, for the mind naturally turns to the bird from which it was plucked, and inquires, What is it like? where does it live? and what are its habits?

On the arid wilds of South Africa the ostrich is often seen in companies of thirty or forty, herding in a friendly manner with zebras and quaggas, when, if in the least alarmed, they take to flight with a speed which surpasses that of the fleetest horse. Their legs are big and strong, and specially adapted for fast running, whereas their wings, from long disuse, are not strong enough to waft their enormous bodies into the air, and are only used to get a good start when the bird begins to run. The question has been asked, Why has not the ostrich acquired the power of flight like most other birds? A very little consideration, however, shows that the ostrich is better as it is. Any animal which expends a great amount of force must eat a great amount of food. To take a common example: A navvy, who has great weights to lift and large loads of earth to wheel about, is obliged to eat more food than the clerk, who never wields anything heavier than a pen. The food which one eats plays an analogous part to the fuel which one burns under a boiler to generate steam. The more fuel one burns, the more force is generated; and the more food an animal eats—supposing it all to be digested—the more power it has. Now an enormous supply of food would be necessary to give to the ostrich sufficient power to move its huge body through the air, and as in the wild desert regions where it lives nourishment is very scarce, it would appear, after all, that its flightless condition is the best for it. After thinking over these matters, one might predict that the framework, or skeleton, of the ostrich would be unlike that of birds which readily fly through the air, and this is seen strikingly in a comparison of their breast-bones. From the broad breast-bone of a flying bird there is a portion which stands out like the keel of a boat, and it is named by anatomists the *carina*, or keel. It is to this keel that the strong muscles which move the wings are mainly fixed. But in the ostrich, where the wing-muscles are not much used, and never for lifting the bird through the air, the keel is not wanted, and it is absent. The breast-bone of an ostrich, therefore, is more like the rounded top of a skull than the bottom of a boat, and this may have arisen from the ages of disuse to which the wings have been condemned. Birds which, like the ostrich, use their legs to run instead of their wings to fly, and which are similar in other respects, have been grouped together by naturalists to form the order of *Cursores*, which is the Latin for *runners*. The order has also had other names given to it, expressive of other peculiarities. This order, or tribe, includes several families, but of these we shall speak presently.

The ostrich is perhaps of more interest to us as being a victim of fashion, having for years been hunted down nearly to extermination for the sake of its feathers, just as the seal, beaver, and other animals are being chased off the face of the earth for their coats. A hunt of this sort is no child's play. Being exceedingly wary, the ostrich will not, in its wild state, permit of the approach of any human being; and, when once started, it would be useless to try and run it down, except by the stratagem of chasing it backwards and forwards on a plain with fresh horses at either end, while, when brought to bay, it is truly dangerous, having been known to split the skull of a dog with its powerful two-clawed foot, and break the thigh-bone of a man. The feathers, however, are very valuable, and in times of scarcity at the Cape, when competition has been keen, the best feathers have been sold as high as £27 10s. to £30 10s. per lb. It will therefore be well understood that the dangers we have spoken of, and others also, have been willingly incurred in supplying the trade. In 1862 more than £76,000 worth of feathers were imported into the United Kingdom alone. Since then it would appear that enormous profits have been made by the commencement of a system of ostrich farming. The birds have been kept out grazing like sheep, and every six months have been shorn of their feathers. From statements made by South African farmers, the half-yearly plucking of male ostriches would appear to yield feathers of the value of from £10 to £12 for each bird. Birds which have been brought up on a farm of this kind are so very tame that they will even allow one with whom they are familiar to go and examine their feathers.

Respecting the habits of the ostrich in the wild state, there is among travellers much diversity of opinion, which naturally arises from the great difficulty of observing the ways of a bird so averse to being approached. Many of them are agreed, however, on this point—that it is a prudent and wary bird, showing little of that stupidity which has been ascribed to it. Where hunted for its plumage, it takes every precaution to hide its nest, nor ever fails to abandon it if there be any evidences of intrusion. Several hens will lay their eggs in one nest, the nest being simply a shallow cavity scraped out of the ground, and bordered by the removed earth or sand. The eggs, each of which is said to be equal in its contents to twenty-four of the domestic hen, are arranged in the nest side by side, and on end, the instinct of the bird having evidently pointed this out as the best disposition of them for successful hatching. The eggs are cream-coloured. The male ostrich is said to undertake the whole duty of incubation. For a long time the females were supposed to take part in the sitting, but this idea may have arisen from the hens proceeding to the nest to lay their eggs. The male is somewhat larger than the female, and has finer plumes, with more strongly contrasted colours.

The ostrich is so easily satisfied with regard to water that he is constantly found in the most arid parts of South Africa, in regions deserted alike by antelope and beast of prey. Nor is he difficult to suit so far as food is concerned, feeding for the most

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the oak and willow, for example—is hard and rough, while in the beech and birch it is smooth. The straight parts of the branches of some trees are short, from their slow growth, while others that increase more rapidly shoot forth their stems in one direction to a greater extent. The smaller twigs and shoots of some, like the birch, are very slender, numerous, and drooping; the horse-chestnut has fewer shoots, but they are thicker, and grow upwards. Much more might be added to our consideration of this important subject, but we think enough has been said to point out the way, trusting our pupils will perfectly comprehend our intention by these remarks, and be prepared to accompany us in the consideration of foliage.

In our last lesson we mentioned that, in drawing foliage, the mode of treatment must in a very great measure be influenced by the *light and shade*. We propose now to proceed with this interesting part of our subject, and show what is meant by the term "*massing in the foliage*." There are some who think that it is necessary to have for each kind of tree some distinct and especial *touch*, classifying them as "the oak touch," "the elm touch," "the beech touch," and numerous others, regardless of the fact that as the sun casts its light upon a tree it brings out the *shape and individual character* of its branches so definitely that even at a considerable distance, when it would be impossible to recognise the leaves, we can pronounce the tree to be an oak, or elm, or whatever else it may be, simply from the manner in which, as an artist would say, "the sun lights it up." The most important consideration in drawing a tree is to devote much attention to the light, and the parts that are made out in light. There are two reasons why the lights are considered to have such special importance (this principle belongs not to trees only, but to every other object that claims the attention of the painter): the first is, because the details are more recognisable in the light than in the shade, and require particular care to represent them faithfully, for without the details in light there would be very little to show for our pains, as the shadows to a great extent absorb or obscure not only the colour but also the form; the other reason is, that the eye naturally rests upon the lights and all the brighter parts *first*—afterwards, when we make a further and closer examination, we see the parts in shadow. Nor must we enter into laborious and painful detail, as in the practice of mere leaf-painting. As we have said before, we do not look at leaves *singly*, but at foliage *collectively; therefore* those branches of a tree, let its kind be what it may, which are in the light, will have their own especial forms in mass to characterise them, and it is those forms in masses which we must copy. But lest our pupil should suppose from these remarks upon generalising foliage that we intend him to stop here, and to represent nothing more than the breadth of light and shade, we must remind him of what has been said above respecting the details in light; we must remember also that, however broadly and definitely the light may fall upon a tree, since it is not a flat surface like a wall, there will be hundreds of minor shadows and semi-tones scattered all over the extent of light, and there is as much individuality amongst these as in the whole mass, and their characteristics in detail are not less striking and significant because they are small: in short, they are reduced repetitions of the general masses of light, and must be treated with the same feeling if we wish to make a faithful representation.

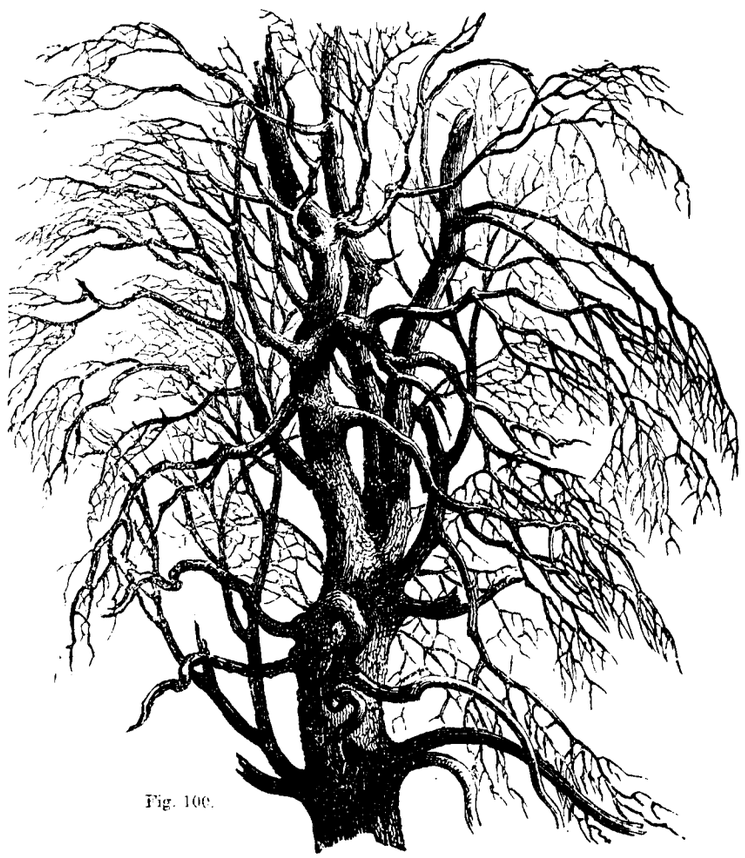


Fig. 100.

Here again is the point of difference between a first-rate and an inferior artist, mentioned in a former lesson — namely, the ability he possesses to represent the minor shades and semi-tones, both in regard to their number and expression, and his capability for doing this will determine his rank as an artist. Sir Joshua Reynolds mentions a landscape painter who was remarkable for his patience in what he considered "high finish," and thought that the greatest excellence to be attained consisted in the representation of every leaf on a tree. "This picture," says Sir Joshua, "I never saw; but I am very sure that an artist who regards only the general character of the species, the order of the branches, and the masses of the foliage, will in a few minutes produce a more true resemblance of trees than this painter in as many months." We must dwell for a few moments upon the principles here inculcated, and explain by what means a painter obtains the enviable power of making a faithful resemblance with comparatively slight labour: it is because he adopts the excellent practice of making separate studies of details, such as branches, trunks, stems, weeds, and foregrounds—in short, everything that may be deemed worthy of note. It is this method of copying parts of objects with close accuracy that gives him the power of representing them generally and yet faithfully, with the natural effect which they bear to one another as a whole. An eminent English landscape painter, whose manner was as remarkable for its freedom of execution as it was for the truthfulness of its results, once remarked to us:—"The secret of my success is in having bestowed much time upon the close examination of the *anatomy* of trees; how their branches spring from the trunks; the forms of their leaves, and the manner in which they grow or cluster in masses from the stems." When such labour and painstaking as this is the rule, we need not wonder at a successful result.

Having said thus much upon the theoretical part of our subject, we will now turn to the practical. We advise our pupils to make a drawing of Fig. 101, *leaves of the lime tree*, with an H B pencil. He must *first* make the arrangement of the whole of the stems, and then proceed with the leaves, beginning where the two stems join, arranging every leaf in succession, without passing over any, to the end, then *faint* the arrangement, and draw carefully every particular: it will be much better at first to make an enlarged drawing, say double the size; do the same also with Fig. 102. Fig. 103, *the cluster of leaves*, will require more time and attention, which must be especially bestowed on the lights and shadows. The pupil will observe five or six leaves upon the dark mass in the centre of the branch; and here we will particularly advise him *not to begin the shading until the outline is completed*, adding, that this should be a *rule* under *all* circumstances; therefore after the outline has been carefully made, he must *tone down*, that is, draw even and close lines over the part in shade up to the outline of the leaves, and further, to make the tint even, he may cross the lines with others similar to the flat tint (Fig. 82, Lesson XII.). He must be careful to go nearly up to the edges of the leaves, as they will come out very forcibly against the dark ground; an H B pencil will make this tint sufficiently dark, as all blackness must be avoided. Here again we must introduce another caution respecting the treatment of shadows amongst foliage—namely, never make the interior shadows too dark; a moderate, clear, and yet decisive tone will be enough, because there must be in all cases, but especially with regard to trees, sufficient opportunities left for marking in more forcibly any form which may be remarked in the shadows, observing that the making out details in shadows cannot be carried to the extent of making out details in the lights. Trees, as we have previously said, are not flat like walls, but their branches and leaves project and recede indefinitely, and consequently those leaves which come out nearer to the light will require a different tone to those which are in shadow; the pupil's own observation must be his guide in this matter as to which leaves must receive the minor tones and the depth of tint to be laid upon them. In Fig. 103 the light falls upon the right side, where less shading is required, but the whole of the leaves to the left, away from the light, must be toned down, though not to the extent of the deep shadow in the middle and interior of the branch. Fig. 100 we recommend should be copied double the size, and according to our old principle of *marking in*. We were once asked by a pupil, "When shall I leave off marking in?" We replied, *never;* it is not desirable that you should ever leave off the practice, because all who do mark in find that they make progress in drawing, and that it saves time, and produces a more satisfactory result. A young mechanic whom we know, who had very much improved his power of drawing from attending a night class at a Mechanics' Institute, offered himself as a candidate for a situation as draughtsman at a manufactory where drawing was essential. Having obtained it, one of his employers, after a few days, when he had become familiar with his work, brought him three or four subjects to draw for working purposes, telling him at the same time that they would, no doubt, occupy him four days at least: at the same hour on the following day he returned the whole finished. His master was agreeably surprised, and also much pleased with the excellence of the work, and asked him how he had done it so well and so quickly. He replied:—"I am very particular in *arranging* my drawing first, and always *make marks to indicate the course of the outline;* the consequence is I have very little rubbing out and alteration, and that has enabled me to finish the drawing so quickly." Therefore, in copying Fig. 100, note every angle, and the distances between each angle, and do the same respecting the positions of the branches as they grow from the trunk, the direction and inclination of the branches, and their extent, and you cannot fail to make a satisfactory drawing.

Fig. 102.

Fig. 101.

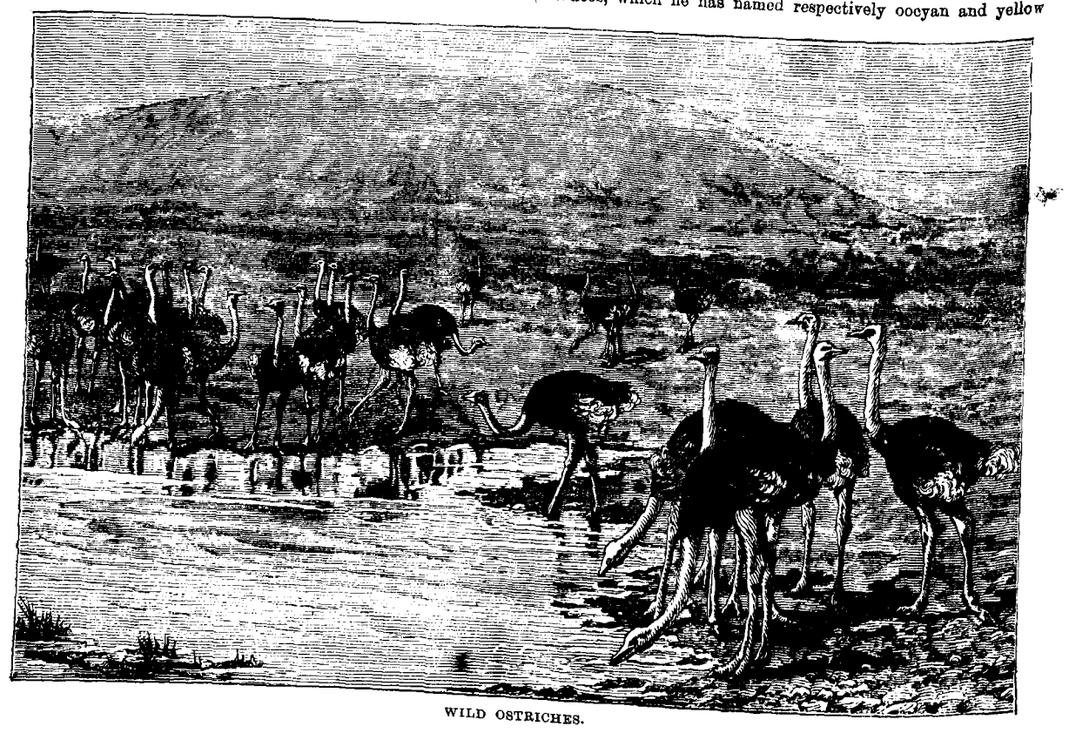


Fig. 103.

The illustrations that accompany the present lesson are representations of the stem, branches, blossom, and leaves of the *Tilia Europæa*, the European or common lime tree, which is the most valuable of the different varieties of this useful tree. It grows most extensively in the middle and northern parts of Europe, and is very common in England. Its large size, handsome appearance, and profusion of sweet flowers, make it a very general favourite throughout this country and most parts of the Continent, where it is extensively planted in parks and other places of public recreation. Its wood is well adapted for carving, being white, close-grained, and smooth. The carvings at Windsor Castle, those of Trinity College, Cambridge, and those at Chatsworth, are of limewood, as, indeed, are most of the other fine specimens of this branch of art in England. The fibres of the bark, which is tough, form the material of an extensive manufacture of cordage and matting in Russia and Sweden. Many specimens of this tree exist which are remarkable for their great age and size. At Neustadt, in Würtemberg, there is a prodigious lime tree, which adds its name to that of the town, this being called *Neustadt an der Linden* (Neustadt at the lime tree). The age of this enormous tree is said, probably with some exaggeration, to be one thousand years.

part on the tops of shrubby plants which are found in the desert regions he frequents. There is no telling what he swallows besides, in the shape of indigestible trifles which take his fancy. Quite recently an ostrich, exhibited long at Rome, was suffocated by thrusting his neck between the bars, and when its stomach was opened there were found in it four large stones, eleven smaller ones, seven nails, a necktie pin, an envelope, thirteen copper coins, fourteen beads, one French franc, two small keys, a piece of handkerchief, a silver medal of the Pope, and the cross of an Italian Order!

There are several birds allied to the ostrich; indeed, so closely allied that for a long time naturalists regarded them as all of the same family. Now, however, some of them are only looked upon as cousins. Belonging to the family of *Struthionidæ* there is the ostrich (*Struthio camelus*), the American rhea, or nandu, and the dwarf nandu; in the family of *Casuariidæ* we have the cassowary of the peninsula of Malacca, and the emu of Australia; while in the *Apterygidæ* family we place the apteryx of New Zealand. Each of these birds deserves a few words of notice.



WILD OSTRICHES.

The rhea, or American ostrich, which stands about five feet high, abounds on the plains of La Plata. Several females will lay in one shallow nest, but before they commence this partnership they carelessly drop their eggs up and down the plains, so that in one day's hunting Darwin picked up no less than twenty lost and wasted eggs. The male bird alone hatches the eggs. The rhea is a good swimmer, and readily takes to the water; it is also very swift of foot.

The dwarf nandu (*Rhea Darwinii*) is very much smaller than the species we have just referred to. It is found principally in Patagonia, and, according to Darwin, is so exceedingly wary that he and his party were unable to approach it save by the quiet and rapid descent of a river.

The male cassowary is smaller than the female, and, according to Mr. Bartlett, it undertakes the whole duty of incubation, and afterwards takes care of the young. The natives of Ceram, however, assert that the male and female sit alternately on the eggs, an assertion which may be accounted for as before, by the female visiting the nest to lay her eggs. The eggs are unlike those of the African ostrich, being of a greenish colour, and having very thin shells.

Very little appears to be known about the emu, or Australian cassowary, in the wild state, except that its food consists chiefly of fruits, roots, and herbage; that it is very fleet of foot, and that it lays eggs of a fine malachite-green colour. The English reader may be surprised to learn that the colouring matter of these eggs is essentially the same as that of the blue-green eggs of our hedge-sparrow. Yet such is the case, for Dr. H. C. Sorby has made out, by means of the spectroscope, that the colour in each results from the mixture of two substances, which he has named respectively oocyan and yellow oxanthine. And thus we get a bond of union—little looked for—between the sparrow of our English hedgerows and the emu of Australian plains!

The apteryx, which inhabits New Zealand, is distinguished by its compact body, short thick neck, the entire absence of tail, and the nearly rudimentary development of the wings. The birds are much hunted by the natives for the skins, which are made into dresses for their chiefs. Being a night bird, the hunt takes place by torchlight. When attacked, the bird displays its courage by fighting vigorously, using its powerful feet with great dexterity.

So much, then, for the living members of the order *Cursores*. Can we say anything of the ancient progenitor from whom they all descend? Nothing positive; but believers in evolution suppose that because young lions and pumas are marked with feeble stripes and rows of spots, the progenitor of the lion and puma was a striped animal. On the same grounds we may imagine that because the young ostrich is covered with coarse mottled and striped plumage, the ancient progenitor of these *Cursores* was a striped bird, and he may have been very different from his descendants of to-day in other important respects—just so much different, in fact, as the circumstances of his day were different from those of the present.

GEOMETRICAL PERSPECTIVE.—I.

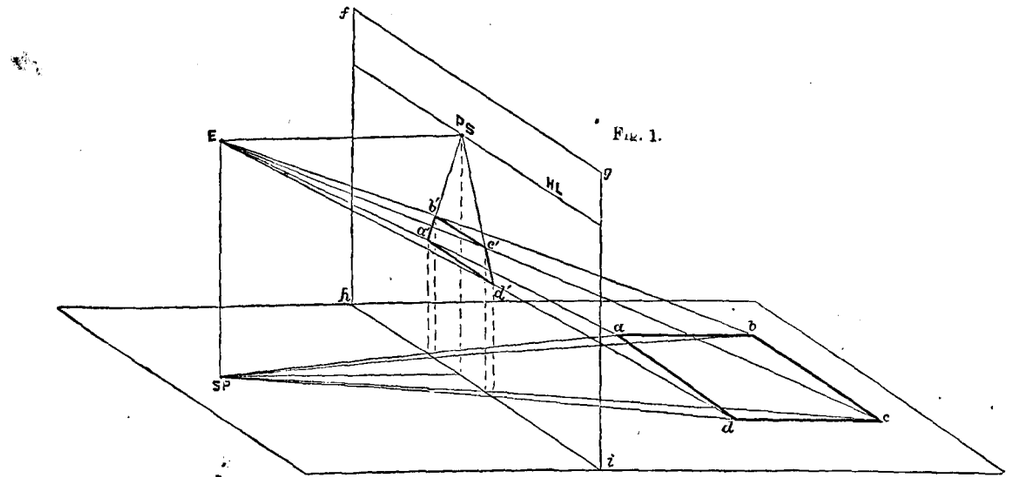
INTRODUCTION—DEFINITIONS—PROPORTIONAL SCALES.

THERE are several very important remarks to be made before we enter upon the subject of Geometrical Perspective. In the first place, we must say a few words respecting the instruments and materials required for this branch of drawing. 1. A T square; 2. A parallel ruler, or set square and flat ruler; 3. A drawing-board; 4. A sector; 5. A pair of compasses, with a movable pencil-leg, and pen; 6. A ruling-pen; 7. A protractor, for making and measuring angles; 8. A plane scale—all fully explained in Lessons in Geometry, III. and IV., pages 95 and 113, Vol. I. It will also be indispensable that the student should be well acquainted with the theory and practice of *Plane Geometry*: it is the language of the science upon which depends the practical working of all the problems that we shall have to propose in the course of these lessons. In previous parts of the POPULAR EDUCATOR will be found all that is necessary for this purpose. Trusting, therefore, that these lessons have been carefully and diligently studied, we take it for granted that it will not be necessary for us to do more than refer the pupil to any particular problem in plane geometry which may be required in connection with our subject as we proceed. It is our intention, as far as possible, to make a *practical application* of all that we shall advance, knowing the valuable assistance Geometrical Perspective affords to those who are engaged in any constructive art, as well as to draughtsmen in general. We hope, also, to create an interest in this useful science amongst those who have a loving sympathy with art for its own sake, and who take a pleasure in all scientific inquiries, especially those which claim to have a mathematical foundation. In a pictorial sense, there is no other branch of drawing more capable of satisfying the mind with regard to the appearances of nature than perspective; it is an art which enables us to draw upon a plane surface things far and near as they appear to the eye, the effect of which can be as clearly and as truthfully presented to us by the help of geometry as if the objects themselves had been traced upon a piece of glass placed between them and the eye. We will now request the pupil to make himself familiar with the following terms and definitions:—

1. *The Plan of an object.* A plan is the representation of all horizontal lengths and breadths, showing only the horizontal distances between objects, or parts of the same object; no heights or depths are expressed on plans. Thus, when a house is being *built*, before the walls are raised, and the foundations only are laid, we then recognise *the plan* of the house. A map is a plan, say of a county; we can understand by it the relative positions of the towns and villages, their distances from one another, the courses of the rivers, and the directions of the roads. If a card be laid *horizontally* on a sheet of paper, and a pencil is drawn about it close to the margin, we shall have a plan of the *whole extent* of the card. If the card is placed *perpendicularly* to the sheet of paper, the plan would be only *a line*, because perpendicular lines projected from every portion of the upright card would only produce a line. This will, perhaps, make it evident that all plans are merely the tracings of perpendicular lines from every part of the object upon a horizontal plane.

2. *The Picture Plane* is the surface of the picture upon which the object is represented. In Fig. 1 it is shown by the letters *f g i h*; in this case it is shown *in position* between the eye at E, and the object, *a b c d*. Fig. 1 will be further explained presently. When practically working out a problem, the lower line, *h i*, is the only line drawn to represent the picture plane, because this *h i* is the *plan* of the picture plane, the picture plane being always considered in a perpendicular position.

FIG. 1.



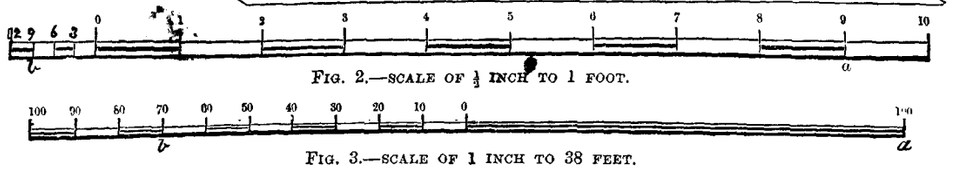


FIG. 2.—SCALE OF ½ INCH TO 1 FOOT.

FIG. 3.—SCALE OF 1 INCH TO 38 FEET.

3. *The Horizontal Line*, or *Line of Sight*, represents the height of the eye in the picture, and is marked in Fig. 1 and figures in future lessons, H L.

4. *The Point of Sight* is the point opposite the eye in the picture, and consequently upon the line of sight. It is marked P S.

5. *The Station Point*, marked S P, is the place where the spectator is supposed to stand when viewing the object represented.

6. *The Distance Point*, marked D P, represents the distance between the eye and the picture plane. Sometimes the distance point and station point represent the same thing. It will be found in the course of our lessons to vary according to circumstances; in some instances it refers to the distance of any vanishing point in the picture from the eye. All these variations will be explained in their proper places.

7. *Vanishing Point.* If a line be drawn from the eye parallel to any original straight line of the object, the point marked V P, where that line cuts the picture plane, marked P P, is the vanishing point of that original line.

8. *Visual Rays* are lines proceeding from every part of the

LESSONS IN FRENCH.—XXVII.

SECTION LVIII.—USE OF THE VERB *CHANGER* (*continued*).

Exercise 111.

Air, *m. air.*	Guinée, f. *guinea.*	Passé, e, *past, last.*
Avis, m. *mind, meaning.*	Jeune, *young.*	Pays, m. *country.*
Blanc, che, *white.*	Maître, m. *master.*	Rentr-er, 1. *to come in again.*
Combat, m. *combat.*	Manteau, m. *cloak.*	Vie, f. *life, conduct.*
Conduite, f. *conduct.*	Monnaie, f. *change.*	Visage, m. *countenance, face.*
Gris, e, *grey.*	Mouillé, e, *wet.*	
	Parce que, *because.*	

1. Cet homme n'a-t-il pas changé de vie? 2. Il a changé de conduite. 3. Cette grande maison n'a-t-elle pas changé de maître? 4. Elle a changé de maître; le capitaine G. vient de l'acheter. 5. Vous êtes mouillé, pourquoi ne changez-vous pas de manteau? 6. Parce que je n'en ai pas d'autre. 7. Votre cousine ne change-t-elle pas souvent d'avis? 8. Elle en change bien souvent. 9. Pendant le combat, ce jeune soldat n'a-t-il pas changé de visage? 10. Il n'a point changé de visage. 11. Ce malade ne devrait-il pas changer d'air? 12. Le médecin lui recommande de changer de pays. 13. Où est votre cheval gris? 14. Je ne l'ai plus, je l'ai changé contre un blanc. 15. Avec qui l'avez-vous changé? 16. Je l'ai changé avec le jeune homme qui demeurait ici le mois passé. 17. Le marchand peut-il me changer cette pièce de quarante francs? 18. Il ne saurait (*cannot*) vous la changer, il n'a pas de monnaie. 19. Avez-vous la monnaie d'une guinée (*change for a guinea*)? 20. Combien de schellings y a-t-il dans une guinée? 21. Il y en a vingt et un. 22. Votre petit garçon ne tarde-t-il pas à rentrer? 23. Il tarde beaucoup. 24. Ne vous tarde-t-il pas d'aller en Italie? 25. Il me tarde d'y aller.

Exercise 112.

1. Why do you not change your coat? 2. For a very good reason (*raison*, f.), because I have no other. 3. Has your father changed houses? 4. No, Sir, but we intend to do so (*de le faire*) to-morrow. 5. Has that child changed his conduct? 6. He has changed his conduct, he is very good now (*maintenant*). 7. Was not your brother afraid; did not his countenance change? 8. His countenance changed, but he was not afraid. 9. Have you not changed rooms (*chambre, f.*)? 10. I have not changed rooms, my room is very good. 11. Do you not long to be in France? 12. I long to be there. 13. Does not your mother tarry too long? 14. She is very long in coming? 15. Have you changed the forty franc piece? 16. I have not changed it yet? 17. Why have you not changed it? 18. Because your father has no change. 19. Have you the change for a guinea? 20. No, Sir, I have only twelve shillings. 21. How many cents are there in a dollar? 22. There are one hundred. 23. With whom have you exchanged your horse? 24. I have exchanged it with my brother. 25. I have exchanged it for a white one.

SECTION LIX.

1. We have given, in Section 9, rules for forming the plural of nouns, but have, in accordance with our plan of not presenting too many difficulties at once, deferred until the present Section the rules for the formation of the plural of compound nouns.

2. When a noun is composed of two substantives, or of a substantive and an adjective, both take the mark of the plural: **un chef-lieu, des chefs-lieux,** *a chief place, chief places;* **un chat-tigre, des chats-tigres,** *a tiger-cat, tiger-cats* [§ 10 (1) (3)].

3. When, however, two nouns are connected by a preposition, the first only takes the mark of the plural: **un chef-d'œuvre, des chefs-d'œuvre,** *a master-piece, master-pieces* [§ 10 (2)].

4. In words composed of a noun and a verb, preposition, or adverb, the noun only takes the mark of the plural: **passe-droit, passe-droits,** *injustice, injustices* [§ 10 (6)].

5. Words composed of two verbs, or of a verb, an adverb, and a preposition, are invariable: **un passe-partout, des passe-partout,** *master-key, master-keys* [§ 10 (8)].

6. We have seen [Sect. 3, R. 4] that the name of the material always follows the name of the object, and that both are united by the preposition **de.** The name of the profession or occupation also follows the noun representing the individual, and the same preposition **de** connects the two: **un maître d'armes,** *a fencing-master;* **un maître de dessin,** *a drawing-master;* **un marchand de farine,** *a dealer in flour* [§ 76 (12), § 80 (4)].

7. The name of a vehicle, boat, mill, &c., always precedes the noun describing the power by which it is impelled, or the purpose to which it is adapted; the name of an apartment, that of the use to which it is appropriated. The connecting preposition is **à**: **un moulin à vapeur,** *a steam-mill;* **un bateau à vapeur,** *a steamboat;* **un moulin à eau,** *a water-mill;* **la salle à manger,** *the dining-room* [§ 76 (13), § 80 (5)].

Miscellaneous Examples.

Lille et Arras sont les chefs-lieux des départements du Nord et du Pas-de-Calais.	*Lille and Arras are the chief places of the departments of the North and of the Pas-de-Calais.*
Les chemins de fer et les bateaux à vapeur sont très nombreux en Amérique.	*Railroads and steamboats are very numerous in America.*
Cette maison contient un salon, une salle à manger, une cuisine, et plusieurs chambres à coucher.	*That house contains a drawing-room, a dining-room, a kitchen, and several bed-rooms.*
Les moulins à vent sont plus communs en France que les moulins à eau ou à vapeur.	*Windmills are more common in France than water or steam-mills.*

Exercise 113.

Armes, f.p. *fencing.*	Dessin, m. *drawing.*	Se mun-ir, 2. *ref. to provide one's self with.*
Bât-ir, 2. *to build.*	Engag-er, 1. *to engage.*	Vapeur, f. *vapour, steam.*
Bouteille, f. *bottle.*	Faire bât-ir, 2. *to have . . . . built.*	Voile, f. *sail.*
Cabriolet, m. *gig.*	Ordinaire, *usual.*	Voiture, f. *carriage.*
Chat-huant, m. *screech-owl.*	Roue, f. *wheel.*	Voyag-er, 1. *to travel.*
Chauve-souris, f. *bat.*		

1. Faut-il un passeport pour voyager en France? 2. Il en faut un. 3. Les Anglais se munissent-ils de passeports pour voyager en Angleterre? 4. On n'a pas besoin de passeport en Angleterre. 5. Aimez-vous à voyager en chemin de fer? 6. J'aime mieux voyager en chemin de fer que sur les chemins ordinaires. 7. Avez-vous apporté vos passe-partout? 8. Je n'ai point de passe-partout, je n'ai que des clefs ordinaires. 9. Votre frère est-il venu par un bateau à vapeur? 10. Il est venu par un bateau à voiles. 11. Avez-vous une voiture à quatre chevaux? 12. Non, Monsieur, nous n'avons qu'un cabriolet à un cheval? 13. Votre frère a-t-il bâti un moulin à vapeur? 14. Il a fait bâtir deux moulins, l'un à vent et l'autre à eau. 15. Votre compagnon a-t-il engagé un maître d'armes? 16. Non, Monsieur, il a déjà un maître de dessin et un maître de danse. 17. Combien de chambres à coucher avez-vous? 18. *Nous en avons deux.* 19. Avez-vous une bouteille de vin? 20. Non, Monsieur, mais j'ai une bouteille à vin (*wine-bottle*) [§ 81]. 21. Voyez-vous les chats-huants? 22. Non, mais je vois les chauves-souris. 23. J'ai une voiture à quatre roues.

Exercise 114.

1. Is your father in England? 2. No, Sir, he is in France with my brother. 3. Have they taken passports? 4. Yes, Sir, they have taken two. 5. Is it necessary to have a passport to travel in America? 6. No, Sir, but it is necessary to have one to travel in Italy. 7. Is there a steamboat from Calais to Dover (*Douvres*)? 8. There are several. 9. Is there a railroad from Paris to Brussels (*Bruxelles*)? 10. There is one from Paris to Brussels, and one from Paris to Tours. 11. Has your brother bought a wind-mill? 12. No, Sir, but he has built a steam-mill. 13. Are there many wind-mills in America? 14. No, Sir, but there are many water and steam-mills. 15. Does your cousin learn drawing? 16. He does not learn it, he cannot find a drawing-master. 17. Is the fencing-master in the dining-room? 18. No, Sir, he is in the drawing-room. 19. Is your cousin in his bed-room? 20. No, Sir, he is out (*sorti*). 21. How many rooms are there in your house? 22. Five: a kitchen, a dining-room, a drawing-room, and two bed-rooms. 23. Are there screech-owls there? 24. Yes, Sir, and bats too. 25. Have you seen those master-pieces? 26. Yes, Sir, I have seen them. 27. Have you sent them to the chief place of the department? 28. I have sent them there. 29. Have you a two-horse *gig*? 30. I have a four-horse one. 31. Has your brother a two-wheel carriage? 32. He has a two-seat carriage (*à deux places*).

*

SECTION LX.—THE TWO FUTURES, SIMPLE AND ANTERIOR (§ 120).

1. The future of every verb in the French language ends with **ai, as, a, ons, ez, ont.**

2. This tense, in all the regular verbs, as also in the irregular verbs not mentioned in the next lesson, is formed from the present of the infinitive by adding to it the endings of the present indicative of the verb **avoir** (R. 1, *above*), without any change in the first or in the second conjugation, but after suppressing **oi** in the third, and **e** in the fourth, as will be seen below:—

3. Conjugation of the Future Simple of the Regular Verbs.

Je	chanter -ai	finir	-ai	recevr	-ai	rendr	-ai
	shall or will sing	*finish*		*receive*		*render*	
Tu	parler -as	chérir	-as	apercevr	-as	vendr	-as
	shall or wilt speak	*cherish*		*perceive*		*sell*	
Il	donner -a	fournir	-a	percevr	-a	tendr	-a
	will or shall give	*furnish*		*collect*		*tend*	
Nous	chercher -ons	punir	-ons	concevr	-ons	entendr	-ons
	shall or will seek	*punish*		*conceive*		*hear*	
Vous	porter -ez	saisir	-ez	devr	-ez	perdr	-ez
	shall or will carry	*seize*		*owe*		*lose*	
Ils	aimer -ont	unir	-ont	décevr	-ont	mordr	-ont
	shall or will love	*unite*		*deceive*		*bite*	

4. The future anterior is merely the past participle of the leading verb, conjugated with the future of one of the auxiliaries, **avoir, être**:—

J'aurai fini; je me serai flatté.	*I shall have done; I shall have flattered myself.*

5. The student, when rendering English into French, should be careful to distinguish *will*, taken as an auxiliary, from the same word employed as a leading verb. In this latter case it is always equivalent to the verb *to wish*, or *to be willing*, and should not be rendered by the future of the verb, but by the present of **vouloir**:—

Ne voulez-vous pas lui écrire?	*Will you not (are you not willing to) write to him?*

Key to Exercises in Lessons in French.

*** For the use of those who are studying our Lessons in French, we now give the first portion of a Key to the exercises contained in those lessons. We have deferred its commencement until the present *time* designedly, that we might not subject our readers to the temptation of consulting the Key until after they had written the Exercises to which it relates, and made such progress as will enable them to detect and amend any errors they may have made when beginning our course of lessons. The only way to acquire a thorough knowledge of a *living* language is to practise one's self in the use of it; and the best exercises will be of no service unless they are written without any other assistance than is supplied by general grammatical information. When, however, the self-teacher has thoroughly studied both lessons and exercises, it is useful for him to be able to turn to a key, such as we are now *going to give* him, for the purpose of comparison and the final correction of any mistakes he may *not* be able to perceive himself.

It may be objected that we have given a Key to the exercises in each Lesson in Latin in the lesson that immediately follows it. It must, however, be remembered that Latin is a highly inflected language, and one which the learner will never attempt to speak; while the grammatical construction of the French language is less complicated; and that it should be the chief object of the learner to speak French; and, for this purpose, to drill himself thoroughly in the rules of which each lesson is composed. To induce him to rely as much as possible on his own resources, we have, therefore, deferred commencing a Key to the Exercises in Lessons in French until the present time.

Exercise 1 (Vol. I., page 3).

1. Who has the bread? 2. The baker has the bread. 3. Has he the flour? 4. Yes, Sir, he has the flour. 5. Have we the meat? 6. Yes, Sir, you have the meat and the bread. 7. The miller has the flour. 8. The baker has the flour and the wheat. 9. Have we the book and the pen? 10. Yes, Miss, you have the book and the pen. 11. The butcher has the meat. 12. The miller has the meat, and I have the coffee. 13. Have you the water and the salt? 14. Yes, Sir; we have the water, the salt, and the oats. 15. Have we the tea? 16. No, Sir; the girl has the tea, the vinegar, and the salt. 17. Have I the wine? 18. No, Madam, you have only the vinegar and the meat. 19. Have you the table? 20. Yes, Madam, I have the table.

Exercise 2 (Vol. I., page 3).

1. Avez-vous le blé? 2. Oui, Monsieur, j'ai le blé. 3. Qui a la viande? 4. Le boucher a la viande et le sel. 5. A-t-il l'avoine? 6. Non, Madame, le cheval a l'avoine. 7. *Avons-nous le blé?* 8. Vous avez le blé et la farine. 9. Qui a le sel. 10. J'ai le sel et la viande. 11. Avons-nous le vinaigre, le thé, et le café? 12. Non, Monsieur, le frère a le vinaigre. 13. Qui a le *cheval*? 14. Le boulanger a le cheval. 15. Avons-nous le livre et la plume? 16. Non, Mademoiselle, la fille a la plume, et le meunier a le livre. 17. Avez-vous la table, Monsier? 18. Non, Monsieur, j'ai seulement le livre. 19. Qui a la table? 20. Nous avons la table, la plume, et le livre.

Exercise 3 (Vol. I., page 3).

1. Have you the gold watch? 2. Yes, Madam, I have the gold watch and the silk hat. 3. Sir, have you the tailor's book? 4. No, Sir, I have the physician's book. 5. Have they the baker's bread? 6. They have the baker's bread and the miller's flour. 7. Have you the *silver pencil-case*? 8. Yes, Sir, we have the silver pencil-case. 9. Have we the horse's oats? 10. You have the horse's oats and hay. 11. Who has the carpenter's cloth coat? 12. The shoemaker has the tailor's silk hat. 13. The tailor has the shoemaker's leather shoe. 14. Have you the wooden table? 15. Yes, Sir, I have the carpenter's wooden table. 16. Have they the silver knife? 17. They have the silver knife. 18. The physician's brother has the silver watch. 19. The shoemaker's sister has the silk dress. 20. Has she the leather shoe? 21. No, Madam, she has the satin shoe. 22. Have we the woollen stocking? 23. No, Sir, you have the tailor's silk stocking. 24. Who has the cotton stocking? 25. The physician has the cotton stocking. 26. The lady has the satin shoe of the baker's sister.

GREAT BOOKS.

IV.—SPENSER'S "FAERY QUEENE."

Between the death of Chaucer and the birth of Edmund Spenser, about a century and a half elapsed. The former quitted this world shortly after the accession of Henry IV.; the latter appears to have been born in the first year of the reign of Queen Mary—viz., 1553. The intervening period, though not very long, had been full of change. With the Wars of the Roses, feudalism had died, and the modern era followed with returning peace. The Reformation had confidently challenged the power of Rome; printing had been invented; America had been discovered. The English language had passed from its infancy into its young manhood, and the English race had thoroughly absorbed those foreign elements which had been introduced by the Norman Conquest. Nevertheless, the echo of ancient chivalry still lingered in the hearts of the people, and society was yet gorgeous with the pageantries of courtly life. These were the influences which shaped the mind and character of Spenser. He was an Englishman and a Protestant of the sixteenth century. The many-coloured light of mediævalism was reflected from his genius, perhaps with the richer glory of sunset; but something of the modern spirit also speaks in his clear and manly thought. Even more than Shakespeare, who belonged to all times and countries, Spenser was a representative and type of the Elizabethan age to which he belonged.

The life of this great poet was brief, considering the large amount of work he executed. He died in 1599, when he could not have been more than forty-six years old; and it is sad to reflect that his end was accelerated by grief and ruined fortunes. He had gone to Ireland as secretary to the governor, Lord Grey of Wilton, and Queen Elizabeth had given him a grant of three thousand acres of land in the county of Cork. During the rebellion of Tyrone, which broke out in 1598, Spenser's house was sacked and burnt; an infant child of the poet perished in the flames, and the miserable parents escaped to London, where, in King Street, Westminster, under the shadow of the Abbey—even then a venerable edifice—Spenser died very early in the following year. His only prose work is descriptive of the state of Ireland as he saw it—a masterly treatise, applicable in some respects to the Ireland of the present day.

*

object to the eye. Fig. 1 will assist to explain this. Let *a b c d* be a slab or board lying upon the ground, let S P be the station point where we are supposed to stand, and E the eye; *f g i h* is the plane of glass, or picture plane, through which we see the slab. Lines from each angle of the object passing through the picture plane towards the eye are termed visual rays, and where they pass through the picture plane determine upon the plane the points of the original object; these points united by straight lines produce the perspective representation required. It must be understood that these visual rays are not limited to proceed from the *angles* only; they come from *every part* at the same time; but when representing the object we use only those lines which proceed from angles and terminations of lines, and thus determine the proportion of the object in sight upon the picture plane. It will be seen when we come to work the problems that these visual rays are drawn from the various angles and characteristic points of the *plan of the object* towards the station point, S P. It will be noticed, also, that it is not necessary to draw these lines beyond the picture plane, P P, but *invariably in the direction* of the station point.

9. *The Point of Contact* is that point found by continuing in the same direction any original line of the ground plan, until it meets the picture plane; if the original line touches the picture plane, it then produces its own point of contact.

10. *Line of Contact* is a term given to that line which is drawn perpendicularly from the point of contact; it is sometimes called a *measuring line*, from its being used to point, or mark off, all heights in working a perspective drawing. Of course in this case the same scale is used as that for laying out the ground plan.

11. All retiring lines have vanishing points.

12. All horizontal retiring lines have their vanishing points upon the line of sight.

13. All *parallel* retiring lines have the *same* vanishing point.

14. All horizontal lines which are parallel with the picture plane are drawn parallel with each other and with the line of sight.

15. All horizontal retiring lines forming right angles with the picture plane have the point of sight for their vanishing point.

16. All lines inclined with the horizon and with the picture plane have their vanishing points above or below the horizontal line, or line of sight, according to the angle they form with the horizon, their vanishing points being always on a line perpendicular to the vanishing point upon the line of sight to which they would have retired had they been horizontal. Observe, all heights are set off on the lines of contact; all horizontal lengths and breadths are arranged on the ground plan.

As it is our intention to apply these lessons practically—that is, to make the drawings according to some given scale—it will be necessary to step aside a little from our course, and explain what is meant by a scale, and the method of constructing it, so that any one who wishes to make a perspective drawing of a building or any other object, according to some stated dimensions, may have no difficulty in this respect in carrying it out. A scale is a means by which a proportional measurement of an object is represented; or, by having a plan of that object, it is a means by which we may obtain an exact idea of all its parts in proportion to one another and to the original object. For instance, suppose a room to be 20 feet long and 15 broad, represented by a plan in the proportion of 1 inch to a foot, the drawing or plan will be then 20 inches long and 15 broad; and if we require single inches in the scale for the plan, the first inch of the scale must be divided into 12 parts. The scale being thus completed, we can measure spaces not limited to feet. Suppose the distance from one corner of the room to the side of a window should measure 6 feet 8 inches, the scale divided as above in the first division will enable us to show that distance on the plan.

To construct a scale of half an inch to a foot, draw a line of any length, and upon it mark off any required number of half-inches. (See Fig. 2.) Divide the first division into twelve parts, to represent inches, or into four parts to represent spaces of 3 inches, and number the divisions as shown in the figure. To measure 9 feet 9 inches, we must place one leg of the compasses on nine of the main divisions, and the other on nine of the minor divisions, marked in Fig. 2 from *a* to *b*.

Sometimes scales are much smaller than the above, when the subject is extensive and the drawing small. It is advisable to make our scales generally about 6 inches long—they may be either a little more or less; the length is not important, so that there be a sufficient number of parts on the scale to make it useful, but the average length of about 6 inches is the most convenient for general purposes.

To obtain the average length, we raise or lower both terms, as the case may require, by multiplying or dividing each by the same figure, so that the proportion remains the same: for example, 1 inch to 7 feet, $1 \times 6 = 6$, $7 \times 6 = 42$. Therefore 1 to 7 is the same proportion as 6 to 42. Again, 14 inches to 100 feet: this must be *lowered*, because a scale 14 inches long would be of unnecessary length, therefore $14 \div 2 = 7$, $100 \div 2 = 50$; so that we can make a more manageable scale of 7 inches long to represent 50 feet, which will be the same as 14 to 100. It will be rendered clearer if we propose to make a scale of 1 inch to 38 feet. The pupil will see the difficulty of dividing an inch into 38 parts and then constructing a lengthened scale from it. To avoid this, we first raise the terms by multiplying both by 6, which will be 6 to 228, and then state the question in the form of a Rule of Three sum. But as we do not wish to go through the trouble of dividing 6 inches into 228 parts, we must find the length of line necessary to include the *nearest whole number* to 228, which is 200, and say as 38 : 1 : : 200 : 5·26.

It will be seen by this that 5·26 inches to 200 feet is the same proportion as 1 inch to 38 feet, and this simplifies the work in making the scale. To do this we draw a line 5·26 inches long (to measure this distance, see Lessons in Geometry, page 113, Vol. I.), and divide it into two equal parts to represent *hundreds*, and the first division into ten equal parts to represent *tens*. (See Fig. 3.) The distance, 170 feet, measured from this scale will be from *a* to *b*. To divide a line into any given number of equal parts, see Lessons in Geometry, Problem XII., page 192, Vol. I.

We will give two other examples, and leave the pupil to practise this method of constructing scales of any given proportion. Construct a scale of 1 inch to 13 feet. $13 \times 6 = 78$. In this case 80 is the nearest whole number to 78, to be stated thus: as 13 : 1 : : 80 : 6·15; therefore draw a line 6·15 inches long, and divide it into *eight* equal parts to represent *tens*, and the first division into *ten* equal parts to represent *units*. Suppose it were 2 inches to 13 feet, then we should have to raise the number 13 by 3. $13 \times 3 = 39$; 40 would be the nearest whole number in this case; then as 13 : 2 : : 40 : 6·15. Therefore a line 6·15 inches long is to be divided into four parts to represent *tens*, and the first division into ten parts to represent *units*.

We will now explain how *a′ b′ c′ d′*, on the picture plane *f g i h* of Fig. 1, is the perspective representation of the square *a b c d*, *the plan* of the square. E is the eye of the spectator when he is standing at S P, the *station point*; H s is the *point of sight*, and H L the *horizontal line*; the lines from *a b c d* to E are the *visual rays*; the lines from *a b c d* to S P are the *plans* of the visual rays; from the points where these last lines (the plans of the rays) cut the base of the picture plane, *h i*, draw perpendicular lines to cut the corresponding visual rays in *a′ b′ c′ d′*, join these points respectively, and then will be produced on the picture plane, *f g i h*, the perspective representation required. This figure is intended only to show how the plan, the eye, and the picture plane are supposed to be arranged with regard to each other, and that the point of sight, P S, is opposite the eye and on the horizontal line, H L, which is on a level with the eye.

LESSONS IN GREEK.—VI.

THE SECOND DECLENSION.

THERE are in the Greek second declension two terminations, that in *os* corresponding with the Latin *us*, and that in *ον* corresponding with the Latin *um*. Of the nouns which terminate in *os* the greater number are of the masculine gender, some are also feminine; nouns in *ον* are of the neuter gender, except diminutive female names, as *ἡ Γλυκεριον, Glycerium.*

The following table presents

THE CASE-ENDINGS OF THE SECOND DECLENSION.

	Singular.		*Plural.*		*Dual.*
Nom.	ος	ον	οι	ă	ω
Gen.	ου		ων		οιν
Dat.	φ		οις		οιν
Acc.	ον		ους	ă	ω
Voc.	ε (ος)	ον	οι	a	ω

Before passing on, let the learner turn back and compare these terminations with those that are given in connection with the article; then he will readily commit these to memory:—

PARADIGMS OR EXAMPLES OF THE SECOND DECLENSION.

Singular.

	Word.	*Island.*	*God.*	*Messenger.*	*Fig.*
Nom.	λογος (*m.*)	νησος (*f.*)	Θεος (*m.*)	αγγελος (*m.*)	συκον (*n.*)
Gen.	λογου	νησου	Θεου	αγγελου	συκου
Dat.	λογῳ	νησῳ	Θεῳ	αγγελῳ	συκῳ
Acc.	λογον	νησον	Θεον	αγγελον	συκον
Voc.	λογε	νησε	Θεος	αγγελε	συκον

Plural.

Nom.	λογοι	νησοι	Θεοι	αγγελοι	συκα
Gen.	λογων	νησων	Θεων	αγγελων	συκων
Dat.	λογοις	νησοις	Θεοις	αγγελοις	συκοις
Acc.	λογους	νησους	Θεους	αγγελους	συκα
Voc.	λογοι	νησοι	Θεοι	αγγελοι	συκα

Dual.

N.A.V.	λογω	νησω	Θεω	αγγελω	συκω
G.D.	λογοιν	νησοιν	Θεοιν	αγγελοιν	συκοιν

The vocative of the words in *os* commonly ends in *ε*, but often, especially in adjectives and participles, in *ε*; as *ω φιλε*, also *ω φιλος*; but *θεος*, like the Latin *Deus*, makes no change in the vocative.

As in Latin nouns in *um*, the Greek neuters in *ον* have the same ending—namely, *ον* in the nominative, the accusative, and the vocative; and this, too, in the plural as well as in the singular—namely, in *α*.

The models just given are followed by adjectives in *os* (m.), *ον* (n.), as *αγαθος* (*αγαθη* [f.], like the first declension), *αγαθον*; as appears in the following

MODELS OF ADJECTIVES AND NOUNS OF THE SECOND DECLENSION.

Singular.

	A Good Word.	*A Good Child.*
Nom.	αγαθος λογος.	αγαθον τεκνον.
Gen.	αγαθου λογου.	αγαθου τεκνου.
Dat.	αγαθῳ λογῳ.	αγαθῳ τεκνῳ.
Acc.	αγαθον λογον.	αγαθον τεκνον.
Voc.	αγαθε λογε.	αγαθον τεκνον.

Plural.

Nom.	αγαθοι λογοι.	αγαθα τεκνα.
Gen.	αγαθων λογων.	αγαθων τεκνων.
Dat.	αγαθοις λογοις.	αγαθοις τεκνοις.
Acc.	αγαθους λογους.	αγαθα τεκνα.
Voc.	αγαθοι λογοι.	αγαθα τεκνα.

Dual.

N.A.V.	αγαθω λογω.	αγαθω τεκνω.
G.D.	αγαθοιν λογοιν.	αγαθοιν τεκνοιν.

The foregoing relates to adjectives of three terminations. Adjectives of two terminations are also declined in the same manner—namely, such as end in *os*, m. and f., and *ον*, n., as *παγκαλος, παγκαλον*, entirely beautiful: for example, *ὁ παγκαλος λογος*, the entirely beautiful speech; *τα παγκαλον τεκνον*, the entirely beautiful child.

N.B.—It must be well remembered that adjectives of two terminations are generally *Compounds* or *Derivatives*.

For the sake of practice, I here subjoin an example of an adjective of three terminations, and one of two terminations, advising you to learn them horizontally as well as perpendicularly.

ADJECTIVES OF THREE AND TWO TERMINATIONS, LIKE THE FIRST AND SECOND DECLENSIONS.

Singular.

Nom.	σοφος, -η, -ον, *wise.*	κοσμιος, -ον, *orderly.*
Gen.	σοφου, -ης, -ου.	κοσμιου, -ου.
Dat.	σοφῳ, -ῃ, -ῳ.	κοσμιῳ, -ῳ.
Acc.	σοφον, -ην, -ον.	κοσμιον, -ον.
Voc.	σοφε, -η, -ον.	κοσμιε, -ον.

Plural.

Nom.	σοφοι, -αι, -α.	κοσμιοι, -α.
Gen.	σοφων, -ων, -ων.	κοσμιων, -ων.
Dat.	σοφοις, -αις, -οις.	κοσμιοις, -οις.
Acc.	σοφους, -ας, -α.	κοσμιους, -α.
Voc.	σοφοι, -αι, -α.	κοσμιοι, -α.

Dual.

N.A.V.	σοφω, -α, -ω.	κοσμιω, -ω.
G.D.	σοφοιν, -αιν, -οιν.	κοσμιοιν, -οιν.

Before you attempt the following exercises, you must understand that Greek nouns in the neuter plural require their verb to be in the singular number.

VOCABULARY.

Αγαθος, -η, -ον, good.	Ἑταιρος, -ου, ὁ, a companion, friend.	Οινος, -ου, ὁ, wine.
Αδελφος, -ου, ὁ, a brother.	Θεος, ὁ, God, the true God.	Παρεχω, I give, bestow.
Αλλ' (αλλα), but.	Κακος, -η, -ον, bad, τα κακα (Latin, *mala*), evils.	Πιστος, -η, -ον, faithful.
Ανθρωπος, -ου, ὁ, a man.	Καλος, -η, -ον, fair, beautiful.	Πολλοι, -αι, -α, many, numerous.
Διδασκαλος, -ου, ὁ, a teacher.	Κινδυνος, -ου, ὁ, danger	Φιλος, -η, -ον, loving, friendly.
Δουλος, -ου, ὁ, a slave.	Μετεχω, (with gen.), I partake, share.	Φροντιζω (gen.), I care for.
Εργον, -ου, το, a work.	Μισγω (Latin, *misceo*, English, *mix*), I mix (acc. and dat.).	Χαιρω (dat.), I rejoice at.
Εσθλος, -η, -ον, excellent.		Χαλεπος, -η, -ον, hard, difficult.
Εχθρος, -α, -ον, hostile, hateful, ὁ εχθρος, the enemy.		

EXERCISE 11.—GREEK-ENGLISH.

1. Διωκε καλα εργα, ω φιλε νεανια. 2. Πειθου τοις του διδασκαλου λογοις. 3. Παρ' εσθλων εσθλα μανθανεις. 4. Πιστος ἑταιρος των αγαθων και των κακων μετεχει. 5. Οἱ Θεοι των ανθρωπων φροντιζουσιν. 6. Οἱ ανθρωποι τους Θεους θεραπευουσιν. 7. Πολλοις εργοις ἑπεται κινδυνος. 8. Μισγεται εσθλα κακοις. 9. Ὁ κακος τοις θεοις και τοις ανθρωποις εχθρος εστιν. 10. Οἱ ανθρωποι τοις εσθλοις χαιρουσιν. 11. Παρεχε, ω Θεος, τοις φιλοις ευτυχιαν. 12. Φερε, ω δουλε, τον οινον τῳ νεανια. 13. Ὁ οινος ου λυει αλλα τικτει τας μεριμνας. 14. Χαλεπῳ εργῳ δοξα ἑπεται.

EXERCISE 12.—ENGLISH-GREEK.

1. Good men obey God. 2. Bad men obey not God. 3. O good youths, obey your (the) teacher. 4. Bad men are hostile to the good (*the bad—the good*). 5. Abstain from bad men. 6. Good men take care of their (the) children. 7. Trust not the word of a liar, O dear boy. 8. Danger follows many words. 9. Good youths honour their (the) teachers.

Remarks.—The Greeks are fond of such an arrangement of words as is found in the phrase *τοις του διδασκαλου λογοις*, given above. Literally, and in the Greek order, the words run —*the of the teacher words*; that is, *the words of the teacher.* Imitate this construction. In general, the Greek order of words approaches more nearly to the English than does the Latin. The sense, however, logically considered, prevails over other considerations in the Greek collocation of words. The chief place of emphasis is the commencement of a sentence, the next is the end. Not by any mere rule can the beginner acquire the tact of placing the Greek words in their idiomatic order. Of course he will study to do his best, and from attention to the sentences given in the exercises, and making them, as far as possible, models, he may learn much and make an approach to correctness; but, after all, nothing but a long and careful study of the writings of the classics themselves can give him complete skill. The student, however, is especially requested to note what is called the *emphatic* collocation of the adjective *with its noun*—where the adjective and noun have each an article, in the following order:—article, noun, article, adjective, as in *το φως το αληθινον*, the light, the true light (John i. 9). With this we may compare in English (especially in poetry) the repetition of a noun with the adjective for the sake of *emphasis*, as in Shakespeare—"Farewell, a long farewell;" "A frost, a killing frost."

VOCABULARY.

Αξιος, -α, -ον (gen.), worthy.	Διχοστασια, -ας, ἡ, division.	Θυμος, -ου, ὁ, mind, courage, spirit.
Απολυω (gen. of the thing), I free from.	Ευφραινω, I make joyful.	Θυρα, -ας, ἡ, a door.
Αργυρος, -ου, ὁ, silver.	Θανατος, -ου, ὁ, death.	Κλειω, I shut.
Βιος, -ου, ὁ, life.	Θειος, -α, -ον, divine, το Θειον, the Divinity.	Μετρον, -ου, το, a measure.
Βουλη, -ης, ἡ, a counsel.		Μοχλος, -ου, ὁ, a bolt.
		Μυριος, -α, -ον, innumerable.

The poems of Spenser are numerous; but the most important, both as to length and imaginative power, is the "Faery Queene." This remarkable work is written in a stanza called the Spenserian, because invented by the poet himself—a stanza of nine lines, ingeniously complicated as regards the rhymes, and ending with an alexandrine, which gives a stately and sonorous close to the previous cadences. We can hardly say of the "Faery Queene" that it is a narrative poem, although it includes a good deal of story-telling. It is rather a collection of apologues, worked out by means of allegories, and by a romantic machinery, in which knights, squires, ladies, enchanters witches, giants, dwarfs, and chimæras, move to and fro through a wondrous land of forests, deserts, mountains, and moors, with lakes reflecting castle and palace, temple and hermitage; sometimes with the gleam or gloom of unknown seas upon the threshold of unknown lands; with haunting sounds of battle, and the clash of steel-clad men; with notes of clarions and of lutes; with gentle shapes of women, and high arguments of life and death, of love and duty, of loyalty to the right, of faith in God. The intention of the poet was that the work should extend to twelve books at least, if not more. We have in fact only six books, with a few fragments of another. Whether the rest was written, and has been lost, or whether it never existed save in the writer's mind, and in the form of detached fragments to be afterwards worked into the general design, is a matter with respect to which we have no certain evidence. It has, however, always been a favourite subject for literary speculation.

Each book of the "Faery Queene" is a tale complete in itself; yet a certain unity of purpose runs through the whole poem. The incidents are supposed to take place in Britain in the time of Prince Arthur, but before he came to the throne; and the personality of this semi-mythical hero is the connecting link between the adventures of one set of knights-errant and another. Gloriana, the Queen of the Fairies (in whom Spenser intended to shadow forth the greatness of Queen Elizabeth), is another note of unity pervading the composition. Arthur is enamoured of her in a vision, and seeks her in fairy-land; but, in the incomplete state of the poem, she does little more than furnish a title to the whole series of books. We should, in truth, know scarcely anything as to the general design of this splendid product of poetic genius, were it not for an interesting letter on the subject addressed by the author to his friend Sir Walter Raleigh, and prefixed to all editions of the poem. From this we learn that the work, in its totality, is to be regarded as "a continued allegory, or dark conceit," and that "the general end is to fashion a gentleman or noble person in virtuous and gentle discipline." Prince Arthur himself represents greatness of soul in the abstract, as including all the other virtues. The twelve knightly heroes of the twelve books are the embodiments of the twelve moral qualities enumerated by Aristotle, the first of which is Holiness, personified by the Red-cross Knight. In these days Spenser's allegory is but little regarded; and, indeed, it is troublesome to follow, and perhaps, for its own sake, scarcely worth the pains. What the "Faery Queene" is chiefly valued for is its wealth of ideal beauty. No work in the English language presents a greater fulness of imagination and fancy. Faulty in construction, and sometimes prolix in detail, it is nevertheless a magnificent example of poetry in its most poetical aspects. Romance is its foster-mother, and the music of a noble versification fills the ear with sweetness, and with the continuity of gentle power.

The man who has not read the "Faery Queene" is unable to appreciate thoroughly the more delicate beauties of English poetry.

LESSONS IN SHORTHAND.—X.

LIST OF BEST OUTLINES (*continued*).

We continue the list of outlines begun in our last lesson. It is necessary again to impress on the learner the necessity of writing this list of words in Shorthand, inserting the vowels. Shorthand is a science that must be thoroughly mastered; and if difficulties lie in the way of its attainment, they must be overcome, and not lightly set on one side.

destined...ds tnd
derogatory...dr g t r
despondence...ds pnd ns
devour...dv r
devout...dv t
digestion...d jst n
dilapidation...d l p dʃn
direct...dr kt
director...dr k tr
directory...dr k t r
discourage...ds kr j (62)
discretion..ds kr*ʃn* (62)
distant...ds tnt
distribute...ds tr bt
disturb...ds t r b
diverge...dv r j
divert...dv rt (*see* advert)
divine...dv n
division...d vʒn
dormant...dr mnt
doubtful...dt fl
doubtless...dt ls
Economy...kn m
efficient...f ʃnt
effrontery...frnt r
embarrass...mb rs
embellish...mb l*ʃ*
embody...mb d
emperor...mp r r
energetic...n r jt k
enlighten...n l tn
enliven...nl vn
enormous...nr ms
enraptured...n r p trd
enthusiasm...n d zs m
enthusiast...n d zst
enthusiastic...n d zs t k
entire...nt r
entirety...n t r t
esteem...st m
exaggerate...ks j rt
excessive...kss v
expeditiously...ks pd ʃs l
extemporé...ks t mp r
Facetious...fs *ʃs*
falsity...f ls t
farewell...f r l
fashionable...fʃn b l
fault...f lt
favoured...f vrd
favourite...f *vrt*
felicity...f ls t
financial...fn n *ʃl*
flesh...fl *ʃ*
flourish...fl r *ʃ*
foolish...f l *ʃ*
forasmuch...*frs* m ç
forbid...fr bd
forego...f r g
former...fr mr
forsake...fr sk
Frenchman...*frn* ç mn
friend...*frnd*
fulfil...f l f l
furnish...*frn ʃ*
furniture...*frn* t r
Galvanise...gl v ns
garden...grd n
genteel...j nt l
gentile...jn t l
gentle, gently...jnt l
get...g t
giant...j nt (*see* agent)
giantess...j n ts
golden...gld n
govern...g vrn
governor...g vr nr
grandfather...gr nd fdr
gratitude...grt td
guardian...gr dn
Hammer...h mr
handle...nd l (When neither the stroke *h* nor the tick *h* is expressed, the dot *h* should be inserted when vocalising.)
handsome...nds m
harden...h*n*d n
hardy...h r d
harlot...hr lt
harm...h*r* m
hart...h*r*t
haven...h vn
headland...h d lnd
health...hl ϑ
heathen...h dn
herd...h*r*d
hereditary...h r dt r
heretofore...h*r*t fr
heritage...h rt j
hermit...h*r* m*t*
Highlands...h lnds
highlander...h lndr(111)
hobby...h b
hold...h ld
holiday...h l d
Holland...h lnd
home...hm
homily...h m l
honorary.. nr r
hook...h k
horizontal...h rs nt l
horn...h*r*n
horrible...h r b
*horror...h*r r
horse...h*r*s
horticulture...h*r*t k ltr
hospital...hs pt l
host...hst (*loop*)
hostage...hs t j
hot...ht
hotel...h t l
hound...h nd
hull...hl
human...hmn
humanity...hm n t
humble...hm bl
humbug...hmb g
hundred...n drd
hunter...h ntr
hurl...h r l
hurricane...h r kn
hurried...h r d
hurt...h*r*t
hydrogen...nd r jn
hypocrisy...p kr s
hypocrite...p krt
Identify...jdnt f
ignominious...g n m ns
ignoramus...g nr ms
ignorant...g nrnt
illegal...l l gl
illegitimate...l l jt mt
illusive...ls v
imbecile...mbs l
imitative...m t tv
immaterial...m mt r l
immoral...m mr l
immortal...m m rt l
imperative...mp rt v
imperfect...m prf kt
imperial...mp r l
impersonal...m prs nl
impertinent..mp rt nnt
impiety...mp t
impoverish...mp *vr ʃ*
indebted...nd td
independent...nd pnd nt
index...nd ks
indicate...nd kt
indolent...n d lnt
indulgent...n d l jnt
inefficient...n f*ʃ*nt
inevitable...n v t bl
inferior...n f r r
inhabit...nh bt (124)
inhabitant...nh b tnt
initial...n *ʃl*
innate...n nt
insurance...n ʃ rns
intelligence...nt l jns
intemperance...n t mp rns
intend...nt nd
intention...nt n*ʃ*n
intér...nt r
interpret...nt r prt
intone...n tn
intoxicate...nt ks kt
January...j n r
jealousy...j l s
journey...jr n
Kindly...knd l
kindle...k nd l
Landscape...lnds k p
lark...l r*k*
latitude...lt td (*see* altitude)
latitudinarian...lt td nrn
laziness...l z ns
length...l ŋ ϑ
lesson...ls n
linear...ln r
lineality...ln l t
linen...l nn
lion...l n
liturgy...lt r j
London...ln dn
Londoner...ln d nr
long...l ŋ
lyric...l r k
Madam...md m
mainly...m n l
man-servant...m ns r vnt
march...m r ç
martial...m r *ʃl*
mediate...md t
meditate...md tt
merchant...m r çnt
merciful...m rs f l
metaphor...mt *fr*
metropolis...mt r pls
military...m lt r
misapply...ms p l
miscalculate..ms k l klt
moderate...md rt
moral...mr l
Mormon...mr mn
mortal...m rt l
mortar...mr tr
Narcotic...nr k t k
narrative...nr tv
north...nr ϑ
northern...nr ð rn
numerous...n m rs
Ordinance...rd n ns
ordnance ..rd nns
ornament...rn mnt
ornamental..rn m n t l
ostentation...st n tʃn
ostentatious...st nt ʃs
overhead...vr d
Patriarch...pt r r k
parlour...pr l r
partner...prt nr
passionate..pʃn t (*hook on the left*)
patient...p*ʃ* nt
patron...p trn
pattern...pt rn
persecutor...p rs k tr
person...p rs n
persuade...prs wd
pertinent...p rt nnt
petrify...pt r f
Philadelphia...fl d l f
philosopher...fls f r
photograph...ft grf
photography...ft gr f
ponder...pnd r
poor...p r (*see* pure)
potato...pt t
prefer...prf r
prejudice...pr jd s
premier...pr m r
prevent...prv nt
primer...pr mr
printer...*prnt* r
private...prv t
profit...prf t
pronoun...pr nn
pronounce...pr n ns
propose...pr ps
prosecutor...prs k tr
Protestant...prts tnt
provide...prv d
provincialism...prv n ʃls m
provoke...prv k
pure...p r (*see* poor)
purport...pr p rt
putrefy...p tr f
pyramid...pr md
Quarrel...k w r l
quarry...k w r
quart...k w r t
quarter...k r tr
question...ks tn
Railway...r l (we)
ransom...rn sm
refer...rf r
rehearse...r h rs (160)
relish...r l*ʃ*
right-hand...*rt* nd
rotundity...r tnd t
Sacred...skr d
sacrifice...skr fs
saucers...ss rs
scissors...sz rs
seat...st
sepulchre...sp l kr
sharp...ʃr p
shawl...*ʃl*
shelter...*ʃl* tr
shilling...*ʃl* ŋ
shortener...ʃr t nr
situation...st ʃn
somehow...sm (*join* s)
spacious...sp ʃs
spectator...sp kt tr
spontaneous.. spnt ns
standard...stnd rd
station...st ʃn (hook on the left)
stereotype...st rt p
subdivide...sbd vd
successful...skss f l
successor...skss r
suffrage...sfr j
suggestion...sjst n
suggestive...sjst v
suit...st
swear...sw r
sweet...swt
swell...sw l
swift...sw ft
swim...sw m
swindle...sw nd l
Swiss...sws
Switzerland...st sr lnd
symbol...sm bl
Teetotaler...tt tl r
telegraph...tl grf
telescope...tls k p
temperance...t mp rns
thanksgiving...ϑ ŋs g
turnpike...t rn p k
Ultimate...lt mt
unavoidable...n vd bl
unregenerate...n r j nrt
unwarrantable..n w r nt bl
upright...p rt
Venture...vnt r
vertical...vr t kl
voluntary...v lnt r
volunteer...v lnt r
Wade...*wd*
wafer...w *fr*
wages...*wjs*
wagon...*wgn*
wait...w t
wakeful...*wk fl*
Wales...*wls* (see Wells)
wallow...w l
waltz...*wlts*
wander...*wndr*
want...*wnt*
ward...wo r d (173)
warrant...wo r nt (173)
weakness...*wk* ns
wealth...*wl* ϑ
wear...w r
weariness...w r ns
weave...wv
wedding...*wd* ŋ
wedge...*wj*
Wednesday...wns d
weight...wt
Wells..*wls* (see Wales)
Welsh...*wl ʃ*
west...wst (*loop*)
whatsoever ... *to the gram.* what *join* s vr
wheel...*wl*
whensoever...n s vr
wheresoever...w r s vr
whisper...ws pr
whitewash...wt w ʃ
whole...hl
whosoever...*to the gram.* who *join* s vr
wickedness...*wk* d ns
widow...*wd*
window...*wn* d
winter...*wntr*
witness...wt ns
woman...*wmn*
wonder...*wndr*
wood...*wd*
wool...*wl*
worm...*wr* m
worse...w rs
wound (p. tense)...wnd
wound (a hurt)...*wnd*
writing...rt ŋ
written...rt n
Yard...y r d
yellow...y l
yes...ys

Sur, a French abbreviation of *super*, appears in *sur*charge, *an overcharge*, an additional charge; in *sur*coat, an *overcoat*; in *sur*tout, literally an *over*all (French, *tout*, *all*); in *sur*feit (French, faire, *to do*), an *over*doing; that is, eating too much.

"There are various degrees of strength in judgment, from the lowest *surmise* to notion, opinion, persuasion, and the highest assurance which we call certainty."—*Search*, "*Light of Nature.*"

Syn, of Greek origin (*συν*, sune, *with*), occurs in the forms *syl*, *sym*, *syn*; as in *syl*logism, *sym*phonious, *syn*chronous, etc.

"Men have endeavoured to transforme logick, or the art of reasoning, into a sort of mechanism, and to teach boys to *syllogise*, or frame arguments and refute them, without any real inward knowledge of the question."—*Watts*, "*Logick.*"

"Up he rode,
Followed with acclamation and the sound
Symphonious of ten thousand harps that tuned
Angelic harmonies." *Milton*, "*Paradise Lost.*"

"Sensations are impressed either at the same instant of time, or in contiguous successive instants. Hence it follows that the corresponding associations are either *synchronous* or successive."—*Belsham*, "*Philosophy of the Mind.*"

Tetra, of Greek origin (*τετρα*, tet-ra, *four*), appears in *tetra*gonal, four-angled; *tetra*meter, *a line consisting of four measures or feet*, and in *tetrarch*, properly a governor of a fourth part, a subordinate prince.

"And Eroude *tetrarck* herde alle thingis that weren don of him."—*Wiclif*, "*Testament*" (Luke ix. 7).

Trans, in Latin, *across*, as in *trans*pose, *to put across from one place* to another; *trans*port, *to carry over the sea.*

"With *transport* views the airy rule his own,
And swells on an imaginary throne."—*Pope.*

Tri, of Latin origin (tres, tres, tria, *three*), appears in *triangle*, *trident* (Latin, dens, *a tooth*), *Neptune's sceptre*; in *trilateral* (Latin, latus, *a side*), *three-sided*, and *triliteral*, having three letters, etc.

When a county is divided into three of these intermediate jurisdictions, they are called *trithings*. These trithings still subsist in the county of York, where, by an easy corruption, they are denominated *ridings*—the north, the east, and the west riding.—*Blackstone*, "*Commentaries.*"

Vice, of Latin origin, signifying *in the place of*, as in *vice*gerent (Latin, gero, *I bear*), *one governing as a substitute*, *vice*roy, or "vice-king," see Hakluyt; also, *vice*-chancellor, *vice*-president.

"In the yeare 1228, one Reginald was viceroy, or petie king of Man."—*Holinshed.*

Vicar (Latin, *vicarius*), comes from *vice*, and so denotes one *who is in the place of another*, hence a "vicarious sacrifice."

"Nature, *the vicare* of the Almighty Lord,
That hote, colde, hevie, light, moist, and drie
Hath knit, by even number of accord,
In easie voice, began to speak and say."—*Chaucer.*

"Then it was devised that, by their common seal (which is the tongue of their corporation), they might appoint a deputy or *vicar* to do it for them."—*Spelman*, "*On Tythes.*"

Viscount is made up of the same prefix—that is, *vice*—and the Latin word comes, *a companion*, in low Latin count or earl; so that viscount (pronounced vi'count) is the deputy, the lieutenant of the count or earl.

"The viscont, called either *procomes* or *vicecomes* in time past, governed in the countie under the earle, but now without any such service or office; it is also become a name of dignity next after the earle, and in degree before the baron."—*Holinshed*, "*Description of England.*"

Ultra, of Latin origin (ultra, *beyond*), is used in *ultra*marine (Latin, mare, *the sea*), properly, beyond the sea; applied to colour, *fine blue.*

"Ultramarine or azure is a very light and a very sweet colour."—*Dryden*, "*On Painting.*"

The blue colouring matter of the lapis-lazuli, or azure-stone, is called ultramarine.

Vivi (Latin, vivus, *alive*) appears in *vivify*, *to make alive*; and in *vivi*parous (Latin, pario, *I bring forth*), bearing (its young) alive.

"The usual distinction of animals, with respect to their manner of generation, has been into the oviparous (Latin, ovum, *an egg*) and *vivi*parous kinds; or, in other words, into those that bring an egg, which is afterwards hatched into life; and those that bring forth their young alive and perfect."—*Goldsmith*, "*Animated Nature.*"

LESSONS IN ENGLISH.—XIV.

DERIVATION: PREFIXES (*concluded*).

Soli, of Latin origin (solus, *alone*), is seen in *soli*loquy (Latin, loquor, *I speak*), *a speaking alone*, being the only speaker; called also a *mono*logue; and in *soli*fidian (Latin, fides, *faith*), one who supposes faith, and not works, *alone* necessary to justification.

"Such is the persuasion of the *Solifidians*, that all religion consists in believing aright."—*Hammond.*

Step, of Saxon origin, from *steopan*, to *bereave*, whence the Anglo-Saxon, *steop*-cild, *step*-child, a child that is deprived of a parent. From this use the term *steop* or *step* was applied to relatives that stood in a similar position, and thus we have *steop*-modor, a *step*-mother; *steop*-dohter, a *step*-daughter; *steop*-faeder, a *step*-father; *steop*-sunn, *step*-son.

Sub, in Latin, *under*, as in *sub*terranean (Latin, terra, *the earth*), *under the earth*; *sub*mersion (Latin, mergo, *I dip*), *dipping*; *sub*scribe (Latin, scribo, *I write*), *to write the name under a document.* *Sub* may denote an inferior degree of the quality of the adjective to which it is prefixed, as *sub*-acid; *sub*-deacon, an *under*-deacon (Greek, διακονος, di-ak'-on-os, *a servant*). *Sub* becomes *suc* in *suc*cession, *suc*cumb, etc.; *suf*, in *suf*ficient, *suf*fragan, etc.; *sug*, in *sug*gest, *sug*gestion, etc.; *sum*, in *sum*mons, etc.; *sup*, in *sup*port, etc.; *sur*, in *sur*prise, etc.; and *sus*, in *sus*tain, etc.

"To nurse
The growing seeds of wisdom that *suggest*,
By every pleasing image they present,
Reflections such as meliorate the heart,
Compose the passions, and exalt the mind."
Cowper, "*Task.*"

Subter, meaning *under*, is *sub* in another form, and appears in *subter*fuge (Latin, fuga, *flight*), an evasion.

Super, of Latin origin, the opposite of *sub*, signifies *over*, *above*, as in *super*natural, *above* nature; *super*mundane, *above* the world *super*vision (Latin, video, *I see*), *over*looking.

Νεος, -α, -ον, young; ὁ νεος, a young man.
Νοσος, -ου, ἡ, sickness.
Ουχ (ουκ comes before an aspirated vowel, instead of υκ and ου), not.
Πονος, -ου, ὁ, labour.
Σιγη, -ης, ἡ, silence.
Χρονος, -ου, ὁ, time.
Χρυσος, -ου, ὁ, gold.

EXERCISE 13.—GREEK-ENGLISH.

1. Το καλον εστι μετρον του βιου, ουχ ὁ χρονος. 2. Ὁ θανατος τους ανθρωπους απολυει πονων και κακων. 3. Ὁ οινος ευφραινει τους των ανθρωπων θυμους. 4. Συν μυριοις πονοις τα καλα γιγνεται. 5. Το θειον τους κακους αγει προς την δικην. 6. Πιστος φιλος χρυσου και αργυρου αξιος εστιν εν χαλεπῃ διχοστασιᾳ. 7. Πολλαι νοσοι εν ανθρωποις εισιν. 8. Βουλη εις αγαθον αγει. 9. Σιγη νεῳ τιμην φερει. 10. Ἡ θυρα μοχλοις κλειεται. 11. Ἡ τεχνη τους ανθρωπους τρεφει. 12. Ω φιλοι μαθηται, της σοφιας και της αρετης ορεγεσθε.

EXERCISE 14.—ENGLISH-GREEK.

1. By death (dat.) men are set free from labours. 2. Many labours follow life. 3. The wisdom of the Divinity leads good men to happiness. 4. Follow the words of the judge. 5. The words of the youth are bad. 6. The lyre dissipates (λυω) the cares of the mind. 7. Silence becomes a boy. 8. Art nourishes good men. 9. The bolt shuts the door.

KEY TO EXERCISES IN LESSONS IN GREEK.—V.

EXERCISE 5.—GREEK-ENGLISH.

1. Dishonour follows vice. 2. Bear poverty easily. 3. Thunder arises from shining lightning. 4. Virtue has excellent repute. 5. Regard to law sets right wrong judgments. 6. Justice begets justice, and injury injury. 7. Pursue a good manner of living. 8. Restrain your tongue. 9. Fortune often has (brings) changes. 10. Bear ye poverty. 11. Splendid fortunes easily fall. 12. Bear thou fortunes (changes of fortune). 13. Virtue yields not to misfortunes (fortunes). 14. Abstain from hard (severe) cares. 15. The queen has a splendid kingdom.* 16. The robe is beautiful. 17. We have beautiful robes.

EXERCISE 6.—ENGLISH-GREEK.

1. Φευγετε τας μεριμνας. 2. Ἡ κακια τικτει ατιμιαν. 3. Ἡ αρετη δοξῃ ἑπεται. 4. Ῥαδιως φερουσι την πενιαν. 5. Ἡ πενια φερεται ῥαδιως. 6. Φερετε την πενιαν ῥαδιως. 7. Εχεις μεταβολας. 8. Απεχου της κακιας. 9. Καλην στολην εχουσι. 10. Μη εικε τῃ τυχῃ. 11. Ῥαδιως εικουσι τῃ τυχῃ. 12. Κατεχετε την γλωτταν. 13. Σκολιαι δικαι ευθυνονται.

EXERCISE 7.—GREEK-ENGLISH.

1. Learn wisdom, O young man. 2. Politeness becomes a citizen. 3. We blame the talkativeness of a youth. 4. Avoid injustice, O citizen. 5. We admire the art of the bird-catcher. 6. It is proper for auditors and spectators to keep silent. 7. O sailors, avoid the north wind. 8. The north wind (compare our Boreas) often injures sailors. 9. O citizens, strive after virtue. 10. The Sybarites were voluptuaries. 11. Sailors have to do with the sea. 12. Flee, O Persian. 13. The Spartans have an honourable reputation. 14. I avoid a youth (who is) a voluptuary (or a voluptuous youth, or a youth given to pleasure). 15. Abstain from chatterers. 16. Hear, O master (sovereign lord).

EXERCISE 8.—ENGLISH-GREEK.

1. Φευγετε, ω Περσαι. 2. Πολιτιαις πρεπει ἡ αρετη. 3. Την ἡσυχιαν αγειν προσηκει πολιτῃ. 4. Μανθανετε, ω νεανιαι, την σοφιαν. 5. Την σοφιαν μανθανουσι. 6. Την σοφιαν μανθανετε. 7. Την σοφιαν μανθανω. 8. Ἡ σοφια μανθανεται. 9. Νεανιᾳ πρεπει ἡ ευκοσμια. 10. Μη βλαπτε, ω βορρα, τους ναυτας. 11. Φευγε, ω ναυτα, τον βορρᾶν. 12. Ὁ βορρας φευγεται. 13. Ορεγου, ω Σπαρτιατα, της δοξης. 14. Ἡσυχιαν αγετε, ω αδολεσχαι. 15. Αδολεσχου απεχετε.

EXERCISE 9.—GREEK-ENGLISH.

1. The bravery of the Spartans was admirable. 2. Flee, O young man. 3. Do you flee, O lovers. 4. Thieves are avoided. 5. Justice becomes judges. 6. It is the duty of soldiers to fight for the citizens. 7. Avoid liars. 8. It is the part of a master to take care of his domestics. 9. Do not trust a liar. 10. Art supports the artist. 11. From liars thieves are produced. 12. The Spartans were lovers of glory and honour. 13. Shipwreck often arises from the north wind. 14. We admire the skill of Hermes (Mercury).

EXERCISE 10.—ENGLISH-GREEK.

1. Οἱ της δοξης ερασται ου φευγονται. 2. Οἱ ψευσται της αληθειας ουκ εισιν ερασται. 3. Ἡ του Σπαρτιατου αρετη θαυμαστη ην. 4. Μη πιστευετε, ω Σπαρτιαται, τοις ψευσταις. 5. Ἡ του Ἑρμου τεχνη ην θαυμαστη. 6. Την των Σπαρτιατων αρετην θαυμαζομεν. 7. Φευγε ψευστην, ω Σπαρτιατα. 8. Εστι δεσποτου, (or δεσποτου εστι) επιμελεσθαι του οικετου. 9. Οικετων εστι επιμελεσθαι των δεσποτων. 10. Τεχνιτας τρεφουσιν αἱ τεχναι. 11. Τοις στρατιωταις προσηκε μαχεσθαι περι των πολιτων. 12. Ἡσυχιαν αγε, ω βορρα. 13. Τον Ἑρμην θαυμαζω.

* In the Greek the distinction between the words for *queen* and *kingdom* is made merely by the accentuation: thus, *queen*, βασιλεια, has the accent on the antepenult (the last syllable but two, reckoning from the end), whereas βασιλεια, *kingdom*, has the accent on the penult, or the last syllable but one.

LESSONS IN GEOGRAPHY.—XIX.

CONSTRUCTION OF THE MAP OF THE WORLD.

To construct a Map of the World, consisting of the Eastern and Western Hemispheres, as in page 144, on the common projection, which is done without any regard to the principles of perspective, or the distance of a point of view, is the simplest thing in the world to him who knows how *to make a circle pass through any three points on a plane, which are not in the same straight line.* The method of doing this has been clearly shown in Problem XXXVI. in Lessons in Geometry, XV., page 49 of this volume.

Now, to make the necessary projection for drawing the Map of the World, as shown in our last lesson, first draw two circles of any convenient, but of the same size, and draw in each two diameters, 0, 0, and *North Pole* and *South Pole*, at right angles to each other (Lessons in Geometry, Problem I., Vol. I., page 156); then divide each quadrant of these two circles and each radius or half of the two diameters into nine equal parts. Mark the divisions of the quadrants between 0 and *North Pole*, and between 0 and *South Pole*, with the numbers 10, 20, 30, 40, 50, 60, 70, and 80; then it will be *understood* that at the point 0, the mark is 0 degrees, while at the *North* or *South Pole* the mark is 90 degrees.

Next, mark the diameters of the two circles which are drawn across the page from 0 to 0 with the word *Equator;* the centre of the *Eastern Hemisphere* with 70; and the centre of the *Western Hemisphere* with 110; then, in the *Eastern Hemisphere* mark to the left of 70 the numbers 60, 50, 40, 30, 20, 10, 0, 10, and 20; and to the right of 70, the numbers 80, 90, 100, 110, 120, 130, 140, 150, and 160. These are to denote the degrees of longitude, the first meridian being that marked 0, and the others at 10 degrees distance from each other; the meridians *to the right* of that marked 0 being in *east longitude*, and those *to the left* being in *west longitude.*

Having done this, in the left-hand circle or *Western Hemisphere* mark *to the right* of 110, the numbers 100, 90, 80, 70, 60, 50, 40, 30, and 20; and *to the left*, the numbers 120, 130, 140, 150, 160, 170, 180, 170, and 160; but here it is necessary to remark, that in this hemisphere, all the numbers are degrees in *west longitude*, except *the last-mentioned two*, 170 and 160, which are in *east longitude*, because these are the continuation of the degrees in the *Eastern Hemisphere, to the right*, which stopped at that point, namely, 160. The *degrees of longitude*, whether *east* or *west*, must be limited by 180, because this number extends over *one-half* of the globe either way, and the meridian marked 180 is the continuation of the meridian of Greenwich, that is, the circle which passes through 0°, 180°, and the two poles, in the meridian of Greenwich; there are some, however, who call the *semicircle* which extends from pole to pole, through any given place, the meridian of that place; and the *opposite semicircle*, the *anti-meridian;* but it is better to consider the meridian as a *complete circle.* Lastly, mark the semi-diameters or radii of each circle or hemisphere which are at right angles to the diameters marked *equator*, with the numbers 10, 20, 30, 40, 50, 60, 70, and 80, placed consecutively from the centre of each to the poles *north* and *south.*

Now draw arcs, or portions of circles, through the two points marked 80, on the north quadrants, and the point marked 80 on the north radii of both circles, and this will give the projection of the parallel of north latitude of 80° in the Northern Hemisphere; do the same in the south quadrants and south radii of both circles, and this will give the projection of the parallel of south latitude of 80 in the Southern Hemisphere. Next, draw arcs, or portions of circles, through the two points marked 70 on the north quadrants, and the point marked 70 on the north radii of both circles, and this will give the projection of the parallel of north latitude of 70° in the Northern Hemisphere; do the same in the south quadrants and south radii of both circles, and this will give the projection of the parallel of 70° in the Southern Hemisphere. Proceed in the same manner until you have projected on the map all the parallels of latitude in both hemispheres, from 80 to 10 inclusive.

To draw the meridians in the Eastern Hemisphere, describe arcs of circles through the north and south poles as two points, and through each of the degrees marked 0, 10, 20, 30, etc., of *longitude*, whether *east* or *west*, as the third or middle point, and this will give the meridian of each point so marked, at *every ten* degrees from 0° to 180°, *east* or *west;* these meridians will serve as a guide to the determination of other meridians, and enable the geographer to approximate to the true position of those places which he may wish to lay down on the map, of which he has thus drawn the skeleton.

By the combined help of the parallels of latitude and the meridians, the draughtsman may now set to work to fill up this skeleton map from a table of latitudes and longitudes, with the names of all the most important places in the world; he may also draw a pretty correct outline of the coast of each continent by laying down the latitudes and longitudes of as many coasting points as possible from such a table, and drawing a curve through them, as like other maps of the world as he can; the accuracy of the map increasing with the number of points laid down according to their latitudes and longitudes. In Norie's Navigation, Table 56, are given the latitudes and longitudes of the principal ports, harbours, capes, shoals, rocks, etc., in the world, founded on thousands of observations made by the most eminent astronomers and navigators; and this table will enable a true student of geography to lay down the outline of the coasts of almost all the continents, islands, and peninsulas in the Map of the World, to any scale or size which he chooses to adopt. He may then fill up the interior of these with the positions of the most important places of the world, from the tables of latitudes and longitudes usually attached to the ordinary atlases used in colleges and schools.

Before concluding this lesson, it may be proper to remark that there are four small circles on the globe, placed among the parallels of latitude, which serve to divide the earth into five zones (from the Greek ζωνη, zo'-ne, *a belt*) between the two poles. The two smaller circles, which are of the same size, are called the *Polar Circles;* the one, the *Arctic, or North Polar Circle;* the other, the *Antarctic*, or *South Polar Circle.* The two larger circles, which are also of the same size, are called the *Tropics;* the one, the *Tropic of Cancer;* and the other, the *Tropic of Capricorn.* The polar circles are each 23° 28′ distant from the poles, when that distance is measured on a meridian: and, consequently, the one, the *Arctic Circle*, is the parallel of latitude 66° 32′ N.; and the other, the *Antarctic Circle*, is the parallel of latitude at 66° 32′ S.; because the poles being 90° distant from the equator, we have 90°— 23° 28′ = 66° 32′.

The *Tropics* are each 23° 28′ distant from the equator when that distance is measured on a meridian: and, consequently, the one, the *Tropic of Cancer*, is the parallel of latitude at 23° 28′ N.; and the other, the *Tropic of Capricorn*, is the parallel of latitude at 23° 28′ S.; each being at the distance of 66° 32′ from the poles, because, as before, 90°— 66° 32′ = 23° 28′. The origin of these circles was explained in a former lesson (page 80), and by referring to the diagram (Fig. 4) on that page you will see that they arise from the different positions of the earth in her orbit or path which she describes in a year in her motion round the sun. The constant inclination of the earth's axis to the plane of the orbit, or the parallelism of that axis to itself in all positions, occasions all the space around the poles to the extent of 23° 28′ from each to be alternately illuminated by the *oblique rays* of the sun for six months of the year, and alternately darkened by the absence of those rays for the same period. It also occasions all the space between the tropics and the equator, to the extent of 23° 28′ on each side of the equator, to receive the *direct rays* of the sun in succession, that is, to have the sun successively vertical to the inhabitants in every latitude, from 0° to 23° 28′ N., and from 0° to 23° 28′ S., for a period of six months alternately.

It is plain, therefore, that the spaces between the tropics and the polar circles can never have the rays of the sun vertical to them; but these rays will be more or less oblique to them in the course of a year—in the former case constituting winter with its preceding autumn; and in the latter summer, with its preceding spring.

The mathematical notion of the manner in which these circles are generated is the following:—Suppose the plane of the ecliptic (the *real path* of the earth in the heavens, and the *apparent path* of the sun in the heavens) to cut the globe, it must pass through the centre, O (see Fig. 4, p. 80), as the ecliptic is the path of the centre, and forms the circle whose radius is O R. This circle intersects the equator, E Q, at an angle, R O Q, of 23° 28′, called the obliquity of the ecliptic, and its two opposite points remotest from the equator (called *solstitial* points),* generate, by the revolution of the earth on its axis, the two tropics seen on opposite sides of E Q, the equator, the one being P R, 23° 28′ north of it, and the other at the same distance south of it. The extremities of the diameter of the globe at right angles to the circle of the ecliptic whose radius is O R, generate, by the same revolution, the two polar circles seen at equal distances, 23° 28′, from N. and S., the north and south poles, and touching the dotted perpendicular which is the said diameter produced.

The space or belt between the *two tropics* (from the Greek τροπος, trop'-os, *turning*) is called the *Torrid Zone.* The word torrid, which means *burning*, is derived from the Latin torreo, *to burn or roast*, and the zone is so called because it is *parched* by the *direct* rays of the sun falling on every latitude in succession during the year; its breadth is twice 23° 28′, that is, 46° 56′, measured on a meridian. The space between the *Tropic of Cancer* (so called, because when the sun appears to enter this constellation in the heavens, at *midsummer*, he seems to *turn* again and move towards the equator) and the *Arctic Circle* is called the *North Temperate Zone*, because the sun's rays fall neither so *directly* as to produce *great heat*, nor so obliquely as to produce *great cold*, although on the limits of the zone both will be felt in a very considerable degree; its breadth is 43° 4′, measured on a meridian. The space between the *Tropic of Capricorn* (so called, because, when the sun appears to enter this constellation in the heavens, at *midwinter*, he seems to turn again and move towards the equator) and the *Antarctic Circle* is called the *South Temperate Zone*, for the same reasons as stated respecting the *North Temperate Zone*, and its breadth is the same, being 43° 4′, measured on a meridian. The space between the *Arctic* (from the Greek αρκτος, ark'-tos, *a bear*, and thence taken to mean *the north*, because the constellation in the heavens called the *Great Bear* always points to the *north*) *Circle* and the *North Pole* is called the *North Frigid Zone*, because it is always *frigid* or cold in this space or portion of the globe, owing to the *great obliquity* of the sun's rays; its breadth is 23° 28′, measured on a meridian. Lastly, the space between the *Antarctic* (from the Greek αντι, an'-ti, *over against*, or *opposite to*, and αρκτος) *Circle* and the *South Pole* is called the *South Frigid Zone;* and its breadth is the same, being 23° 28′, measured on a meridian.

The following table contains the breadth of each of the zones in degrees and British miles, their surfaces in square miles, the middle latitude of each zone, and the length of the parallel in that latitude in miles:—

ZONES.	Breadths in Degrees.	Breadths in Miles.	Surfaces in Square Miles.	Mid. Latitude.	Length of parallel in Mid. Lat.
North Frigid	23° 28′	1,620	8,132,807	78°16′ N.	5,055
North Temperate	43 4	2,974	51,041,534	45 0 N.	17,576
Torrid	46 56	3,240	78,314,214	0 0	24,856
South Temperate	43 4	2,974	51,041,534	45 0 S.	17,576
South Frigid	23 28	1,620	8,132,807	78 16 S.	5,055
	180 0	12,428	196,662,896		

The determination of the numbers in the second and third columns of the preceding table depends on the length of the *mean diameter of the earth*, which, as we have seen before, is about 7,913 British miles. Hence, the *circumference of the earth* is about 24,856 miles, and the mean length of a degree on its surface about 69·045 miles. Consequently, we find that the extent of the *surface of the globe*, including both land and water, and taking no account of the elevations and depressions of either, is about 196,662,896 square miles; and that its capacity, or solid content, is about 259,332,805,054 cubic miles.

* The term *solstitial* means literally *sun-standing* (from Latin sol, *the sun*, and sto, *I stand*); it is applied to the apparent motion of the sun at those points, which seems to be so very slow that this luminary may be said to all appearance, for a few days, to be stationary.

Un, of Saxon origin, *not*, reverses the meaning of the word to which it is prefixed, as *un*natural, *not natural*, the opposite of natural.

"Thus was I, sleeping, by a brother's hand,
Of life, of crown, and queen at once despatched;
Cut off even in the blossomes of my sinne,
Unhousl'd, disappointed, *unanel'd*."
Shakespeare, "Hamlet."

Unanel'd is *unoiled*, not having received the oil of extreme unction; disappointed means *not prepared*. To *housel* is to minister the communion to one who is on his death-bed. *Housel* comes from the Saxon husel, *the host*, or sacrifice of "the sacrament of the Lord's Supper."

Un, from the Latin unus, *one*, is exemplified in *un*animous (Latin, animus, *mind*), *of one mind*; in *uni*parous, bearing one at a birth; in *uni*son (Latin, sonus, *sound*), *one single sound*; in *uni*vocal (Latin, vox, *a voice*), *having one voice* or *meaning*. *Un*, of Saxon origin, has in some measure yielded to *in*; thus, for the old form *un*perfect, we now say *im*perfect. "*Unpossible*" is quite obsolete.

Under, of Saxon origin, is found in such words as *under*sell, *under*prop, *under*value, *under*went. In the word *under*stand, the derivative or secondary meaning is very remote from its primitive; namely, *to stand under*. *Under*taker and *under*writer have, in process of time, come to have very special significations. *Under*taker, originally one who took on himself a certain duty, is at present applied to persons who are entrusted with the management of funerals; and *under*writers, properly signifying those who wrote (their names) *under* a legal document (in Latin, *subscriptor*), is a word limited to persons who render themselves liable in a policy of marine insurance.

Uni, of Latin origin (unus, *one*), occurs in *uni*corn (Latin, cornu, *a horn*), an animal with *one* horn; and *uni*form (Latin, forma, *form*), having *one* form.

Up, of Saxon origin, is found in *up*hill, *up*hold, *up*lift, *up*spring, *up*start, etc.

A summary of these prefixes arranged according to the sources whence they are derived, is presented in the following tables:—

1.—Prefixes from the Greek.

1. A, *not*.
2. Amb, *about*.
3. Ana, *up*.
4. Anti, *opposite*.
5. Apo, *from*.
6. Arch (k), *first*.
7. Auto, *himself*.
8. Cata, *down*.
9. Deca, *ten*.
10. Dia, *through*.
11. En, *in*.
12. Epi, *upon*.
13. Eu, *well*.
14. Hemi, *half*.
15. Hept, *seven*.
16. Hetero, *another's*.
17. Hex, *six*.
18. Hier, *sacred*.
19. Holo, *whole*.
20. Hyper, *above*.
21. Hypo, *beneath*.
22. Melan, *black*.
23. Meta, *after*.
24. Meter, *mother*.
25. Micro, *small*.
26. Mono, *alone*.
27. Neo, *new*.
28. Olig, *few*.
29. Ortho, *straight*.
30. Pan, *all*.
31. Para, *by the side of*.
32. Pent, *five*.
33. Peri, *around*.
34. Phil, *fond of*.
35. Phys, *natural*.
36. Pleos, *full*.
37. Poly, *many*.
38. Proto, *first*.
39. Pseudo, *false*.
40. Syn, *with*.
41. Tetr, *four*.

2.—Prefixes from the Latin.

1. A, *from*.
2. Ad, *to*.
3. Ante, *before*.
4. Bene, *well*.
5. Bi, *twice*.
6. Cent, *hundred*.
7. Circum, *around*.
8. Cis, *on this side*.
9. Co, *with*.
10. Contra, *against*.
11. De, *downwards*.
12. Demi, *half*.
13. Dis, *apart, not*.
14. E, *out of*.
15. Equi, *equal*.
16. Extra, *beyond*.
17. In, *in, into*.
18. In, *not*.
19. Inter, *between*.
20. Intra, *within*.
21. Magn, *great*.
22. Mal, *bad*.
23. Mille, *a thousand*.
24. Mod, *limit*.
25. Molli, *soft*.
26. Mort, *death*.
27. Multi, *many*.
28. Non, *not*.
29. Ob, *towards*.
30. Octo, *eight*.
31. Omni, *all*.
32. Par, *part*.
33. Per, *through*.
34. Pleni, *full*.
35. Post, *after*.
36. Pre, *before*.
37. Preter, *against*.
38. Pro, *forward*.
39. Pusill, *little*.
40. Putri, *rotten*.
41. Quadr, *four*.
42. Quinque, *five*.
43. Re, *back*.
44. Rect, *right, straight*.
45. Retro, *backwards*.
46. Se, *apart*.
47. Semi, *demi*.
48. Sept, *seven*.
49. Sex, *six*.
50. Soli, *alone*.
51. Sub, *under*.
52. Super, *over*.
53. Trans, *across*.
54. Tri, *three*.
55. Ultra, *beyond*.
56. Uni, *one*.
57. Vice, *in place of*.
58. Vivi, *alive*.

3.—Prefixes from the Saxon.

1. A, *in, on*.
2. Be, *intensive*.
3. By, *instrumental*.
4. Down, *descent*.
5. Ever, *always*.
6. For, *the reverse*.
7. Fore, *in advance*.
8. Mid, *half-way*.
9. Mis, *failure*.
10. Over, *above*.
11. Out, *not in*.
12. Step, *bereavement*.
13. Un, *not*.
14. Under, *beneath*.
15. Up, *upwards*.

In this summary of prefixes in English, there are 41 prefixes of Greek origin, 58 of Latin origin, and 15 of Saxon origin, making in all 114 prefixes.

This statement presents some curious facts in the way of deductions. Out of 114 prefixes in English, only fifteen belong to the language of our nurseries. How largely indebted then must the English be to the Greek and the Latin; and how necessary to every student of English is some acquaintance with those languages. Let it be observed that it is not merely that in English there are ninety-nine prefixes derived from the Greek and the Latin; but these prefixes enter into combination, and form very many words, the exact meaning of which can be known by those only who are acquainted with their compound parts. Truly ours is a composite language. It is also a rich language, and has great flexibility, owing to the diverse sources whence its vocabulary comes. How poor comparatively would the language have been, but for the treasures it has derived from the classical tongues!

Since so many of our prefixes are of foreign origin, our compound words must also be to a large extent of foreign origin. Consequently monosyllables may in general be regarded as Saxon.

I have given above the Greek, the Latin, and the Saxon, as the sources whence our prefixes are derived. The French might have been added; but the French is not an original source; words derived by us from the French may in general be traced back to the Latin as their parent.

A little attention may lead the student to suspect that there is some genealogical connection between the three sources of our prefixes. By comparing particles together, he might be led to trace a resemblance between *dia* and *dis*; *hemi* and *demi*; *hex* and *six*; *hept* and *seven*; *holo* and *whole*; *in* and *in*; *en* and *in*; *non* and *not*, etc. In reality such a genealogical connection does exist. The Greek, the Latin, and the Saxon (or Teutonic) are sister languages, being branches from the one stem called by linguists the *Indo-Germanic* or *Indo-European* stem, which comprises the Sanscrit, or the old sacred tongue of Hindostan; the Celtic, or parent of the Gaelic; the Erse, the Latin, the Welsh, the native Irish; and the Teutonic, the parent of the Greek, the German, the Dutch, and the Saxon-English. This family of languages then extends, you see, with some exceptions, from the banks of the Ganges to the western shores of Ireland. It extends also from the North Cape to the Strait of Gibraltar.

The epithet *Indo-Germanic* is in origin prior to the epithet *Indo-European*. Indo-Germanic was intended to include two classes of languages, namely, the Sanscrit (*Indo*) and the Germanic (*Teutonic* or *Saxon*); but when it had been ascertained that the Celtic was a kindred tongue, a more comprehensive epithet was required, and Indo-European was formed. But Indo-European errs somewhat in excess, since some dialects spoken in Europe are not of Indian, Celtic, or Teutonic origin. That the English, as well as the Greek and Latin, is connected with the Sanscrit, may be seen by comparing together these numerals in the different tongues.

Sanscrit.	*Greek.*	*German.*	*English.*	*Latin.*	*Erse.*	*Welsh.*
1. eka	hen	oin	one	unus	aen	un
2. dwi	duo	zwei	two	duo	da	dau
3. tri	treis	drei	three	tres	tri	tri
4. chatur	tettar	vier	four	quatuor	keathair	pedwar
5. panchan	pente	fünf	five	quinque	kuig	pump
6. shash	hex	sechs	six	sex	se	chwech
7. saptan	hepta	sieben	seven	septem	secht	saith
8. ashtan	okto	acht	eight	octo	ocht	wyth
9. navan	enneka	neun	nine	novem	not	naw
10. dasan	deka	zehn	ten	decem	deich	deg

To you there may not seem the close resemblance among these words, severally, which is obvious to the student who is aware of the changes which letters undergo in allied tongues, from laws and influences peculiar to each separate language; but surely there is enough in the tabular view just given to illustrate what I state as a fact; namely, that the languages of which specimens appear above are kindred languages. Look, for instance, at the forms through which the numeral *three* passes, thus: tri, treis, drei, three, tres, tri, tri.

From these statements you will see that words which are found in the Sanscrit, the Greek, and the Latin, or in the Sanscrit, the Saxon, and the Erse, may be designated Indo-European, inasmuch as they exist in the three great branches of that stalk—I mean in the Sanscrit, the Celtic, and the Teutonic.

Of these three—namely, the Sanscrit, the Celtic, and the Teutonic—the first may be considered as the most ancient tongue; the second stands next in age, and the third is the youngest.

You have been led to regard monosyllables as to a large extent of Saxon origin. But many words, commonly considered Saxon, are rather Indo-European, being found in Sanscrit, in Greek, and in Latin, or in one of these besides the modern English. Such words as know, lick, break, yoke, sit, are the common property of the Sanscrit, the Latin, the Greek, the German, and the English.

Had I space to exhibit the proofs of the relationship of these languages, I should dwell on the similarity which prevails in the modifications of number, person, case, tense, etc., which they severally undergo; but I can, in addition, do nothing more than set down in different tongues the variations of a few words of universal prevalence, which indicate a common origin.

English.	*Sanscrit.*	*Greek.*	*Latin.*	*Teutonic.*	*Celtic.*
Father	pitri (pader)	pater	pater	vater	athair
Mother	matri	meter	mater	mutter	mathair
Son	sunu			sunu	
Daughter	duhitri	thugater		dauhtar	dear
Brother	bhrati	phrator	frater	brothar	brathair
Sister	swarsi		soror	swistar	siur
Man	manu		homo	mann	
Woman	vamani		femina		femen
Eye	akshi	okko	oculus	augo	
Nose	nasa		naso	nase	
Tooth	danta	odont	dent	thuntu	dend
Sun	heli	helio	sol	sauil	haul
Moon	masa	men	mensi	mena	mios
Water	uda	udat	unda	vato	dour
Day	dyu	dio	diu	dag	dia
Sea	mira		mari	marei	muir
Light	loch (*to see*)	leuko	luc	licht	lhwg

LESSONS IN ARCHITECTURE.—III.

Cyclopean or Pelasgic Architecture—Early Monuments.

After the brief sketch of the origin of architecture in our last lesson (Vol. I., page 369), we must notice in proper order that system of construction, the monuments of which cover a great part of the Old World. This system had its origin among the Shemitic tribes, which at the commencement of civilisation peopled the fairest part of the globe. This early system, noted for the rudeness of its form, its stability without mortar, and the great size and irregularity of its materials, is attributed to the Pelasgians, a people originally from Upper Asia, who, according to Herodotus, spread themselves over Phœnicia and Asia Minor, and colonised Greece and Italy. Examples of this style of architecture, called Pelasgic, are found extending from the borders of Persia and Armenia to the western limits of Asia. The term "Cyclopean" is also applied to this kind of architecture, because, in Greece, these buildings of huge rough blocks of stone were fabled to be the work of the Cyclopes—a race of giants with one eye in the middle of the forehead, who laboured at the forges of Hephœstus, fire-god of the Greeks, and patron of all who wrought in iron. Crossing the Mediterranean, it spread over Greece, where the most remarkable monuments described by ancient authors, from the age of Hesiod and Homer, are traced, according to tradition, as far back as eighteen centuries before our era. This was the style of construction used in the heroic times of ancient Greece; and at a later period it was employed on certain important occasions.

The migrations of the Pelasgi carried this system into Italy, and we meet with it at every step, particularly in the central countries. Examples are also to be seen in nearly all the western islands of the Mediterranean, in the Balearic Isles, and some even on the coasts of France and Spain. In fine, by a remarkable coincidence, travellers who have drawn and described the monuments of Palenqué and Papantla, cities of Mexico destroyed long ago, and grown over by forests, exhibit constructions similar to those of the Pelasgi. The gigantic remains of the Pelasgic monuments, to this day subjected to examination by travellers, bear traces of different modes of building. Those which seem to be the most ancient are composed of blocks of stone, or rather of rocks, so rude and so immense that Pausanias, in speaking of the walls of Tiryns, near Nauplia, in Greece, built thirty-six centuries ago, describes them thus:—"These walls are constructed of unhewn stones, and are all of such dimensions that a yoke of oxen could not shake the smallest of them. The interstices are filled up with smaller stones, which serve to unite the larger ones." These walls present the same appearance now which they did in the days of Homer and of Pausanias. They are about 25 feet thick, and about 43 feet in height. Two temples, close to each other, in the island of Gozo, near Malta, are analogous in their construction to the walls of Tiryns. They are built of immense blocks of stone, forming a sort of artificial hill, in which are placed the naves and arches of the temples; but some of the rocks bear traces of the mason's tools.

It has been proved, by careful examination, that these edifices were dedicated to the gods of Asia. To conclude: the walls of Tarragona, on the east coast of Spain, are constructed, like the preceding, of immense rocks in their natural state. The application of instruments to building, at a later period, caused the edifices of the Pelasgians to assume another form. The stones taken from quarries were cut into irregular polygons, and placed one upon another in such a manner as to make the different faces of the geometrical figures which they employed coincide, the salient angles filling up the re-entrant angles formed by two adjoining stones in a manner precisely similar to that used in the present day for building walls of Kentish *rag*stone or Devonshire limestone. This was the ordinary manner of building under this system of construction. It is met with from Lake Van, on the frontiers of Armenia, to the west of Italy, Sardinia, and the Balearic Isles; and it is found in temples and in tombs, in public and private buildings, and in innumerable military constructions. At last, a third method presents itself in the walls of these early buildings—namely, that in which the stones are fashioned in the square form; and the buildings themselves, assuming the same form, exhibit a greater degree of civilisation, and the invention and application of more exact instruments. The walls of the ancient Mycenæ were built in this manner.

The continued and progressive order of these Pelasgic constructions is one of the most interesting facts in the history of the art of building—particularly when we refer them to an antiquity which goes back to the heroic time of Greece. Doubtless the gradual improvement which is to be seen in the walls constructed by this original people, does not reveal all the revolutions of this art in early antiquity; but it enables us to perceive the progress of the greater part of the civilised world, a progress which it must necessarily follow, because it is the nature of all human inventions to pass from early and rude attempts to successive periods of improvement and perfection. The Pelasgic monuments, sketched and studied at the present day, extend over a zone which, comprising the breadth of Western Asia, stretches over Greece and Central Italy; and this is not the whole of the ancient world, as we have already said, in which early monuments composed of rocks in their natural state have been seen by ancients and moderns; but they have been discovered in all the northern countries, and in Africa, from Egypt to the neighbourhood of Carthage; and we have reason to believe that in these countries, to the primitive constructions, a second period succeeded, more refined in its productions, and forming a step from the first attempts to the more perfect examples, of which we behold the numerous ruins in India, in Central Asia, in the valley of the Nile, and in the oases of the desert. These monuments of transition, so to speak, have disappeared under early and actual civilisation, and have even escaped the investigation of travellers.

First Regular Constructions, Pyramids, etc.

The Pelasgi, proceeding from the Asiatic plateaus, or table-lands, directed their steps towards the west; other Shemitic tribes marched towards the south and east, and peopled India, Persia, Assyria, and Arabia, as well as Ethiopia and Egypt. The art of these tribes, like that of the western branch, passed through a rude and primitive state, as we have shown—through the Beth-el style, or constructions in unhewn stones. It cannot be supposed that these tribes were more privileged than others, and were able, without previous attempts, to hew stones regularly, to mould and cement bricks, and to give to the union

Book, according to the directions placed at the top of each column, the persons *from whom they are received* being the *Creditors* in each transaction of this description, and the Account of *Bills Receivable* being the *Debtor*.

3rd. All *Acceptances* of Bills must be entered in the Bills Payable Book, according to the directions placed at the top of each column, the persons *by whom they are drawn* being the *Debtors* in each transaction of this kind, and the Account of *Bills Payable* being the Creditor.

4th. All *other* transactions (that is, exclusive of *Cash* and *Bills*) are to be entered in the Day-Book, or in such other Book as may be peculiarly appropriated for the entries of particular classes of transactions, such as the *Purchases* and *Sales* of Cotton, etc. In cases where such peculiar transactions are not passed through the *Day-Book*, the books containing the records of these transactions must be considered as so many *Day-Books* or *Subsidiary Books* in the general system.

The following is the form of the Cash Book which we recommend, with the entries of all the *Cash* and *Bank* transactions from *January* till *June*, as laid down in the *Memoranda of Transactions*, given in the two preceding lessons.

CASH BOOK.

ACCOUNT. (I)

Dr. Cr.

1881.		Receipts.	‖ Bank Col.	Cash Col.	1881.		Payments.	‖ Bank Col.	Cash Col.
Jan.	1	To Stock Account	1200		Jan.	3	By London and Westminster Bank	1200	
,,	5	,, London and Westminster Bank	10	0	,,	5	,, Petty Cash		5 0
,,	17	,, London and Westminster Bank	985	0	,,	10	,, Petty Cash		5 0
,,	22	,, London and Westminster Bank	10	0	,,	17	,, Three per Cents. for £1000 stock		985 0
,,	31	,, Balance of Deposits	195	0	,,	22	,, Private Account		10 0
					,,	31	,, Balance of Cash		195 0
		£	1200	0			£	1200	0 0
Feb.	1	To Balance of Cash	195	0	Feb.	1	By Balance of Deposits	195	0
,,	5	,, London and Westminster Bank	100	0	,,	5	,, Thomas Watson, loan	100	0
,,	22	,, Thomas Watson, repayment of loan	100	0	,,	22	,, London and Westminster Bank		100 0
,,	26	,, London and Westminster Bank	120	0	,,	26	,, Darling and Co., loan	120	0
,,	28	,, Balance of Deposits	75	0	,,	28	,, East India Company, Deposit	75	0
					,,	,,	,, Petty Cash		10 0
					,,	,,	,, Balance of Cash		75 0
		£	295	0			£	295	0 0
Mar.	1	To Balance of Cash	75	0	Mar.	1	By Balance of Deposits	75	0
,,	,,	,, Brown and Smith	300	0	,,	,,	,, London and Westminster Bank	300	0
,,	3	,, Three per Cents. for £1000 stock	1000	0	,,	2	,, James Manning, Brokerage		3 12
,,	5	,, Darling and Co., repayment of loan	50	0	,,	3	,, London and Westminster Bank	1000	0
,,	10	,, London and Westminster Bank	200	0	,,	5	,, London and Westminster Bank	50	0
,,	14	,, Williams and Co.			,,	10	,, White and Co.	170	0
,,	16	,, Thomson and Co.			,,	14	,, London and Westminster Bank		
,,	21	,, Williams and Co.			,,	17	,, White and Co.		
,,	26	,, London and Westminster Bank	600	0	,,	18	,, Private Account		
,,	29	,, Althorpe and Co.			,,	21	,, London and Westminster Bank	200	0
,,	30	,, White and Co., loan			,,	26	,, White and Co., repayment of loan	740	0
,,	31	,, Balance of Deposits	1735	0	,,	31	,, Balance of Cash		1746 13
		£	2535	0			£	2535	0 2795 8 6

LESSONS IN BOOKKEEPING.—X.

SUBSIDIARY BOOKS.

In our two preceding Lessons we have laid down a set of Transactions for the student to enter in the subsidiary Books, according to the rules given in our former lessons. We now proceed to show the manner of making these entries, according to the date of each transaction, viz.:—

1st. All *Receipts* and *Payments* of Cash are to be entered in the Cash-Book, in the proper *Cash columns*, Cash Account being made Dr. *to* every personal or fictitious account, from whom, or on account of which, money has been *received*; and Cr. *by* every such account, to whom, or on account of which, money has been *paid* away. Moreover, all moneys *drawn* from or *lodged* with the Bank must be also entered in the Cash-Book, in the proper *Bank columns*, Cash Account being made Dr. for every sum *withdrawn* from the Bank; and Cr. for every sum *deposited* in the Bank.

2nd. All *Drafts* or *Remittances* in Bills must be entered in the Bills Receivable

HISTORIC SKETCHES.—XIX.

HOW ENGLAND AND SCOTLAND BECAME ONE.—PART II.

With an army at his command, Wallace availed himself of his intimate knowledge of the country, and effected a series of surprises on the English garrisons, which fell before him like huts before an avalanche. Ormesby, Earl Warenne's deputy, fled from Scone on hearing that an attempt would be made to take him there, and he carried to his chief the news of the rising of the Scots.

With 40,000 men Earl Warenne marched northwards, and, meeting Wallace at Cambuskenneth, near to Stirling, thought to crush him by sheer weight; but the Scotch captain, who had meantime been joined by Sir William Douglas and many other noblemen, so skilfully conducted himself that he was able to fall on the English piecemeal, and utterly to defeat them ere their whole strength could be displayed. Earl Warenne retreated across the border, and Wallace, flushed with victory, carried the war into England, and ravaged and plundered the whole bishopric of Durham.

Edward, on receiving this news, came over from Flanders, and hastily marched to the north with an army computed at 100,000 men. At Falkirk, on the 22nd of July, 1298, he encountered the Scots' army under Wallace, and entirely routed it, with an enormous loss in killed and wounded. So exhausting, however, was the effort, that Edward retreated instead of following up his success, and the Scots employed the interval in trying to get help both from the French king and the pope. The former refused the slightest assistance, but the pope, Boniface VIII., took up the matter by ordering Edward to refer his claims to the papal arbitration, seeing that the pope was lord paramount of all the kingdoms in the world. The English king, however, quickly disposed of this claim by informing the pope that "neither for Zion nor Jerusalem would he depart from his just rights while there was breath in his nostrils;" and the English Parliament, before whom the pope's bull was laid, resolved with one voice, "that in temporal matters the King of England was independent of Rome, and that they would not permit his sovereignty to be questioned."

The war with Scotland went on for two years with changeable fortune, the Scots on the whole getting the best of it, when in 1302-1303 Edward took the matter in hand himself, and entering Scotland with a powerful army, applied himself vigorously to the campaign. Town after town succumbed to him, the magic of his skill made the strong places yield, and the heart of Scotland became chilled, as stroke after stroke of his heavy sword fell upon her devoted children. The English dominion was re-asserted in almost every part, and when in 1304 William Wallace was betrayed by Sir John Monteith, and subsequently beheaded in London as a traitor, hope itself seemed to be dead within the Scottish breast.

In 1305-6, however, Robert Bruce, Earl of Carrick, grandson of the competitor of Baliol, and one of those to whom Edward chiefly looked to secure his Scotch conquests for him, awoke to a sense of his duty, and entered into a plot for the overthrow of the Anglo-Scotch tyranny. Accident suddenly compelled him to declare himself; the principal Scotch nobles espoused his cause, and so strong did Bruce find himself that in March, 1306, he caused himself to be crowned king at Scone, the ancient coronation-place of the Scottish kings.

Overwhelming were the preparations made by Edward to crush the rebellion, as he called it. The Earl of Pembroke and other commanders invaded the country, and defeated Bruce and his friends in many encounters; so that by the winter of 1306 many of the chiefs were taken and executed, and Bruce himself was a wanderer. Nevertheless, in the spring of 1307, Bruce with a small band of followers appeared in Arran, and, passing into Ayrshire, was soon enabled to show a front. Sir James Douglas joined him, and his success became so marked and signal, that Edward found himself under the necessity of marching in person against him.

How Edward did march, and how he died on his way in sight of the Scottish border, and how before he died he made his son promise to carry his unburied corpse with the army till Scotland should have been subdued, are matters of history. So is it matter of history how, six years afterwards, in 1313-14, that son marched with an enormous army, and how at Bannockburn, on the 25th of June, 1314, Bruce overthrew him, and routed with irretrievable loss, both of men and prestige, the whole English army, inflicting a greater blow than the English arms had suffered since the Conquest, and establishing once and for ever the independence of the kingdom of Scotland.

Several futile attempts were subsequently made to assert the English supremacy over Scotland, and the English kings for some time consoled themselves with the barren comfort of refusing to recognise the kings of Scotland as independent; but since the well-won battle of Bannockburn was fought the question was never put practically to Scotland, as it had been done before, which of the realms should be the greater. The same inconveniences which the policy of Edward I. sought to remove continued to present themselves; Scotland remained a source of danger, a thorn in the side, to England; national antipathies, aggravated by constant provocations, and finding vent perennially in border warfare, were fostered between the two countries, till the death of Queen Elizabeth opened the way to a community of interest, and a unity of state policy. Whenever, after Bannockburn, there was fighting between England and Scotland, it was always conducted on the principle of equality in status in the belligerents; the words "lord paramount" and "vassal" were no longer heard; and the Scots, jealous of any, the slightest dictation, whether from Southron or any other, were always ready to "fight for the liberty which was dearer to them than life."

It is a common error to suppose that when James VI. of Scotland and I. of England ascended the English throne, the crowns of the two countries resting upon one head, united the two kingdoms. England and Scotland remained separate and distinct in every respect, save as to their king; they had separate parliaments, separate laws, a distinct religion, different social customs. There was not, of course, the same danger to either country as there had been before the power of peace or war centred in one man; but the national antipathies and prejudices became probably stronger for being brought more closely into contact. All through the English civil war the Scots acted as an independent people, and refused to meet the English in a common council, though they were engaged in a common cause. It was not till 1707, when Queen Anne was on the throne, that the union of England and Scotland into one kingdom under the name of Great Britain, was accomplished. Not without much difficulty, much delicate negotiation, much giving and taking, was the union effected; but the conditions, contained in twenty-five articles, having been agreed to, the two realms were so inseparably united that nothing short of successful revolution could ever sunder them again. The principal conditions of the union are appended, not only in justification of this assertion, but because they are not themselves generally known.

The Parliaments of the two countries agree that—

1. On the 1st of May, 1707, and for ever after, the kingdoms of England and Scotland shall be united into one kingdom, under the name of Great Britain.

2. The succession to the monarchy of Great Britain shall be the same as was before settled with regard to that of England.

3. The united kingdom shall be represented by one Parliament.

4. There shall be a communication of all rights and privileges between the subjects of both kingdoms, except where it is otherwise agreed.

5. When England raises £2,000,000 by a land-tax, Scotland shall raise £48,000.

16, 17. The standards of the coin, of weights, and of measures, shall be reduced to those of England throughout the united kingdoms.

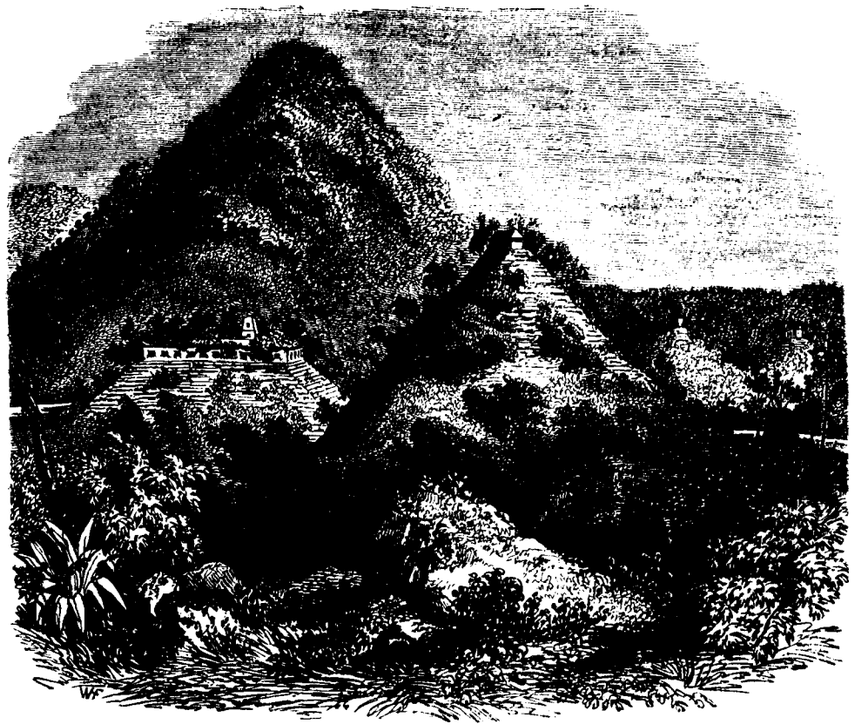
18. The laws relating to trade, customs, and the excise, shall be the same in Scotland as in England. But all the other laws of Scotland shall remain in force, although alterable by the Parliament of Great Britain.

22. Sixteen peers are to be chosen to represent the peerage of Scotland in Parliament, and forty-five members to sit in the House of Commons. [The Reform Act of 1832 added eight members.]

23. The sixteen representative peers of Scotland shall have all privileges of Parliament; and all peers of Scotland shall be peers of Great Britain, and rank next after those of the same degree at the time of the union, and shall have all privileges of peers, except sitting in the House of Lords, and voting on the trial of a peer.

*

of these materials architectural forms, without going through that initiatory process which characterises the origin of all human inventions. Yet the plains of Chaldea soon exhibited constructions which had a great influence over primitive art in the East, and formed the basis of a system which extended its branches even to the West. The want of stones in Mesopotamia taught the inhabitants to mould bricks, and the most ancient temple of which we have any mention, called the Temple of Baal, was an immense pyramid built of bricks piled on one another, and forming, according to report, eight storeys or rows, gradually receding from each other. At the top of this building they sacrificed to Baal; at a later period the Chaldean kings placed his statue there, when their artists had made some progress in the art of sculpture. It is probable that this pyramidal-formed temple owed its origin to their remembrance of the practices of those Caucasian countries whence the Shemitic tribes derived



THE PYRAMIDS OF PALENQUÉ, MEXICO.

their origin. Herodotus gave a glimpse of the truth, when he said that the Scythians made their temples or altars with a great quantity of wood heaped in the form of a pyramid. However the case may be, this very simple form, which appears to have come naturally to the minds of those men who were the first to raise large constructions, spread itself over all Asia; the ancient pagodas of India are built in this form; the most ancient monuments of Lower Egypt and Ethiopia, where the Shemitic tribes settled in Africa, are all of them pyramids. In Asia whole cities—Ecbatana, for example—presented numerous concentric enclosures rising one above another in such a way as to exhibit the pyramidal form. The celebrated Hanging Gardens of Babylon, formed of numerous terraces, one above another, had also the same configuration. In short, this must be considered as the progress of architecture, when we see that the most ancient religious edifices of the Mexicans are immense pyramidal buildings, simple at first like those of Chaldea, and of Lower and Upper Egypt; but at a later period ornamented with sculpture like the pagodas of India. Ancient public buildings were also found in Mexico of a pyramidal form. It is evident that these first regular constructions were thus generally established; and the greater part of the primitive world adopted them, with the exception of those countries where great political events interrupted the first movements of civilisation, and suspended the march of the arts; with the exception also of those whose inhabitants, less endowed by nature, necessarily remained in the rear of civilisation, and only received a movement of this kind from their neighbours, or from an invasion of some people more advanced in civilisation. The first builders worthy of the name from their ability to mould bricks, and hew stones to raise their gigantic monuments, were compelled to follow the road in which they were placed. The want of experience, the absence of instruments and machines, prevented them from raising, at first, great edifices with vertical façades or fronts, such as they were enabled to construct at a later period. To form large foundations, and to raise above them materials with gradual and numerous recesses such as would prevent the fall of the upper parts of the building, was the first law of construction and of statics to which they were obliged to submit. This is so true that, after having made their great steps in the art of building, and become able builders, the Indians, the Chaldeans, the Ethiopians, and the Egyptians, still continued in the path of which the pyramid was the starting-point, by raising their edifices in such a manner as to give to their façades a great inclination in order to obtain greater stability; a wise system, which was adopted by the Etruscans when they left Asia, where these principles were long established. They were also spread over a part of Italy, and traces of them are found at Norchia. The same ideas exerted their influence over the early edifices of the Greeks, and they are found in a modified form among the finest specimens of their later architecture. They are recognised, for instance, in the remains of the Parthenon, or Temple of Minerva at Athens, where the inclination of the jambs of the doors and windows still exists. Mexico also bears witness to this, as may be seen in our remarks on the first regular constructions of that country.

COMPARATIVE ANATOMY.—I.

INTRODUCTION—TERMS EMPLOYED IN CLASSIFICATION.

THE simple instructions given by Linnè to all succeeding naturalists were "Observe and compare." This Swedish naturalist, whom we call Linnæus, assiduously followed his own maxim, and became one of the greatest masters of the description, and the largest contributor to the science of the classification, of living things whom the world has known.

All the higher animals are free, locomotive, well-defined individuals. Each has within the circumscribed limits of its body, whether that body be of moderate dimensions or extremely minute, every organ which is requisite to self-existence and reproduction. The actions which the body has to perform in order to carry on that orderly system of constructive change which is always associated with life, are very numerous. To perform these actions, many complex organs are required; hence an animal is a very compact piece of machinery, no part of which can be dispensed with without crippling the whole. As in a large factory every band, and wheel, and rod, from the great piston to the little bobbin, has its separate office, the adaptations to which have required thought and contrivance; so there is no part of any animal which is not fitted to carry out some necessary function.

The outward form of animals is often beautiful, and the study of it instructive; but it is obvious that we cannot expect to know anything of the animal, considered as a machine, until we have searched it throughout by cutting down to every internal organ, and examining all the peculiarities of each. If we neglect to do this, it is not only probable, but *certain*, that in the unexamined part we shall leave some secret of its life, some admirable contrivance, some wonderful adaptation, unnoticed. This leads us to the conclusion that in order to acquire a knowledge of living things we must use the knife. The microscope, the injecting syringe, and all the appliances of modern science, may be used, but the knife or scalpel is indispensable, and the use of it has given a name to the science. The word *anatomy* is derived from the Greek *ανα* (an'-a), *through*, and *τομη* (tom'-e), *a cutting*. In following the Linnæan direction to *observe* in this realm of Nature, it was natural that the only means of observation should give its name to the science which sprung out of the investigation. At first, however, the study was directed upon one species only. If in more senses than one the proper study of mankind is man, it was natural that at first the human frame should have monopolised all the attention of scientific dissectors. Hence the word *anatomy* was applied to the study of the structure of the human species. As science advanced, other animals were examined in the same way, and the new study, as it always suggested a comparison with the results of the old, was called *comparative anatomy*.

Comparative anatomy is a study of all the parts of all the different kinds of bodies which are found in the animal kingdom, so far as structure is concerned. Strictly speaking, it treats of the dead animal alone. It describes the machine when the motive power has ceased to act. Nevertheless, in examining the structure of a species it is quite impossible, and very undesirable, to exclude the idea of the function which the several parts have to perform when animated with life. Thus the twin studies of anatomy (or the structure of living beings) and of physiology are indissolubly connected, though distinct from one another. The mechanist has to do with the several parts of the engine while they are at rest, but every fitting is constructed with reference to motion. He cannot exclude the idea of motion while he is constructing his machine. He asks himself at every stage, Will it go? will it do its work well? The works of God cannot be constructed by man, and their simplest contrivances can scarcely be imitated; but man can examine and analyse them, and as he does so he will be continually asking himself, How does this structure act in the living animal? and exclaim, as knowledge dawns upon him, How admirably is this organ constructed to do its work!

The words *comparative anatomy*, however, suggest another truth—they suggest that living beings may be compared with one another. Every animal might be made a study by itself, as man has been. The fact that man's frame has been the subject of thousands of books, and the object of millions of investigations, and still affords unsolved problems, shows that the study of each species is almost unlimited. On comparing the bodies of different animals, it is found that they are not totally dissimilar structures. The first thing which strikes the student is that a very large number of animals are constructed upon the same ground-plan—they differ only in the details of their structure. Now, the details of structure are often most apparent on the exterior, while the essential plan lies deeper. The anatomist (*i.e.*, dissector) will often reveal a similarity between two animals which the zoologist would not suspect. If we take two animals so utterly dissimilar in size, outward form, and habits as the bat and the pig, and dissect them, we shall find that in the main they are alike. Not only is there a bony axis composed of many joints in the interior of the body of each, which supports the animal, gives origin to the muscles, and protects the nervous matter, but with few and slight exceptions we find bone for bone, muscle for muscle, nerve for nerve, in comparing each point of the internal structure of the two animals. Not only is the fore-limb of a dog built upon the same plan as the arm of a man, but it is essentially more like it than it is to the hind-limb of the same animal.

The similarity of structure which is found throughout a very large number of animals is the first fact which strikes every candid student of comparative anatomy. It is fortunate for the study that this is the case. If every animal were built up on an independent plan, no one could hope to gain a comprehensive view of the structure of the animal kingdom; nor would the study be so interesting, for the human mind delights in similitudes and generalisations; moreover, on this likeness of structure all classification of animals depends.

In pursuing his study, the comparative anatomist finds that while a very large number of animals are constructed after the same pattern, this pattern does not run through the structure of all animals. He finds another multitude of animals which are built upon a plan common to them all, but this plan is quite different from that which characterises the first group. When he has determined the number of these large groups, he finds further that each species in one of these groups is not in the same degree like or unlike every other of the same group. If *a*, *b*, *c*, etc., represent a number of animals in a large group, he finds that *c* is not as like to *a* as *b* is to *a*, so that he can arrange them in something like order, placing one next to that to which it is most like, so as to show that though *z* be to a great extent unlike *a*, yet it is connected with it by the intermediate links. Our student also will find that each species is not in the same degree like or unlike even its next door neighbour, as every other two next door neighbours are. In other words, there are gaps in the series, and very useful these gaps are, because they enable us to split up the tens of thousands of species which belong to each group into natural sections. The great groups themselves are probably only caused by very wide gaps; and these groups are subdivided by less marked gaps into smaller groups, and so on. The reader must always remember that the vast scheme of animated nature is far more complex than any of these poor illustrations express, or else he will be misled by that which was intended to explain it. Perhaps the best illustration of the relations of animals to one another is that of the richly-branched head of a large tree. In summer, when the leafy covering presents an even surface to the eye, the connection of the ultimate twigs is not apparent; but in winter we can see that a number of twigs spring from one little bough, a number of these boughs spring from a branch, and a number of these branches may be traced down to where they diverge from the giant fork.

It follows from this arrangement that a great many things may be said about the structure of each animal in one group which will be true of all in that group. A great many more facts may be stated of the animals of a smaller group, and so on. Now, these statements are the results of comparative anatomy, and the only true grounds of classification.

The comparative anatomist has a most difficult task before him, and the collected wisdom of all comparative anatomists has not saved them from many blunders; but every student of the science has this satisfaction: he knows that the classification which is being worked out is not an imaginary but a real one. The classification which unites animals into groups within groups, grounded on their likeness more or less to one another, indicates a real and natural relationship in those which are placed together. Whether this classification indicates a material blood-relationship, or reveals the plan of the Almighty

LESSONS IN CHEMISTRY.—VI.

HYDROGEN.

SYMBOL . . H — ATOMIC WEIGHT . . 1 — DENSITY . . 1.

HYDROGEN is a permanent gas, without colour, taste, or smell. It is never found free in nature, and is the lightest known body, being 14·47 times lighter than the air.

It was distinguished by Cavendish in 1766 as being one of the constituents of water, from the decomposition of which the gas is generally procured.

PREPARATION.

The metals of the alkalies (K, Na, etc.) and of the alkaline earths (Ca, Sr, and Ba) have the power of decomposing water at ordinary temperatures. If a piece of potassium be thrown on water, the potassium takes the oxygen, forming potash, and the chemical action is so vigorous, that sufficient heat is developed to set fire to the escaping hydrogen. Care must be taken not to hold the face too near when the flame has ceased; for there remains a globule of potash, which is in a melted state, and when it cools down to such a temperature as to permit the water to come in contact with it, steam is generated in a large quantity, and the melted potash blown out of the water.

The following equation expresses the action:—

$$H_2O + 2K = K_2O + 2H.$$

The potash (K_2O) is dissolved in the water, which then possesses the "greasy" feel of an alkaline liquid. It will "blue" red litmus paper, and convert oil poured into it into soap.

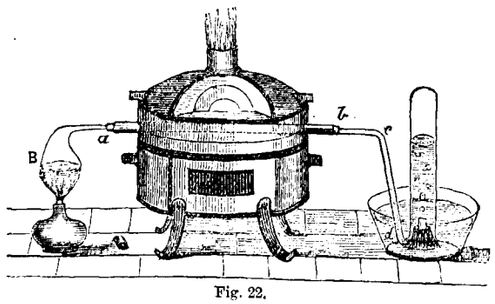


Fig. 22.

If sodium be used instead of potassium, the metal will melt into a globule, and run about on the water, being pushed by the atoms of hydrogen escaping from its under-surface; but the action is not violent enough to set fire to the gas. If, however, the water be thickened with starch, so as to increase the vigour of the action, the hydrogen will be lit. In this case soda (Na_2O) and hydrogen are the products of the reaction.

To collect the gas in these cases, fill a test-tube with water, place the thumb over its end, and then invert it in a bowl of water. Wrap a small piece of the metal in paper, and quickly pass it under the mouth of the test-tube, which is, of course, beneath the surface of the water. The gas thus collected will exhibit the properties of hydrogen. To prepare this gas in large quantities, some iron turnings are placed in a porcelain tube, *a b* (Fig. 22), which passes through a charcoal furnace. Steam is generated in the flask, B, and as it passes over the red-hot iron it is deprived of its oxygen, which forms with the iron the same compound as was produced when the iron was burnt in oxygen (Fe_3O_4, the magnetic oxide): thus the action will be—

$$3Fe + 4H_2O = Fe_3O_4 + 8H.$$

Zinc, tin, and some other less important metals, also have this power of decomposing water at a high temperature.

But the property which these metals likewise possess of decomposing water in the presence of an acid is taken advantage of in the laboratory for obtaining the gas. A "Woulff's bottle" with two necks—as is shown in Fig. 23—is used, or a bottle with *one* wide neck, into which a cork is fitted, pierced with two holes. The long tube with a funnel is a "safety tube," by which the acid is added; the other tube is the "delivery tube," from which the gas is conducted into a receiver, as in the case of oxygen.

On account of the lightness of the gas, it is frequently collected by "displacement," as in this diagram. The hydrogen rises to the top of the jar, and displaces the air.

To prepare the experiment, some granulated zinc—which is obtained by pouring melted zinc into cold water—is placed in the bottle. Water is added, and then sulphuric acid (1 part of the acid to 8 of water) gradually. Bubbles of the gas rapidly rise. Iron may be used; but it generally contains carbon, and the gas comes off mixed with some compound of carbon and hydrogen, and is rendered explosive. The action is thus represented:—

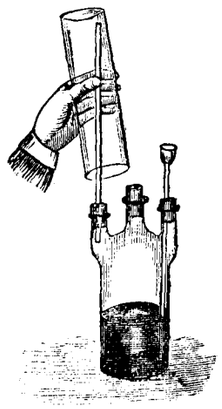


Fig. 23.

$$Zn + H_2SO_4 = ZnSO_4 + H_2.$$

Thus zinc sulphate (white vitriol) is formed, which is dissolved in the water. If the water be evaporated slowly, this salt *crystallises out* in white needles.

The decomposition of the water will be explained to be due to the agency of electricity. Hydrogen may also be set free from hydrochloric acid (HCl) and zinc: thus—

$$Zn + 2HCl = ZnCl_2 + 2H,$$

forming zinc chloride and hydrogen.

When hydrogen burns, it of course forms with the oxygen water. If into a jar full of hydrogen a burning taper be introduced, it will be extinguished; but the gas will burn with a pale yellow flame at the place where it meets the oxygen of the air. During the experiment the jar must be held mouth downwards, and the disc of yellow flame gradually passes up it.

The gas may be lit as it escapes from the generating jar. For this purpose the delivery tube must be drawn to a point. If over this flame a dry jar be held, the water formed in the combustion will be deposited as dew on the sides of the jar.

A singular property of the hydrogen flame may be shown by allowing it to burn in a tube of glass or metal: a musical note is produced; the explanation being, that the flame of hydrogen is in reality a series of rapid explosions, which cause the air in the tube to vibrate, thus producing the note.

In lighting the gas, the greatest care must be taken to allow sufficient time for all the air to be expelled from the bottle. Should there be any oxygen in it, the mixture will explode with great violence; and in all cases it is a safe preservative to wrap a damp cloth round the bottle, which will prevent the glass from flying, should there be an accident. To show the lightness of the gas, a balloon of gold-beater's skin may be fastened to the delivery tube, which will rise when it becomes filled. If the india-rubber balloons be used, it will be necessary to pass the

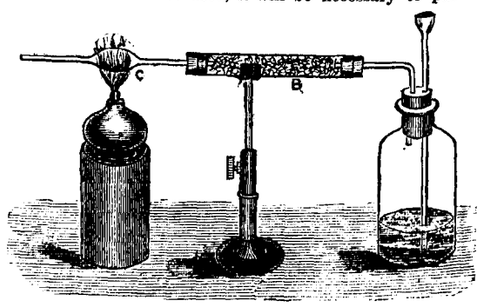


Fig. 24.

gas into an india-rubber bag, and then into the balloon, for the pressure of the gas escaping from the bottle is not sufficient to distend the balloon. The same experiment may be shown by blowing soap-bubbles with the gas.

In the laboratory hydrogen is frequently employed as a reducing agent. If we heat to redness in an atmosphere of hydrogen metallic oxides, chlorides, iodides, bromides, or sulphides, the gas combines with the oxygen, chlorine, iodine, bromine, or sulphur, forming H_2O, HCl, HI, HBr, and H_2S respectively. The experiment is arranged as in Fig. 24. B is a tube packed with calcium chloride, which takes all moisture from the gas (this is not actually necessary). C is a "reduction tube."* Place in the bulb a little black oxide of copper, and apply heat. The hydrogen will take the oxygen, forming H_2O, and the metallic copper will be found in the bulb. Thus—

$$CuO + H_2 = H_2O + Cu.$$

The same experiment may be performed with iron filings. Iron has such a strong affinity for oxygen that it is never obtained in a pure state, save by this means. The filings will assume the colour of pure iron—dark blue; and when scattered out of the tube into the air, so rapidly do they combine with the oxygen again, that they become red-hot.

THE DIFFUSION OF GASES.

If oil and water and mercury be shaken in a bottle for any length of time, the moment the motion ceases the mercury will sink to the bottom and the oil rise to the top, but this is not the case with gases; if it were, our world would not be habitable.

Take two flasks, and connect them by a small tube passing through the cork of each. Place them as in Fig. 25; fill the top one with hydrogen, and the other with carbonic acid—a very heavy gas—and it will be found that the gases mix, the carbonic acid rising, and the hydrogen falling.

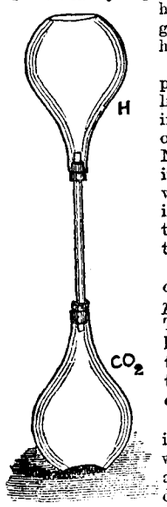


Fig. 25.

This fact may be strikingly shown by plugging up the end of a long tube with a little plaster of Paris. Moisten the powder into a clay, and then place some in the end of the tube—quickly, for it soon "sets." Now fill the tube with hydrogen, and stand it in a glass containing some coloured water, and the water will be found to rise in the tube, for the hydrogen passes out through the plug with greater rapidity than the air passes in; hence the water rises.

It has been discovered that the *rate of diffusion of different gases is inversely proportional to the square root of their densities.* Thus oxygen is 16 times heavier than hydrogen; the square root of 16 is 4, and that of 1 is 1: therefore hydrogen passes through the diaphragm 4 times faster than oxygen.

As hydrogen is the lightest of all bodies, it is taken as the standard of the atomic weight, and if we know its weight we can always find that of any other gas; for the densities of all these elements, which can be got in the gaseous state, are identical with their atomic weights. There are, however, two notable exceptions to this law, *phosphorus* and *arsenic*, whose vapours have densities just twice their atomic weights.

In the case of almost all compound gases, the density is *half* the combining weight.

The weight of a litre of hydrogen at 0° Cent. and 760 mm. [millimètres] pressure (the standard temperature and pressure) is 0·08936 *grammes.* **Therefore at the same temperature and pressure—**

1 litre of O weighs $16 \times 0{\cdot}08936$

1 litre of Cl weighs $35{\cdot}5 \times 0{\cdot}08936$

1 litre of CO_2 weighs $\frac{44}{2} \times 0{\cdot}08936$

1 litre of HCl weighs $\frac{36{\cdot}5}{2} \times 0{\cdot}08936$

etc. etc.

It is necessary to have a standard of temperature and pressure, since the volumes of gases are very much altered by a change in either.

EFFECT OF CHANGE OF TEMPERATURE ON GASES.

It has been found by careful experiment that when heated gases expand *the* $\frac{1}{273}$ *part of their volume at* 0° *for every degree Centigrade*, this fraction, or its equivalent decimal 0·003665, is called "the co-efficient of the expansion of gases." There is no similar co-efficient for solids, for all differ in their expansions, whereas gases expand alike. The alteration in volume for a change of temperature is easily found—

273 volumes of gas at 0° Cent.			
become 274	,,	,,	1° ,,
275	,,	,,	2° ,,
276	,,	,,	3° ,,
etc.			etc.
273 + t	,,	,,	t°

If, therefore, we require to know what volume 500 litres of hydrogen at 50° would become at 120°, we ask what 273 litres do under the same circumstances. 273 would become 323 at 50°, and 493 at 120°: hence this proportion will give us the required volume:—As 323 : 493 : : 500 : the new volume; or according to the formula: $V^1 = V\left(1 + \frac{n}{273+t}\right)$, in which V and V^1 are the new and old volumes, t is the temperature of V, and n the number of degrees the temperature is altered. For Fahrenheit degrees the expansion will be $\frac{1}{273} \times \frac{5}{9} = \frac{1}{492}$ of the volume at 32° for each degree. It is right to observe that this law is not absolutely accurate; yet it is sufficiently so for all practical purposes. The reader will note that the increment is a fraction of the *volume at zero*, and therefore an absolute quantity; if it were a fraction of the volume at *any* temperature, the increment would be variable. It will be evident from the above that it is necessary to have a standard temperature, to which to reduce all gases, in order that they may be compared under the same circumstances. The temperature of melting ice, or 0° Centigrade, has been fixed upon.

EFFECT OF PRESSURE ON THE VOLUME OF GASES.

Boyle, an English, and Mariotte, a French philosopher, discovered independently of each other the law which bears their name—*Boyle and Mariotte's law*—"The volume of a gas is inversely proportional to the pressure to which it is subjected."

If, for instance, a litre of gas supports a pressure of 1 kilogramme, and the pressure be increased to 2 kilogrammes, the volume will soon become $\frac{1}{2}$ a litre. The pressure generally exerted on gases is the weight of the atmosphere, which is measured by the *barometer*. If a glass tube, A B (Fig. 26), sealed at one end, and about one yard long, be filled with mercury, and then inverted into a vessel also containing that metal, the mercury in the tube will be found to fall, leaving a space, A C, of about six inches empty; this is called "Torricelli's vacuum." That is, the column of mercury in the tube is exactly the weight of a column of air its own size, to the top of the atmosphere. If from any cause the weight of the air alter, the mercury will rise or fall accordingly. The standard pressure of the atmosphere is in English 30 inches, in French 760 millimètres. If the tube were a square inch in surface, then 30 inches of mercury would weigh 14·67 lbs., or the pressure of the atmosphere on every square inch is 14·67 lbs. When great pressures are used, they are measured by "atmospheres." For instance, we say a gas liquefies with a pressure of 35 atmospheres, which will equal $35 \times 14{\cdot}67 =$ 513·45 lbs. on every square inch.

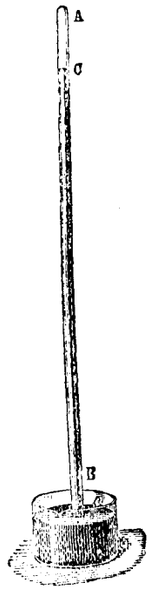


Fig. 26.

According to Boyle and Mariotte's law, whenever we want to find the alteration the volume of a gas undergoes by a change of pressure, we form with the new pressure and the standard pressure, 760 mm., a fraction. If the pressure be increased 760 must be the numerator, if diminished the denominator, and by this fraction we multiply the original volume of the gas. For example: 500 litres of air are now under the pressure of 712 mm.; what would be their volume at the standard pressure? Here the pressure will be increased, hence the volume diminished; the fraction must therefore be less than unity.

$$\frac{500 \times 712}{760} = 468{\cdot}4 \text{ litres.}$$

* Woulff's bottles, 8-oz. capacity, 1s. 4d.; "reduction tubes," 6d.

Creator, or both of these combined, no comparative anatomist doubts that there is something absolute in nature which corresponds more or less closely to it, as we are more or less acute in our observations.

Of course, since we can say so many things which are true of a whole group of animals, but which cannot be said of any animal not belonging to that group, this greatly simplifies the whole study of comparative anatomy. Thus we can frame definitions of groups, but there is this difficulty in this treatment of the subject: we are not acquainted with all animals, and it not unfrequently happens that when we have made our definitions of two groups, apparently perfectly distinct, some strange creature from some outlandish country is brought home which has some of the characters given in one definition and some that are given in the other. Then the definitions have to be re-framed so as to include the new species on one side or other of the line of demarcation, or a new group made for its accommodation. To avoid this result, it is perhaps better to take some one animal of a group which has all the essential features of its group well developed, and describe it as a type, laying stress on the description of those peculiarities which are the most widely possessed by the members of the group. As a matter of fact, it will be found that an immense number of forms cluster closely around such a typical species, while those forms which lie between two such types will be few and rare. This plan of describing types we shall endeavour to follow; but since the human mind longs for definitions because they are definite, we can hardly escape sometimes giving them.

The animal kingdom is the realm we have to explore. How is it bounded? The question involves us in the very difficulty to which we have just referred. The animal kingdom is cut off from the mineral kingdom by the fact that while a mineral remains unchanged unless acted on by external forces, an animal is compelled to pass through a series of changes. But how shall we distinguish an animal from a vegetable? The answer which would naturally suggest itself is: An animal moves and feels. Yes; but what is meant by movement and feeling? Many animals are fixed, and grow up from the rocks beneath the ocean as plants do, and some plants possess not only motion but locomotion. We cannot interrogate the lowest animals as to whether they feel, and if we are guided by appearances, the sensitive mimosa feels. The fact is, we cannot define, for whatever the definition, some troublesome species of plant or animal obtrudes itself to disturb our distinction. We can, however, affirm many things about plants and animals which are generally true of the one kingdom and exclusive of the other. Thus, animals cannot exist on mineral substances alone, but most plants both can and do do so. Animals generally have an internal cavity to lodge their food while it is being dissolved and absorbed; plants have no stomach. Most animals have a nervous system, that is, a material by which the whole organism is connected into a sentient individual, and which conveys volition through the frame; no plant has a nervous system. These contrasts between a typical animal and a typical plant must satisfy the reader. The lower groups in both kingdoms present species which it may be difficult to assign to their respective spheres; but by keeping in mind the typical or ideal plant or animal we shall usually be able to determine the position of every form which presents itself.

In the next lesson we shall give an outline of the classification of the animal kingdom, only giving its main features, and not descending into the minor divisions, and then take a type of each class, and describe it so as to bring out its peculiar characteristics. The student will find it a great and material help, as he proceeds in his study of this subject, if he does not content himself merely with committing to memory the written description of various characteristics in the construction of animals, but refers to the particular animal selected as an illustration, and so fixes the truth in his mind by the aid of actual experience. With a view to enable the reader thus to verify the statements for himself, and to impress them intelligently on his memory, the types chosen will, so far as it is possible, be ordinary and familiar animals in each department.

It will prevent confusion in the mind of the reader not only of the following lessons, but of all books on this subject, if he have a clear idea of the terms applied to the different grades of the groups in classification. We give the principal names employed in the order of their importance, reading from left to right: and taking three familiar examples, we give the names of the groups into which they fall, proceeding from the higher to the lower grade.

SUB-KINGDOM OR BRANCH.	CLASS.	ORDER.	FAMILY.	GENUS	SPECIES	COMMON NAME.
Vertebrata	Mammalia	Pachydermata	Solidungula	Equus	Caballus	Horse
Articulata	Crustacea	Decapoda	Caridia	Crangon	Vulgaris	Shrimp
Mollusca	Gastero; oda	Pulmonifera	Helicidæ	Helix	Aspersa	Garden Snail

A species is the lowest grade with which we shall have anything to do, and may be defined to be that assemblage of animals which are alike in every essential feature of structure, and any two of which (male and female) are capable of reproducing their own kind in perpetuity.

When we wish to name a species we use two names, that of the genus followed by that of the species: thus science names the horse *Equus caballus*.

A genus is an assemblage of species; a family a number of genera, and so on. Professor Agassiz has endeavoured to define all the grades, but his definitions are so vague as to be almost worthless. We will not attempt to give definitions, because all are open to objections, as indeed that which we have given to define a species is. What is essential to the student is to know that they rank one above the other, and are not used indiscriminately. He will soon see how they are applied as he gets to know more of the animal kingdom.

To carry out the example given:—The genus *Equus* includes not only the horse, but the ass, zebra, etc.; the family *Solidungula* includes all animals which have a single consolidated toe to each foot; the order *Pachydermata* includes not only the horse family, but also the elephant family, the rhinoceros family, the hog family, etc.; the class *Mammalia* includes not only the *Pachydermata*, but the *Carnivora*, *Rodentia*, etc., *i.e.*, all brutes; and the sub-kingdom *Vertebrata* includes not only brutes, but birds, reptiles, and fish.

Other intermediate grades are often used, but those we have given are the best established. With this explanation our way is cleared for our next lesson on general classification.

LESSONS IN LATIN.—XIV.

ADVERBS.

In English, adverbs are formed from adjectives by the addition of *ly*, thus swift, swift-*ly*. Similar is the manner in which the Romans formed their adverbs. The ordinary terminations of the Latin adverbs are *e* and *ter*; *ter* sometimes stands as *ĭter*. To form an adverb, find the stem and add the terminations. Adverbs formed from adjectives or participles of the second declension end in *e*. Adverbs formed from adjectives or participles of the third declension, in *ens* and *ans*, end in *ter*. Adverbs formed from the other adjectives of the third declension, end in *iter*.

You ought now to have no difficulty to know which are adjectives of the second, and which adjectives of the third declension. But for your assistance I interpose a few remarks. Adjectives follow the first, the second, and the third declension of nouns. Adjectives which have the nominative singular in *a*, and genitive singular in *æ*, follow the first declension. Adjectives which have the nominative singular in *us* or *um*, and genitive singular in *i*, follow the second declension. Adjectives which have the nominative singular in *is*, etc., and genitive singular in *is*, follow the third declension. There are no adjectives of the fourth or fifth declension. I add instances of

ADVERBS FORMED FROM ADJECTIVES.

Clare, *clearly, brightly*;	from	clarus, 2, *clear*.
Libĕre, *freely*;		liber, 2, *free*.
Pulchre, *beautifully*;		pulcher (pulchri), 2, *beautiful*.
Prudenter, *prudently*;		prudens (prudent), 3, *prudent*.
Amanter, *lovingly*;		amans (amant), 3, *loving*.
Fortĭter, *bravely*;		fortis (fort), 3, *brave*.
Audacĭter, *daringly*;		audax (audac), 3, *daring*.

Adverbs, like adjectives, undergo comparison. Thus, clare, *clearly*, positive; clarius, *more clearly*, comparative; clarissime, *most clearly*, superlative. Properly the comparative adverb is the neuter gender singular number of the comparative adjective: thus, clarus, clarior, *clarius*. The superlative is formed by the conversion of *us* of the adjective into *e*: thus, optimus, *best*; optime, *in the best manner*. Instances follow of

ADVERBS IN THE THREE DEGREES OF COMPARISON.

Positive.	*Comparative.*	*Superlative.*
Læte, *joyfully*;	lætius, *more joyfully*;	lætissime, *most joyfully*.
Docte, *learnedly*;	doctius, *more learnedly*;	doctissime, *most learnedly*
Leviter, *lightly*;	levius, *more lightly*;	levissime, *most lightly*.
Feliciter, *happily*;	felicius, *more happily*;	felicissime, *most happily*.
Magnifice, *splendidly*;	magnificentius, *more splendidly*;	magnificentissime, *most splendidly*.
Similiter, *similarly*;	similius, *more similarly*;	simillime, *most similarly*.

These adverbs are irregular:—

Positive.	*Comparative.*	*Superlative.*
Bene, *well*;	melius, *better*;	optime, *best*.
Male, *ill*;	pejus, *worse*;	pessime, *worst*.
Multum, *much*;	plus, *more*;	plurimum, *most*.
		maxime, *very greatly*.

VOCABULARY.

Administro, 1, *I administer* (E. R. *administer*).	Habito, 1, *I dwell, remain* (E. R. *habitation*).	Que (stands after the word, thus, plusque), *and*.
Ædifico, 1, *I build* (E. R. *edifice*).	In dies, *every day*.	Quotidie, *daily*.
Atque, *and*.	Labōro, 1, *I labour*.	Rus, ruris, n., *the country*.
Civitas, -ātis, f., *a city or state* (E. R. *civic, civil*).	Nego, 1, *I deny* (E. R. *negation*).	Scriptus, -a, -um, *written*.
Cogito, 1, *I think*.	Occultus, -a, -um, *hidden* (E. R. *occult*).	Sedo, 1, *I set down, compose*.
De, *concerning*.	Patiens, *patient*.	Sono, 1, *I sound*.
Dimico, 1, *I contend*.	Periculum, -i, n., *a danger* (E. R. *peril*).	Supero, 1, *I overcome* (E. R. *superior*).
Græcia, -æ, f., *Greece*.	Pugno, 1, *I fight* (E. R. *pugilist*).	Vito, 1, *I avoid*.

EXERCISE 47.—LATIN-ENGLISH.

1. Milites fortiter pugnant. 2. Pugnantne fortiter milites? 3. Nonne fortiter pugnant milites? 4. Romani fortius quam hostes pugnant. 5. De Græcia magis atque magis cogito. 6. Nonne de patre tuo multum cogitas? 7. Literas magis atque magis quotidie expectamus. 8. Cupidissime adventum matris expectas. 9. Rus patrem plus plusque in dies delectat. 10. Bene domum ædificas. 11. Ædificatne domum optime? 12. Literæ sunt pessime scriptæ. 13. Verba tua male sonant. 14. Servi do domino pessime cogitant. 15. Puellæ patientius quam pueri labōrant. 16. Occultissima pericula difficillime vitantur. 17. Difficile est Græcos superare. 18. Fortissime dimicant Græci. 19. Seditio facilius quam bellum sedatur. 20. Civitas optime administratur. 21. Audaciter negat. 22. Urbem feliciter habitant cives.

EXERCISE 48.—ENGLISH-LATIN.

1. Is the war easily composed? 2. The war is composed with very great difficulty (superlative from *difficilis*). 3. He fights bravely. 4. They fight more bravely. 5. The Greeks fight very bravely. 6. Greatly do you hope for (*expecto*) the coming of spring. 7. The coming of spring is most eagerly hoped for by all boys and girls. 8. They hope for your letter daily more and more. 9. Bad words sound badly. 10. The soldiers contend more and more. 11. Hidden things are not easily avoided. 12. Mothers labour more patiently than daughters. 13. The sedition is happily composed (that is, being put down). 14. He writes a letter beautifully. 15. The Romans fight more bravely than the Greeks. 16. The country delights my mind very much. 17. Is thy mind delighted much by the country? 18. Very much do I think of my home (*domus*), my brothers, and my sisters. 19. The state is administered very ill by the Romans.

PRONOUNS.

The personal pronouns ego, *I*, and tu, *thou*, are declined according to the ensuing table. Strictly, the Latins have no personal pronoun of the third person, *he*; that is, no pronoun which exactly corresponds to our *he*. Ille, which is often given as such, signifies *that person*, and sui (no nominative) is a reflective pronoun; that is, it has a reference to a subject preceding. As, however, parts of sui agree with parts of the personal pronouns, it is inserted in this table of

THE PERSONAL OR SUBSTANTIVE PRONOUNS.

	Singular.		Plural.		
Cases.	1st.	2nd.	1st.	2nd.	3rd.
N.	ego, *I*;	tu, *thou*.	nos, *we*;	vos, *you*.	sui, *of him, himself*.
G.	mei, *of me*;	tui, *of thee*;	nostri, nostrum, *of us*;	vestri, vestrum, *of you*;	sui, *of them, themselves*.
D.	mihi, *to me*;	tibi, *to thee*;	nobis, *to us*;	vobis, *to you*;	sibi, *to himself*.
Ac.	me, *me*;	te, *thee*;	nos, *us*;	vos, *you*;	se, *himself*.
Ab.	me (a me), *by me*;	te (a te), *by thee*;	nobis (a nobis), *by us*;	vobis (a vobis), *by you*;	se (a se) *by them, themselves*.

Sui, sibi, etc., you see are the same in the plural as in the singular.

In pronouns, the vocative, when it exists, is generally the same as the nominative. The preposition cum, *with* (governing the ablative), is put after me, te, etc., and joined to them; as, mecum, *with me*; tecum, *with thee*: so, secum, *with them*, or *with themselves*; nobiscum, *with us*; vobiscum, *with you*.

In order to give emphasis, met is subjoined to all these forms except tu, and the genitive plural of ego and tu; thus, egomet, temet, sibimet, nosmet, vosmet: tu takes te, as tute; se, for the sake of force, is doubled, as sese.

Nostri and vestri differ in use from nostrum and vestrum. Nostri is simply *of us*; nostrum is *ours*; nostrum denotes a class, and is used with partitives, that is, words which signify one, etc., of a class, as nemo nostrum, *none of us*, considered as a number or a class, and not an individual or individuals.

VOCABULARY.

Æquālis, -e, *equal*.	Imperium, -i, n., *a command, a government* (E.R. *empire*).	Præceptor, -ōris, m., *a preceptor*, or *instructor*.
Apud, *with, at home*.	Impero, I (with dative), *I command* (E. R. *imperial*)	Præceptum, -i, n., *a precept, a command*.
Apud se, *with himself, master of himself*.	Inter, prep. (with acc.), *between, among*.	Salutāris, -e, *salutary, healthful*.
Attente, adv., *attentively*).	Irātus, -a, -um, *angry*.	Semper, *always*.
Canto, 1, *I sing* (E. R. *canticle*).	Ludo, 3, *I play* (E. R. *illusory*).	Tractatio, -ōnis, f., *a handling, a treatise* (E. R. *to treat of*).
Clamo, 1, *I cry out* (E.R. *exclamation*).	Magister, -tri, m., *a teacher* (E.R. *master*).	Veritas, -ātis, f., *truth*.
Disco, 3, *I learn* (E. R. *disciple*).	Narro, 1, *I relate* (E. R. *narrative*).	Voco, 1, *I call* (E. R. *vocative*).
Doleo, 2, *I am in pain, I grieve* (E. R. *dolorous*).		

EXERCISE 49.—LATIN-ENGLISH.

1. Ego canto. 2. Tu clamas. 3. Amicus vocat. 4. Nos narrāmus. 5. Vos saltātis. 6. Fratres labōrant. 7. Ego fleo. 8. Tu rides. 9. Frater dolet. 10. Nos præceptores docēmus; vos discipuli discītis. 11. Ego ludo. 12. Tu discis. 13. Soror acu pingit. 14. Nos scribimus. 15. Vos legitis. 16. Fratres pingunt. 17. Ego salio. 18. Tu feris. 19. Puer dormit. 20. Nos magistri erudimus vos, O discipuli. 21. Vos, boni discipuli, attente auditis præcepta nostra. 22. Virtutes inter se æquales sunt. 23 Imperare sibi (*one's self*) maximum est imperium. 24. Iratus non est apud se. 25. Tractatio literarum nobis est salutaris. 26. Veritas semper mihi grata est.

EXERCISE 50.—ENGLISH-LATIN.

1. I relate. 2. Thou dancest. 3. (Our) brother labours. 4. We sing. 5. You labour. 6. (Our) friends dance. 7. I, the teacher, teach; you, O scholars, learn. 8. We grieve. 9. Thou paintest. 10. The young men strike. 11. We instructors do not try to teach you, O angry boys! 12. Good scholars ought (*debeo*) to command themselves. 13. To command one's self is a virtue. 14. It is difficult for (Dat.) the angry man to command himself. 15. The angry are not masters of themselves (*apud se*). 16. Command is always pleasant to thee. 17 Is not command pleasant to us? 18. To thee, not to me, is truth pleasant. 19. Truth is salutary to thee, to me, to us, to all.

VOCABULARY.

Acriter, *valorously, energetically*.	Modus, -i, m., *a mode or manner* (E. R. *mood, modify*).	Propter, prep. (with Acc.), *on account of*.
Cantus, -ūs, m., *a song*.	Nunquam, *never*.	Proximus, -a, -um, *nearest, next, a neighbour*.
Caput, -itis, n., *a head*.	Obrēpo, 3, (with Dat.), *I creep upon*.	Reditus, -ūs, m., *a return*.
Cives, -is, m., *a citizen* (E. R. *city*).	Par, paris, *like* (E. R. *pair, peer*).	Splendeo, 2, *I shine* (E. R. *splendid, resplendent*).
De (with Abl.), *of, concerning*.	Parentes, -um, c., *parents*.	Vitium, -i, n., *vice, faults*.
Discordo, 1, *I disagree*.	Per, prep. (with Acc.), *through*.	
Expĕto, 3, *I desire, strive after*.	Porto, 1, *I carry* (E. R. *porter*).	
Faveo, 2, *I am favourable to*.		

EXERCISE 51.—LATIN-ENGLISH.

1. Obrēpunt vitia nobis nomine (*under the name*) virtutum. 2. Nos favemus vobis, vos non favetis nobis. 3. Tu me amas, ego te amo. 4. Mihi mea vita, tibi tua cara est. 5. Virtus per se splendet semper.

In the following example the volume of a gas will be "corrected" for temperature and pressure:—

What weight of potassium chlorate will be required to fill a gas bag of a capacity of 20 litres, the temperature of the room being 15° Cent., and the pressure of the air at the same time 750 mm.?

$$KClO_3 = KCl + O_3$$
$$39{\cdot}1 + 35{\cdot}5 + 48 = 39{\cdot}1 + 35{\cdot}5 + 48;$$

or 122·6 parts by weight of $KClO_3$ give off 48 of O, or 100 parts of the salt yield 39·2 of the gas. We know that the weight of a litre of oxygen at the standard temperature and pressure will be 16 × 0·08936 grammes = 1·4298 grammes; therefore 20 litres will weigh 1·4298 × 20 = 28·596 grammes.

We must know first what volume 20 litres would occupy at the given temperature and pressure.

To correct for temperature we must multiply 20 by $\frac{273 + 15}{273}$, and for pressure by $\frac{760}{750}$; or at one operation, $\frac{20 \times 760 \times (273 + 15)}{273 \times 750}$ = 21·38 litres at 15° Cent. and 750 mm.

The *weight* of the gas has not been altered, and therefore this 21·38 litres at 15° Cent. and 750 mm. weighs what it did when it was 20 litres at 0° and 760 mm., that is, 28,596 grammes. What, then, will 20 litres of this more rarefied gas weigh? This proportion will give the answer—

$$21{\cdot}38 : 20 :: 28{\cdot}596 : \frac{28{\cdot}596 \times 20}{21{\cdot}38} = 26{\cdot}7 \text{ grains.}$$

How much potassium chlorate will be required to yield 26·7 grammes of oxygen, when 100 yield 39·2?

$$39{\cdot}2 : 26{\cdot}7 :: 100 : 68{\cdot}11.$$

Therefore 68·11 grammes of potassium chlorate will yield sufficient gas to fill a bag of 20 litres at 20° Cent. and 750 mm. pressure.

LESSONS IN ENGLISH.—XIX.

SUFFIXES (*continued*).

Th, of Anglo-Saxon origin, being a termination by which adjectives are transformed into nouns; as, treow*th*, truth, from treowe, German treu, English true; whence tro*th* and be*trothed*. We find the ending in *mirth* (merry), dear*th* (dear), bread*th* (broad), dep*th* (deep), etc.

Tude, a Latin termination, found in lati*tudo* (latus, *broad*), *latitude*; longi*tudo* (longus, *long*, *longitude*). So forti*tude* (fortis, *brave*), magni*tude* (magnus, *great*), etc.

Ty, from the Latin substantive termination *tas*; as commodi*tas*, *commodity*. Here we have an instance of the way in which derivatives often depart from the meaning of their primitives. Commoditas in Latin means *proportion*, *convenience*, while *commodity* now signifies *a thing*, and has a strictly commercial import. The steps by which the derivation took place may be supplied from our older writers. Commodity is found *signifying advantage*; and as proportion, or due observance of measure, time, or opportunity leads to *convenience*, so does a regard to convenience conduce to *advantage*; but advantage is only *interest* or *profit*, and profit is by *commodities*, the sources of gain.

Commodity as *convenience*:—

"Travellers turn out of the highway, drawn either by the *commodity* of a footpath, or the delicacy or the freshness of the fields."—*B. Jonson.*

Commodity as *advantage*:—

"They know that howsoever men may seek their own *commodity*, yet if this were done with injury unto others, it was not to be suffered."—*Hooker.*

Commodity as *wares*:—

"Of money in the commerce of mankind the principal use is that of saving the commutation of more bulky *commodities*."—*Arbuthnot*, "*On Coins.*"

Ule, as in glob*ule*, from the Latin glob*ulus*, *a small globe* or *ball*. The termination *ule* (in Latin both *ulus* and *ula*) is found in partic*ule* (Latin particula) shortened into partic*le*. Animalcule, *a little animal*, is formed by analogy rather than authority, inasmuch as the only connected diminutive in Latin is anim*ula*, from anima, there being no diminutive from *animal*.

Ure, from the Latin *ura*; as tinct*ura* (a colour), tinct*ure*. It is found also in verd*ure* (Latin, viridis, *green*), immediately from the French; and in ten*ure*, from the word tenura, belonging to feudal or mediæval Latin.

Ute, from the Latin participial ending *utus*, as ac*utus* (Latin, *acu*, *a needle*), *sharpened*, *acute*.

Ward appears in the German warts, as in vorwärts, *forwards*; and the Latin versus, *towards*. It forms many compounds, traces of which are found in the Anglo-Saxon, as thider-weard, *thitherward*; ham-ward, *homeward*. In the use of *toward*, the *to* and the *ward* were sometimes separated by the interposition of the noun under regimen, as in 1 Thess. i. 8—

"Your faith *to* God-*ward* is spread abroad."

Wise, from the Anglo-Saxon wise, *manner*, is used in both Anglo-Saxon and English as a suffix; as right*wis*, *righteous*, formerly *rightwise*; unrightwis, *unrighteous*. Wise, denoting *manner*, is found in the Bible.

"Now the birth of Jesus Christ was on this wise." (Matt. i. 18.)
"If thou afflict them in *any wise*." (Exod. xxii. 23.)

Webster, in his dictionary, under *wise*, states that wise is corrupted into *ways*, as in *lengthways*. This position may be questioned. *Way*, signifying manner, is good English. Why, then, may we not say *lengthways*? The *s* is merely a terminating consonant for the voice to rest on, as in *always*. Good writers use *longways* no less than *longwise*. *Sideways* is more common than *sidewise*. For always, *algates*; and for otherwise, *othergates* (which are the same as our always and otherways; *gates* being from the German gehen, *to go*; and gasse, *a street* or *way*), are not uncommon in the north of England.

Y, a Saxon termination, in adjectives representing *ig*, as myr*y*, *merry*; wässer*y*, *watery*; and in nouns representing for the Latin *ia*, as victor*ia*, victory; for the Greek, also, *ia*, as geometr*ia*, geometry. See the terminations *ance* and *ce*. In such words as *yclept*, that is, *called*; *yclad*, that is, *clothed*; the *y* is a softened sound of the German *ge*, which is prefixed to the past participles, as *ge*boren, *born*.

"But come, thou goddess, fair and free,
In heaven *yclep'd Euphrosyne*,
And by men heart-easing mirth."—*Milton.*

ENGLISH SUFFIXES.

From Greek.	From Latin.	From French.	From Saxon.	Meaning.
		1 ade	...	result
	1 age	...	...	being
	2 al	...	...	personality
	3 ance	...	...	condition
	4 ar	...	...	effect
1 archy	...	...	...	government
			1 ard	habit
	5 ary	...	...	quality
		2 aster	...	discredit
	6 ce	...	...	condition
			2 ch	result
			3 cle	diminution
			4 dom	dominion
		3 ee	...	effect
			5 el	instrument
	7 ence	...	...	result
			6 end	agent
			7 er	agent
			8 ery	place
			9 es, *s*	possession
		4 esque	...	quality
	8 ess	...	...	female
		5 et	...	diminution
		6 ette	...	result
	9 eur	...	...	agent
			10 head	condition
			11 ite	family
			12 ive	being
			13 ing	sonship
	10 ion	...	...	action
2 ism	...	...	...	division
3 ist	...	...	...	adherence
4 istry	...	...	...	place
	11 ix	...	...	female
			14 kin	sonship
			15 let	diminution
			16 ling	descent
		7 ment	...	result
	12 mony	...	..	effect

ENGLISH SUFFIXES (*continued*).

From Greek.	From Latin.	From French.	From Saxon.	Meaning.
			17 ness	quality
			18 ock	diminution
		8 oon, on	...	greatness
	13 or	...	...	agency
	14 ory	...	...	condition
			19 ric	authority
			20 ship	condition
			21 ster	female
			22 th	result
	15 ty	...	...	result
	16 tude	...	...	condition
	17 ute	...	...	diminution
			23 able	capacity
	18 al	...	...	belonging to
	19 an	...	...	pertaining to
	20 ant	...	...	state
	21 ar	...	...	according to
	22 ary	...	...	quality
	23 ate	...	...	condition
			24 en	result
			25 ent	condition
			26 ever	augmentive
			27 full	abundance
			28 ic	like
		24 ile	...	condition
		25 in	...	place, quality
		26 ique	...	quality
			29 ish	diminution
			30 less	privation
			31 ly	likeness
	27 ose	...	...	quality
			32 some	a part
			33 ward	direction
			34 wise	manner
			35 ig	quality
			36 en	to make
			37 es, *s*	he
			38 est	thou
			39 eth	he
	28 fy	...	...	to make, do
5 ise	...	...	...	to make, do
6 ish	...	...	...	to make, do
7 ote	...	...	...	to make, do

From the above table it appears that there are 82 English suffixes, of which 7 are of Greek origin; 28 Latin; 8 French; and 39 Saxon.

It is of little consequence in general whether the suffixes ascribed to the French be ascribed to it or to the Latin, whence they originally came. If the eight French suffixes are added to the twenty-eight Latin ones, then the Latin suffixes are nearly equal to those of Saxon origin. Adding all the foreign suffixes together, we find they amount to forty-three, and so outnumber our native or Saxon suffixes.

LESSONS IN FRENCH.—XXXII.

SECTION LXX.—THE IMPERATIVE.

1. CONJUGATION OF THE IMPERATIVE OF THE REGULAR VERBS:—

	Chant	-e	fin	-is	reç	-ois	rend -s
	sing		*finish*		*receive*		*render*
Qu'il	parl	-e	chér	-isse	aperç	-oive	vend -e
	let him speak		*let him cherish*		*let him perceive*		*let him sell*
	Donn	-ons	fourn	-issons	perc	-evons	tend -ons
	let us give		*let us furnish*		*let us collect*		*let us tend*
	Cherch	-ez	pun	-issez	conc	-evez	entend -ez
	seek		*punish*		*conceive*		*hear*
Qu'ils	port	-ent	sais	-issent	d	-oivent	perd -ent
	let them carry		*let them seize*		*let them owe*		*let them lose*

2. The second person singular, and the first and second persons plural of the imperative are the same as the first person singular, and the first and second persons plural of the present of the indicative. The pronouns are dropped:—

Je parle, *parle*; je finis, *finis*. *I speak, speak; I finish, finish.*

3. Exceptions:—Those persons of the imperative of **avoir**, *to have*, are: **aie, ayons, ayez**; of **être**, *to be*, **sois, soyons, soyez**; of **savoir**, *to know*, **sache, sachons, sachez**; and **aller, va**, and **vas** before **y** and **en**.

4. **Vouloir** has only the second person plural, **veuillez**, *have the goodness to . . .*

5. The French imperative has no third persons. The English form *let him, let her, let them*, is rendered in French by the third persons of the present subjunctive:—

Qu'il parle.	*Let him speak.*	Qu'ils entrent.	*Let them come in.*
Qu'elle finisse.	*Let her finish.*	Qu'elles sortent.	*Let them go out.*

6. **À droite, à gauche**, correspond in signification to the English *to the right, to the left*:—

Allez à droite; à gauche.	*Go to the right; to the left.*

7. For the place of the pronouns in connection with the imperative, see Sect. 26, R. 1, 4; Sect. 27, R. 1, 2, 3, 4.

MISCELLANEOUS EXAMPLES.

Prenons la première rue à droite.	*Let us take the first street to the right.*
Ne cherchez plus à le tromper.	*Seek no longer to deceive him.*
Sachons nous contenter du nécessaire.	*Let us know how to content ourselves with necessaries.*
Faites bien attention à ce que vous dites.	*Pay great attention to what you say.*
Dites toujours la vérité.	*Always tell the truth.*
Allons! Messieurs, dépêchez-vous.	*Come! gentlemen, make haste.*
Tenez, Monsieur, voilà votre argent.	*Here, Sir, here is your money.*
Veuillez accepter ce présent.	*Be so kind as to accept this present.*

EXERCISE 135.

Clef, f. *key*. Crayon, m. *pencil*. Institutrice, f. *teacher*. Obé-ir, 2. *to obey*. Partie, f. *part*. Précepteur, m. *tutor*. Promett-re, 4. ir. *to promise*. Rapport-er, 1. *to bring back*. Remett-re, 4. ir. *to deliver*. Renvoy-er, 1. *to send back*. Sans faute, *without fail*. Se serv-ir, 2. ref. *to use*. Tiers, m. *third*. Verrez, 3. ir. from *voir*, *to see*.

1. Envoyez chercher le médecin, votre petit garçon est malade. 2. Nous l'avons déjà envoyé chercher. 3. Vous n'avez pas besoin de votre crayon, prêtez-le-moi [Sect. 26, R. 4; Sect. 27, R. 4]. 4. Je ne puis vous le prêter, je m'en sers. 5. Donnez-le-moi ou me le prêtez [§ 97 (7)]. 6. Je l'ai promis à votre institutrice. 7. Si vous ne le lui avez pas dit, dites-le-lui aussitôt que possible. 8. Ne le lui dites pas encore. 9. Parlez-lui-en [§ 40, 17] la prochaine fois que vous le verrez. 10. Ayez patience, mon ami, votre père ne tardera pas à venir. 11. Obéissez à votre précepteur. 12. Je lui obéis toujours. 13. Donnez-lui-en une bonne partie. 14. Je lui en ai déjà donné plus des deux tiers. 15. Avez-vous porté cette clef au serrurier? 16. J'ai oublié de la lui remettre. 17. Portez-la-lui sans faute cette après-midi. 18. Veuillez me dire où demeure M. G. 19. Prenez la première rue à gauche; il demeure dans la deuxième maison à droite. 20. Allons, Mesdemoiselles, dépêchons-nous. 21. Menez-les-y le plus tôt possible. 22. Ne me les rapportez pas. 23. Renvoyez-les-moi demain. 24. Portons-les-y. 25. Ne les y portons pas. 26. Prêtez-les-lui, mais ne les lui donnez pas.

EXERCISE 136.

1. Give a book to the young man. 2. I have already given him one, and he does not read it. 3. Lend it to him, if you will not give it to him. 4. I will not lend it to him. 5. Make haste, young ladies, it is ten o'clock. 6. Have the goodness to give me a pen. 7. I have given one to your brother. 8. Obey your father, and speak to your sister. 9. Will you not send for the letter? 10. I will send for it. 11. Send for it as soon as you can. 12. Do not do so (*le*), but write to my cousin. 13. Come, children (*mes enfants*), learn your lesson. 14. Give him some [§ 40, 17], or lend him some [§ 97, (7)]. 15. Do not make haste, we have (*le*) time. 16. Have patience, my child, the merchant will soon come. 17. Send it to him, if you cannot give it to him. 18. Write to him this afternoon without fail. 19. I would write to him if I had time. 20. Let us take the first street to the left. 21. Take the second street to the right. 22. Pay attention to what your brother says. 23. Let us tell the truth. 24. Let us read that book to-day. 25. Pay your debts as soon as possible. 26. Let us obey our

6. Cantus nos delectat. 7. Parentes a nobis diliguntur. 8. O mi fili, nunquam mihi pares! 9. Frater me et te amat. 10. Egomet mihi sum proximus. 11. Tute tibi imperas bene. 12. Virtus propter sese colitur. 13. Suapte naturâ virtus expetitur. 14. Cives de suistuet capitibus dimicant. 15. Sapiens omnia sua secum portat. 16. Nos vobiscum de patris redita gaudemus. 17. Tu tecum pulchre pugnas. 18. Deus tecum est. 19. Sæpe animus secum discordat. 20. Hostes nobiscum acriter pugnant. 21. Oratio tua tecum pugnat.

EXERCISE 52.—ENGLISH-LATIN.

1. I carry all mine (my things) with me. 2. Do wise men carry all their property (all theirs) with them? 3. Thou lovest me, I love thee. 4. Thy life is pleasant to me, my life is pleasant to thee. 5. Bad men always disagree with themselves. 6. The handling (pursuit) of letters is very pleasant to us. 7. Men love themselves. 8. Do women love themselves? 9. Bad men love themselves very badly. 10. Virtue is beautiful by (*per*) itself. 11. On account of thyself I love thee. 12. My native country is more pleasant to me than thine to thee.

KEY TO EXERCISES IN LESSONS IN LATIN, XII. AND XIII. (Vol. I., pp. 358, 388.)

EXERCISE 39.—LATIN-ENGLISH.

1. Hope is uncertain and doubtful. 2. The power of hope is great in the minds of men. 3. Is not the power of hope great in thy mind? 4. Boys easily indulge in vain hope. 5. We ought not to lose the hope of happier times in the miseries of life. 6. O hope, thou refreshest the minds of wretched men with a sweet solace! 7. By vain hope we are often deceived. 8. Human affairs are often uncertain and doubtful. 9. The condition of human affairs is doubtful. 10. Thou oughtest to oppose virtue to adverse things; *i.e.*, thou oughtest to withstand adversity by virtue. 11. A wise man does not dread adversity. 12. O human affairs, how often you deceive the minds of men! 13. The mind of a wise man is not beaten down by adversity.

EXERCISE 40.—ENGLISH-LATIN.

1. Spes vitæ incerta est. 2. Spes longæ vitæ est vana. 3. Spe animum recreo. 4. Sapiens non facile in ærumnis afflictatur. 5. Fortium animos hominum afflictant adversæ res. 6. Fortium hominum animi adversis rebus afflictantur. 7. Spei solatio sapientis animus recreatur. 8. Virtutem in vitæ ærumnis non amittere debemus. 9. Conditionis ærumnæ hominem afflictant. 10. Spem felicioris temporis amittit.

EXERCISE 41.—LATIN-ENGLISH.

1. The faithfulness of friendship refreshes the mind in the wretchedness of life. 2. The examples of true friendship are rare. 3. To the fidelity of friends we owe (our) safety in adversity. 4. A true friend preserves his fidelity even in the miseries of life. 5. Fidelity prepares a port even for the wretched. 6. A safe port is prepared for me. 7. An uncorrupted friend is rare in adversity. 8. He rests in the fidelity of (his) friends. 9. The coming of spring is sweet. 10. The day flies quickly away. 11. Fair days are rare in spring. 12. He calls together the soldiers into the city on (an) appointed day. 13. On a fixed day, my friends are called together into my house. 14. Sad are the days of the wretched.

EXERCISE 42.—ENGLISH-LATIN.

1. Veri amici fidem servant in ærumnis vitæ. 2. Fides amicitiæ non est spes vana. 3. Rarumne exemplum est fides incorrupti amici? 4. In adversis rebus portum debemus veris amicis. 5. Veræ amicitiæ solatium amicos convocat. 6. Cito avolant sereni dies. 7. Certâ die convocant duces agmina. 8. Constituta die milites a rege convocantur. 9. Cupide adventum veris expecto. 10. In vere rara est tristis dies.

EXERCISE 43.—LATIN-ENGLISH.

1. I have a faithful and dear friend. 2. Thy slave is unfaithful. 3. The earth is round. 4. True friendship is everlasting. 5. Hunger and thirst are troublesome. 6. The miser is never contented. 7. The king is powerful. 8. Thy step is slow. 9. The virtue of thy father is remarkable. 10. The fountain is clear and cold. 11. The generals have an illustrious name. 12. A limpid river delights all men. 13. The stag has high horns. 14. The affair is great and unusual. 15. Here are vast marshes. 16. Credulous hope deceives boys. 17. Men have a small day (short life). 18. No one is always happy. 19. The ice is slippery. 20. The wooden bridge is guarded. 21. Not all soldiers are brave. 22. The magnificent porticoes are defended. 23. The harbour is convenient. 24. We eat with sharp teeth. 25. The night is long and cold. 26. A good man is praised, a bad man is blamed. 27. Old age is often morose (cross). 28. Unhoped-for safety comes. 29. The sea is vast, deep, swelling. 30. Much desired rest is easily lost. 31. We learn Latin. 32. Dost thou not teach Greek? 33. Barbarous nations are distant. 34. Timorous hares fly away. 35. The flower is perishable. 36. The last hour is coming. 37. Riches are uncertain. 38. My mother loves ancient customs. 39. Thy words are hard. 40. How moist is the ground. 41. The fields are not easily tilled in winter.

EXERCISE 44.—ENGLISH-LATIN.

1. Amantur fidi amici. 2. Sunt mihi magnæ divitiæ, or magnæ divitiæ sunt mihi, or magnæ divitiæ mihi sunt. 3. Expectatam amicitiam amittunt. 4. Humida est humus. 5. Nocet humus humida. 6. Acuti dentes sunt leporibus. 7. Acutis dentibus edimus omnes. 8. Fortes sunt milites tui. 9. Fortesne sunt tui patris milites? 10. Credula spe delectantur. 11. Tauri cornua valida sunt. 12. Eximiæ sunt regis virtutes. 13. Quam pulchra est porticus. 14. Sermonem Latinum discere debes. 15. Ultimam horam expavescunt homines. 16. Valido agmine domus custoditur. 17. Avari vitantur. 18. Morosæ feminæ nunquam amantur. 19. Morosi sunt molesti. 20. Sempiterna estne amicitia? 21. Spes est sempiterna. 22. Quam tardi sunt gradus tui! 23. Glacies lubrica est in hieme. 24. Nemo famem sitimque diligit. 25. Quies avolat cito. 26. Commodus navibus est portus. 27. Timidi nunquam sunt securi. 28. Sermone patris esne contentus? 29. Potentem principem feriunt. 30. Caduci flores leguntur. 31. In itinere flores legit. 32. Græca lingua est pulchra. 33. Sæpe inveniuntur tumida maria. 34. Exoptatæ sunt consolatio quiesque veræ amicitiæ. 35. Semper beatus est nemo.

EXERCISE 45.—LATIN-ENGLISH.

1. Nothing is more suited to the nature of man than benevolence. 2. Nothing is more lovely than virtue. 3. Light is swifter than sound. 4. Nothing is better than wisdom. 5. Many men are more chattering than swallows. 6. The poor are often more munificent than the rich. 7. In adversity men are often more prudent than in prosperity. 8. The life of the richest is often very miserable. 9. The pretence of love is worse than hatred. 10. Nothing is better than reason. 11. The sun is greater than the earth. 12. The moon is less than the earth. 13. The sage is the happiest of all men. 14. Homer is the most ancient of all the Greek poets. 15. Flattery is a very great evil. 16. The city of Syracuse (in Latin, the city Syracuse) is the greatest and most beautiful of all the Grecian cities. 17. Evil speakers are very bad men. 18. Thy brothers are of all men the most given to evil speaking. 19. In friendship, similarity of character has more power than relationship. 20. Thy sister is more amiable than mine.

EXERCISE 46.—ENGLISH-LATIN.

1. Nihil est pejus quam amoris simulatio. 2. Maximus est sol. 3. Sol major est quam luna. 4. Brevissima est hominum vita. 5. Divitissimi sæpe sunt infelicissimi. 6. Pauperrimi nonnunquam sunt felicissimi. 7. Labor est facillimus. 8. Meus labor facilior est quam tuus. 9. Mores hominum sunt dissimillimi. 10. Rex est munificentissimus. 11. Pessimi non sæpe sunt felices. 12. Boni sunt felices. 13. Optimi sunt felicissimi. 14. Felicissimus omnium est Deus. 15. Optimi a pessimis nonnunquam contemnuntur. 16. Infirmissima est amici mei valetudo. 17. Patris hortus pulcherrimus est. 18. Filii hortus pulchrior est. 19. Difficillimus est labor. 20. Urbis muri sunt humillimi. 21. Patriam amant plurimi. 22. Nihil melius est quam virtus. 23. Portus est celeberrimus. 24. Deus omnium est maximus, optimus et sapientissimus. 25. Lacedemoniorum mores erant simplicissimi. 26. Velocissimus est equus. 27. Corvi sunt nigerrimi. 28. Pater tuus est benevolentissimus et munificentissimus. 29. Frater tuus domum pulcherrimam ædificat. 30. Pulcherrima domus ædificatur a fratre tuo. 31. Modestissimæ esse debent virgines. 32. Soror tua modestior est quam frater. 33. Similis hominibus est simia. 34. Similissima estne simia hominibus? 35. Omnium animalium similissima hominibus est simia. 36. Nihil dulcius est quam amicitia. 37. Lacedemonii fortissimi erant. 38. Velocissima est lux. 39. Lux velocior est quam sonitus.

HISTORIC SKETCHES.—XIV.

THE PROTECTOR OF THE COMMONWEALTH.

AT the Royal Palace of Whitehall, on the 3rd of September, 1658, a man lay dying. Eight days before he felt so confident of life that he told his wife not to think he should die, as he felt sure of the contrary. Now he was speechless, sinking; and the last thing about which he had seriously troubled himself was a curious metaphysical one. "Tell me," he said to Sterry, a minister who stood by him, "is it possible to fall from grace?" "It is not possible," said the minister. "Then," exclaimed the dying man, "I am safe; for I know that I was once in grace."

The attention of all England was riveted on the sick room at Whitehall, with keen and sincere interest. From the lips of many went forth earnest prayers that God would be pleased to spare the invalid's life; in other hearts there were joy and exultation over the death of a sinner; while in others, that should have been kindly disposed, there was a certain sort of assurance that there is something in the misfortunes of our greatest friends which is not displeasing to us. A frightful wind-storm raged, rooting up trees in the park, and tearing off the roofs of houses in London. The friends of the dying argued that God was giving warning of his intention to take to himself the great soul of the sufferer; his enemies argued that "the princes of the

powers of the air" were holding fearful revels amid the storm-driven clouds in honour of the prospect of seizing on a great offender's soul.

The dying man was Oliver Cromwell, Lord Protector of England and Ireland, the man who for ten years had governed the kingdom in a right kingly way, and made it stronger and more respected by all foreign powers than it had been since the days of Henry V. and Agincourt; the man who had subverted the subverters of the monarchy, and had yet annihilated monarchy itself in the person of his own king; who had overcome all rivals, punished all rebels against his own authority, and seated himself firmly on the throne of kings, though he had refused the name and emblems of royalty.

It was the 3rd of September, the day Cromwell was wont to call his fortunate day. On a 3rd of September he overcame the Scots' army at Dunbar, when, looking at the position of his army in a military point of view, he was committed to certain destruction at their hands; on a 3rd of September he had fought the battle of Worcester, "the Lord's crowning mercy to him," as he called it, when the royalist cause was lost in England, so long as Cromwell could move a regiment or man a ship. His wife and his friends hoped much from this circumstance, that the worst of the fever seemed to come upon him on this his fortunate day. Fortunate indeed if he could realise in his own case the assertion of the wise king, that the day of one's death is better than the day of his birth; fortunate too, still, if he could feel that death was but the entrance into life, the outlet from a world of which he was heartily tired and weary; the means by which, and by which only, he could enter into rest.

In this sense surely the 3rd of September was still Cromwell's fortunate day, for if ever a man was weary of life and anxious to be quit of its cares, Cromwell must have been that man.

Whether he was to be blamed or not for the part he had taken in the recent troubles, the result to him was the same: the weight of the government pressed heavily upon his shoulders, and he found at the end of ten years that all he had for the labour which he had taken under the sun was vanity and vexation of spirit. Fatigue of body and mind was supplemented latterly by a spring of bitterness welling up within, sapping the strong man's energy, gnawing away at the very vitals of his strength, overwhelming him with a dreadful sense of responsibility and fear lest he had striven in vain and in the wrong direction. Once he had felt no hesitation about what he should do, and believed that his decision was an inspiration direct from the Spirit of the Almighty; now he doubted whether all things were lawful or expedient unto him. Once he had felt no difficulty in telling his troopers, by way of assurance against their fears as to the propriety of offering personal violence to the king, "If I should meet the king in battle, I would shoot the king;" now he was uneasy in his mind when even his favourite daughter, Mrs. Claypole, suggested to him doubts as to the integrity of his conduct in the sight of God. Even his old friends, the men who had stood by him through good report and evil until his genius eclipsed them and turned them into rivals and opponents, these too had forsaken him, and left him alone in the state like a lodge in a garden of cucumbers. Then he found how, without being bitter, a man's household may be among his foes. His mother, a homely woman, quite incapable of realising the magnitude and the difficulties of her son's position, disquieted him in return for his filial devotion to her with the expression of her convictions that they and the like of them had no business in the royal palaces. His children were incapable, excepting perhaps Henry, of appreciating his statesmanship and his motives, and were therefore divided from him by a great gulf of want of sympathy; while some of them, if the accounts of those times are to be trusted, actually reproached him for what he had done for the country. On one side, a numerous and implacable enemy, burning with desire to revenge the unpardonable death of "the royal martyr," and the losses they had incurred in his behalf—on another side, a formidable array of enemies who had once been friends and associates; the hatred of foreign nations, only kept from finding expression by the fear inspired by his sword; chronic rebellion at home; within the camp lukewarm allies, ready to fall away like water as soon as they should "perceive the least rub in his fortunes;" his own kith and kin not with him, and uneasy in his own mind about grace and acceptance; doubtful, too, as has been said, whether or not he had striven in vain for the ultimate good of his country—what comfort could he have in living? He was alone, and he felt it keenly; the still strong man felt the need of some sympathy, some divider of cares with whom he could relieve himself of the great burden of public and private care which came upon him daily in the singularly exceptional position in which he found himself placed. As age increased he suffered more and more from the chilling wind of isolation, and seemed to yearn after that rest which the weary love. Yet the spirit of duty within him, the duty which he believed he was called to discharge in England, strove to prevent his wish to depart; he saw his work all unfinished, and he knew that he had no fit successor; he believed—some say affected to believe—that his work was God's work, and he wished to do it to the utmost of his power. For duty's sake and religion's, and because it was "God's high gift," he guarded his life "from scathe and wrong," and his hold on life was not a little strengthened by the natural dread a man has of loosening it through sudden violence and deadly malice. Such a dread had Cromwell for a companion, in addition to his load of carking cares and weighty troubles. Plots to assassinate him were continually being made, and were only baffled by the most watchful energy and the most exemplary punishments. The knowledge of their existence, and the consciousness that at any moment he might fall a victim, contributed to make a man whose mind was already overladen, a man who had a religious or superstitious dread of being sent to his account suddenly, "disappointed, unaneled," without any reckoning made, excitable and nervous to an almost unbearable degree.

In August, 1658, he was at Hampton Court Palace, watching the sure progress of disease in the body of his best beloved child, Elizabeth Claypole. He was, and had been for some time, far from well, but the absorbing attractions of his daughter's state made him oblivious or indifferent to his own ills. On the 6th of August the strongest link of affection that bound him to the world was snapped; Elizabeth Claypole died, and then the Protector found out, what other men had known long since, that he was very ill. For a time he distracted himself by the sad cares of the last offices for his daughter, whom he caused to be buried with imperial pomp among kings and queens in Westminster Abbey; but this done he had leisure to find out that he was mortal. At the moment of his daughter's death he was confined to his bed with gout, and upon that fever supervened. His pulse became intermittent, but his physicians did not seem to be anxious, and he, on his wife expressing her fears as to the issue of his illness, bade her be sure he should not die, since he knew he should not "from better authority than any which you can have from Galen or Hippocrates. It is the answer of God himself to our prayers; not to mine alone, but to those of others who have a more intimate interest in him than I have."

For sake of the change he had moved from Hampton Court to Whitehall, where he took to his bed, and within a month of his daughter's decease he had followed her to her long home. Thurloe, his faithful secretary and most devoted friend, announced the event to the Deputy of Ireland in a letter wherein he said of Cromwell, "He is gone to heaven, embalmed with the tears of his people, and upon the wings of the prayers of the saints."

With a magnificent ceremonial, copied from that which was used at the funeral of the Spanish King Philip II., in 1598, the Republican Government laid the body of Oliver Cromwell in Westminster Abbey, where it remained with those of princes and senators till the restoration of the monarchy, when the spirit of revenge wreaked itself on the corpse of the spoiler of kings by causing it to be exposed on the gallows at Tyburn, and then buried in a hole like the carcase of a dog. To Cromwell himself it could scarcely have mattered much where they laid his body or what they did with it after he had done with it; the splendid funeral at St. Peter's was as little in accordance with his habits and ways as the ignominious barbarity at Tyburn. He was beyond the reach of honour and dishonour, insensible to flattery as to blame; but to those who remained these two ceremonials signified something. What had Cromwell done that gave significance to them?

In order to answer this question, it is necessary to take a survey of the life of the man, as the history of it is presented to us in the records of his time, and by the light of dispassionate, truth-seeking inquiry instituted since then.

Oliver Cromwell was born on April 25, 1599, at Hunting-

tutor. 27. Take the key to him. 28. Bring me back the books which I have lent you. 29. Do not bring them back to me, read them. 30. Let us have patience, we shall soon have money. 31. Let us speak to them, they are at my father's. 32. Tell them that I intend to write to them to-morrow morning. 33. Go to church this afternoon. 34. Bring me back my letters. 35. Do not carry them there, but bring them to me as soon as possible.

SECTION LXXI.

1. A verb following another verb in the imperative, is put in the infinitive (according to general rule, Sect. 20, 2). The conjunction, which often comes between the two verbs in English, is not used in French :—

Allez parler au musicien.	*Go and speak to the musician.*
Allez faire votre ouvrage.	*Go and do your work.*
Courez voir ces messieurs.	*Run and see those gentlemen.*

2. **Prendre garde,** *to take care, to take heed,* when followed by another verb in the infinitive, means *to take care not to* :—

Prenez garde de tomber.	*Take care not to fall.*

3. **Prendre le deuil,** means *to go into mourning;* **prendre la peine,** *to take the trouble;* **prendre les devants,** *to go on before;* **prendre un parti,** *to take a determination;* **prendre du café, du thé,** &c., *to take coffee, tea,* &c.

MISCELLANEOUS EXAMPLES.

Envoyez chercher le tapissier.	*Send for the upholsterer.*
Allez chercher votre parapluie.	*Go and fetch your umbrella.*
Courez voir votre père.	*Run and see your father.*
Prenons garde de nous blesser.	*Let us take care not to hurt ourselves.*
Prenez garde de déchirer vos habits.	*Take care not to tear your clothes.*
N'avez-vous pas pris le deuil ?	*Have you not put on mourning?*
Prenez la peine de vous asseoir.	*Take the trouble to sit down.*
Prenez du thé ou du café.	*Take tea or coffee.*
Quel parti avez-vous pris ?	*What resolution have you taken?*

EXERCISE 137.

Attend-re, 4. *to expect, to wait for.*	Gât-er, 1. *to spoil.*	Robe, *f. dress.*
Chocolat, m. *chocolate.*	Gouverneur, m. *governor.*	Se tai-re, 4. ir. *to be silent.*
Courrier, m. *courier.*	Lorsque, *when.*	Soin, m. *care.*
Croi-re, 4. ir. *to believe.*	Port-er, 1. *to wear.*	Tach-er, 1. *to stain, to spot.*
Déchir-er, 1. *to tear.*	Quelquefois, *sometimes.*	Tomb-er, 1. *to fall.*

1. Allez voir mon frère, il a quelque chose à vous communiquer. 2. Courez leur dire que je les attends. 3. Mon frère a pris bien garde de déchirer ses habits. 4. Votre cousine a-t-elle pris garde de tacher sa robe ? 5. Elle a pris garde de tomber, car en tombant elle l'aurait gâtée. 6. Ces petites filles ont-elles pris le deuil ? 7. Elles viennent de le prendre. 8. Pour qui prenez-vous le deuil ? 9. Je prends le deuil pour ma mère. 10. Prenez-vous du thé ou du café le matin ? 11. Nous prenons du thé et du café. 12. Ne prenez-vous pas quelquefois du chocolat ? 13. Nous n'en prenons que lorsque nous sommes malades. 14. Quel parti le gouverneur a-t-il pris ? 15. Il a pris le parti de se taire. 16. Prendrez-vous mon parti (*my part*) ou celui de votre fils ? 17. Je prendrai le vôtre, si je crois que vous avez raison. 18. Pourquoi ne prenez-vous pas la peine de lire sa lettre ? 19. Parce qu'elle n'en vaut pas la peine. 20. Votre courrier a-t-il pris les devants ? 21. Il n'a pu prendre les devants. 22. N'avez-vous pas tort de prendre son parti ? 23. Je n'ai pas tort de le prendre. 24. Avez-vous pris le thé (*your tea*) ? 25. Nous n'avons pas pris (*our*) le thé, nous avons pris le café.

EXERCISE 138.

1. Has your brother taken care not to spoil his hat ? 2. He has taken care not to spoil it, he has only one. 3. Go and speak to your sister, she calls you (*appelle*). 4. Will you not take a cup (*tasse*) of tea ? 5. I have just taken my tea. 6. What have you said to your little girl ? 7. I have told her to take care not to tear her dress. 8. Let us take care not to tear that book. 9. My son has just brought it. 10. Has he taken his tea ? 11. He has not yet taken tea, it is too early. 12. At what hour do you take tea at your house ? 13. We take tea at six o'clock. 14. Do you take tea or coffee for breakfast (*à votre déjeûner*) ? 15. We take coffee. 16. Is your courier gone on before ? 17. He has not been able to go on before. 18. What resolution have you taken ? 19. I have taken the resolution to study my lesson. 20. Have you taken care not to tear your books ? 21. I have taken care not to stain them. 22. What has your brother determined ? 23. He has determined to remain silent. 24. Have you taken my part ? 25. I have taken my brother's part. 26. Are you right to take his part ? 27. I am right to take his part, because he is right. 28. Are you not afraid to take his part ? 29. I am not afraid to take his part. 30. Will you take your sister's part or mine ? 31. I will take my sister's part. 32. Go and read your book, you do not know your lesson. 33. I know my lesson, and I know also that you are my friend. 34. Let us go to our father, he wants us.

SECTION LXXII.—THE SUBJUNCTIVE.

1. All the French verbs, regular and irregular, end in this tense with **e, es, e, ions, iez, ent** :—

2. CONJUGATION OF THE PRESENT OF THE SUBJUNCTIVE OF THE REGULAR VERBS.

Que je chant	**-e**	fin	**-isse**	reç	**-oive**	rend	**-e**
That I may sing		*may finish*		*may receive*		*may render*	
Que tu parl	**-es**	chér	**-isses**	aperç	**-oives**	vend	**-es**
That thou mayest speak		*mayest cherish*		*mayest perceive*		*mayest sell*	
Qu'il donn	**-e**	fourn	**-isse**	perç	**-oive**	tend	**-e**
That he may give		*may furnish*		*may collect*		*may tend*	
Que nous cherch	**-ions**	pun	**-issions**	conç	**-evions**	entend	**-ions**
That we may seek		*may punish*		*may conceive*		*may hear*	
Que vous port	**-iez**	sais	**-issiez**	d	**-eviez**	perd	**-iez**
That you may carry		*may seize*		*may owe*		*may lose*	
Qu'ils aim	**-ent**	un	**-issent**	déç	**-oivent**	mord	**-ent**
That they may love		*may unite*		*may deceive*		*may bite*	

3. In the first conjugation, the subjunctive is in the singular, similar to the present of the indicative. *Exception :* **aller —je, vais, que j'aille.**

4. The first and second persons plural of the subjunctive, in the four conjugations, are the same as the corresponding persons of the imperfect of the indicative. The third person plural is like the corresponding person in the indicative present. Exceptions : **avoir,** subjunctive, **nous ayons, vous ayez, ils aient ; savoir, nous sachions, vous sachiez, ils sachent ; être, nous soyons, vous soyez, ils soient ; faire, nous fassions, vous fassiez, ils fassent ; aller, ils aillent ; vouloir, ils veuillent ; valoir, ils vaillent,** etc.

5. The subjunctive is formed from the participle present, by changing **ant** into **e, es, e, ions, iez, ent** : as, **chantant, je chante ; finissant, je finisse ; rendant, je rende ; sachant, je sache ; craignant, je craigne.**

6. In the following verbs the *endings* of the Present Subjunctive are formed as stated in No. 5 above, but the root is altered. The student will find them conjugated in the Second Part of this Grammar, § 64 :—

Acquérir	Concevoir	Mourir	Prendre	Savoir	Venir
Aller	*Décevoir*	*Mouvoir*	(and	Tenir (and	(and
Apercevoir	Devoir	Percevoir	its com-	its com-	its com-
Avoir	Être	Pourvoir	pounds)	pounds)	pounds)
Boire	Faire	Pouvoir	Recevoir	Valoir	Vouloir

7. The past of the subjunctive is formed from the subjunctive present of one of the auxiliaries, **avoir, être,** and the past participle of the leading verb [§ 46] :—

Que j'aie parlé, que je sois venu.	*That I may have spoken, that I may have come.*

8. A verb is put in the subjunctive, when it is preceded by another verb expressing consent, command, doubt, desire, surprise, will, want, duty, necessity, regret, fear, apprehension, &c. [§ 123 (4)] :—

Je veux que vous lui parliez.	*I wish you to speak to him.*
Je désire que vous arriviez à temps.	*I wish you to arrive in time.*

9. When the first verb expresses fear or apprehension, the second must be preceded by **ne,** which, however, has no negative sense [§ 123 (5), § 134 (4) (5) (6)] :—

Je crains qu'il ne tombe.	*I am afraid lest he fall.*

10. After **craindre,** *to fear;* **appréhender,** *to apprehend;* **avoir peur,** *to be afraid;* **trembler,** *to tremble;* **pas** is used in connection with **ne,** when we wish for the accomplishment of the action or occurrence expressed by the second verb [§ 134 (7)] :—

Je tremble qu'il n'arrive pas à temps.	*I tremble that he may not arrive in time.*

MISCELLANEOUS EXAMPLES.

Le médecin veut-il que je boive de l'eau ?	*Does the physician wish me to drink water?*
Je consens que vous alliez le voir.	*I consent that you go to see him.*
Nous doutons que vous arriviez à temps.	*We doubt your arriving in time.*
Je crains que votre maître ne vous punisse.	*I fear lest your master may punish you.*
Je crains que votre maître ne vous punisse pas.	*I fear that your master may not punish you.*
Je m'étonne qu'il ne sache pas cela.	*I am astonished that he does not know that.*
J'exige que vous lui donniez cela.	*I require you to give him that.*
Voulez-vous qu'il aille à la chasse ?	*Do you wish him to go hunting?*
Que voulez-vous que je dise ?	*What do you wish me to (that I should) say?*
J'aime mieux que vous me payiez.	*I would rather have you to pay me.*

EXERCISE 139.

Artisan, m. *mechanic.*	Empêch-er, 1. *to prevent.*	Obé-ir, 2. *to obey.*
Atelier, m. *workshop.*	Force, f. *strength.*	Rempl-ir, 2. *to fulfil.*
Au-dessus, *above.*	Fortement, *very much.*	Rue, f. *street.*
Bracelet, m. *bracelet.*	Magasin, m. *warehouse.*	Scierie, f. *saw-mill.*
Déjà, *already.*	Malsain, e, *unhealthy.*	Tomb-er, 1. *to fall.*

1. Que voulez-vous que nous fassions ? 2. Je désire que vous fassiez attention à vos études. 3. Ne craignez-vous pas que la pluie ne vous empêche de sortir ? 4. Nous craignons fortement que la pluie ne nous empêche de remplir nos engagements. 5. Doutez-vous qu'il soit chez lui maintenant ? 6. Je doute qu'il y soit, il est déjà dix heures. 7. Exigez-vous qu'il parte de bonne heure ? 8. Je m'étonne qu'il ne soit pas déjà parti. 9. Aimez-vous mieux que je vous rende ces bracelets ? 10. J'aime mieux que vous me les payiez. 11. Votre voisin craint-il que son enfant ne sorte ? 12. Il craint qu'il ne tombe dans la rue. 13. Ne désirez-vous pas que vos élèves vous obéissent ? 14. Je souhaite qu'ils m'obéissent et qu'ils obéissent à leurs professeurs. 15. Ne craignez-vous pas que cet artisan ne tombe malade ? 16. Je crains qu'il ne tombe malade, car son atelier est très malsain. 17. Ne regrettez-vous pas qu'il soit obligé de travailler ? 18. Je regrette qu'il soit obligé de travailler au-dessus de ses forces. 19. Ne désirez-vous pas qu'on lui apprenne cette nouvelle ? 20. Je désire qu'on la lui apprenne le plus tôt possible. 21. Votre père ne veut-il pas que vous achetiez un magasin ? 22. Il veut que j'achète une scierie. 23. Désirez-vous que je vous quitte ? 24. Je désire que vous restiez avec moi. 25. Je veux que vous partiez ce matin.

EXERCISE 140.

1. Do you wish me to speak to the mechanic ? 2. I wish you to tell him to (*de*) come here to-morrow morning. 3. What do you wish me to do ? 4. I wish you to bring me a book. 5. Do you not wish me to read your letter ? 6. I wish you to read it and (*que*) give it to my sisters. 7. Does not your sister fear lest the rain may prevent her going out ? 8. She fears that the rain may prevent our going out. 9. Do you doubt that your father be at home now ? 10. I doubt his being there. 11. Do you require me to do my work now ? 12. I wish you to do your work before going out (*avant de sortir*). 13. Do you not regret his being obliged to work ? 14. I do not regret his being obliged to work. 15. Are you not astonished that he knows that ? 16. I am astonished that he knows all. 17. Do you require me to pay him to-day ? 18. I wish you to pay him to-morrow. 19. What would you have me do (*see* No. 1 *of the above exercise*) ? 20. I will have you pay him immediately. 21. Do you fear lest the master punish your son ? 22. I fear that he may not punish him. 23. What would you have me say ? 24. I would have you say the truth. 25. Does not your father wish you to buy a house ? 26. He wishes me to buy a store-house. 27. Do you wish us to leave you ? 28. I wish you to go away to-morrow. 29. Do you wish me to stay with you ? 30. I wish you to stay here. 31. Do you wish me to tell him that news ? 32. I wish you to tell it to him. 33. Do you wish your children to obey their teacher ? 34. I wish them to obey him.

SECTION LXXIII.—USE OF THE SUBJUNCTIVE (*continued*).

1. A verb preceded by one of the impersonal verbs, **il faut,** *it is necessary* ; **il importe,** *it matters, it is important* ; **il convient,** *it is proper, becoming* ; **il vaut mieux,** *it is better* ; **il plaît,** *it pleases, suits* ; **il se peut, il peut se faire,** *it may be* ; **il est juste,** *it is just* ; **il est bon,** *it is proper* ; **il est nécessaire,** *it is necessary* ; **il est important,** *it is important* ; **il est temps,** *it is time* ; **il est indispensable,** *it is indispensable* ; **il est à propos,** *it is proper* ; **il est fâcheux,** *it is sad, it is a pity* ; **il est urgent,** *it is urgent,* or by another verb or expression implying necessity, will, or propriety, must be put in the subjunctive [§ 123 (7)] :—

Il faut que vous restiez ici.	*You must remain here.*
Il est juste que vous soyez récompensé.	*It is just you be rewarded.*

2. The impersonal verb **il est** requires the indicative mood, when it is used affirmatively with one of the adjectives, **sûr,** *sure* ; **certain,** *certain* ; **vrai,** *true* ; **démontré,** *proved* ; **incontestable,** *incontestable* ; **évident,** *evident,* and others having a positive and affirmative sense :—

Il est certain qu'il vient ou qu'il viendra.	*It is certain that he comes or will come.*

3. When, however, the verb **il est,** used in the above connection, is negative or interrogative, it is followed by either the indicative or subjunctive mood :—

Il n'est nullement certain qu'il vienne, *or* qu'il est venu, *or* qu'il viendra.	*It is by no means certain that he will come,* or *has come.*

4. After certain conjunctions, **afin que,** *in order that* ; **quoique,** *although,* &c. [*see full list,* § 140 (1) (3)], the subjunctive is always used :—

Quoi que vous fassiez, quoi que vous disiez.	*Whatever you may do, whatever you may say.*

5. Other important rules on the government of conjunctions will be found in § 73, 140.

MISCELLANEOUS EXAMPLES.

Que faut-il que votre sœur fasse ?	*What must your sister do ?*
Faut-il que je lui écrive ?	*Must I write to him ?*
Il est nécessaire que vous lui écriviez.	*It is necessary for you to write to him.*
Il est temps que vous lui donniez son argent.	*It is time that you should give him his money.*
N'est-il pas fâcheux qu'il soit arrivé si tard ?	*Is it not a pity that he arrived so late ?*
Il est certain qu'il est arrivé.	*It is certain that he is arrived.*
Il n'est point certain qu'il se soit blessé, *or* qu'il s'est blessé.	*It is not certain that he has hurt himself.*
Restez ici jusqu'à ce qu'il arrive.	*Remain here until he comes.*
Pourvu que vous finissiez à temps.	*Provided that you finish in time.*

EXERCISE 141.

Affaire, f. *affair.*	Nécessaire, m. *necessaries.*	Régl-er, 1. *to regulate.*
Ainsi, *thus.*	Ordre, m. *order.*	Satisfai-re, 4. ir, *to satisfy.*
Créancier, m. *creditor.*	Oubli-er, 1. *to forget.*	Se couch-er, 1. ref. *to retire.*
Emprunt-er, 1. *to borrow.*	Point, m. *point, degree.*	Se lev-er, 1. ref. *to rise.*
Fourn-ir, 2, *to furnish.*	Pourvu que, *provided that.*	Tel, le, *such.*
Linge, m. *linen.*		
Manqu-er, 1. *to want.*		

1. Que faut-il que je dise ? 2. Il faut que vous disiez ce que vous avez entendu. 3. Ne faut-il pas que je finisse cette histoire ? 4. Il n'est pas nécessaire que vous la finissiez. 5. N'est-il pas à propos que je satisfasse mes créanciers ? 6. Il est à propos que vous le fassiez. 7. N'est-il pas juste que je vous paie ce que je vous ai emprunté ? 8. Il est juste que vous me le payiez. 9. Se peut-il que votre frère ait oublié sa famille ? 10. Il ne se peut pas qu'il l'ait oublié. 11. Est-il certain que votre frère se soit oublié à un tel point ? 12. Il est certain qu'il s'est oublié. 13. Il est bien fâcheux qu'il se soit oublié

don, and was the son of a country gentleman of moderate estate, who was of the same family as that Thomas Cromwell, Cardinal Wolsey's favourite secretary, who was made Earl of Essex by Henry VIII., and was afterwards beheaded by him. Oliver was sent to the University, where he made but small proficiency in his studies, and fell, it is said, into some wild courses. Reforming his mode of life, however, on a sudden but sincere conviction that it was a wrong one, Cromwell married, and at the same time warmly embraced the Puritanical faith, which was then beginning to acquire great influence throughout the country. For reasons of economy he gave up housekeeping as a country gentleman, and farmed some land which he took near St. Ives; but his operations in this direction were not successful, the duties of the farmer being probably neglected for those of the religious politician. In conjunction with his kinsman, John Hampden, he formed a project of emigrating to America, believing that there alone he could live in the enjoyment of that freedom of conscience and of political action which was denied to him and his brethren here. How that project was frustrated by royal order, on the very eve of completion, has been already shown at length in a previous number of the present series of Historic Sketches.

Soon after the veto was put on his emigration, Cromwell was sent to Parliament as member for the town of Cambridge, and though he seldom spoke, and when he did, not in a way to captivate or lead the house, his vote was invariably to be found in the lists of those who had maintained the popular right against the kingly power. He did not take a prominent part in the political and domestic matters which brought about the rupture between the King and the Parliament, but he made good use of his time, and of his great powers of observation and reflection, to make up his mind thoroughly both as to the righteousness of the common cause, and as to the integrity and capacity of the men engaged on both sides of it. Having formed very strong opinions upon the most important questions of the day, he cleaved to them as a strongly persuaded man does with uncompromising intensity; and the shape of the quarrel in the state, and the peculiar habit of his mind, caused him to see plainly a great gulf fixed between what he believed to be on one side the cause of God himself, and on the other the cause of God's enemies.

In all important points before the breaking out of civil war we find him voting on the popular side, lending whatever weight his influence had to the cause of liberty; and when by the flight of the king from London, and by the rearing of the royal standard at Nottingham, August 25, 1642, war became inevitable, Cromwell, then in his forty-third year, was among the first to offer his sword to the Parliament, and he was forthwith commissioned to raise a troop of horsemen to serve in the Parliamentary army. This troop, which he soon increased to a regiment, he raised from among the yeomen and well-to-do farmers in Cambridgeshire and the neighbouring counties, ensuring thereby a certain amount of education among his men, and a large admixture of that free spirit which cannot grow but in an independent atmosphere. He severely disciplined his recruits till they become the famous "Ironsides," dreadful in battle; he prayed with them, preached to them, fought with them, and by cool courage and fervent zeal succeeded in inspiring them with a belief that a prophet had risen up among them.

First at Gainsborough, and then at Horncastle, in Yorkshire, Cromwell displayed his military ability as a general, by defeating with severe loss some divisions of the Royalist army under the Marquis of Newcastle; and soon afterwards, in 1644, he was appointed second in command of the Parliamentary army operating in the Eastern counties under the Earl of Manchester. In conjunction with Fairfax and Lambert, the Earl of Manchester, having been victorious in the east, marched to York and besieged it, the issue being the battle of Marston Moor, where the cavalry and infantry under the command of Oliver Cromwell broke the serried ranks of Prince Rupert, and carried the day "for God and the Houses."

At Dennington Castle, near Newbury, where King Charles had left his baggage and artillery after the rout of his army at the latter place, a difference arose between Cromwell and the Earl of Manchester which first showed the firmness and dominancy of the spirit which actuated the future Protector. Cromwell was for taking the castle and the guns, the earl was for marching elsewhere, and upon this question the two men split, Cromwell thereafter taking his own independent line across the difficult country of politics which was before him. It matters not now to follow him through all his military achievements prior to the death of the king; suffice it to say that he was incessantly employed, retaining by stratagem his seat as a member of Parliament the while, and that he figured in all the great battles of the war, including Naseby, June 14, 1645, and was always attended by success.

Thoroughly persuaded of the dishonesty of the king; convinced that, unless he were completely overthrown, the last state of England would be worst than the first; persuaded also that there was not any man, or any set of men on the Parliamentary side, who could prevent this except himself, he determined, about the time King Charles was given up by the Scots, with whom he had taken refuge, to gather up the reins into his own hands, and to drive the chariot of the state along the only road which in his opinion was a safe one. Firmly, harshly, perseveringly, prayerfully, he addressed himself to his task which was to overthrow the power—namely the Parliament—which had overthrown the king, to subject the king utterly, even by death if need be, and to bring under obedience those rival chiefs and commanders, who, he foresaw, would never tolerate quietly the assumption of power by one whom they looked on as their equal or inferior.

It was by Cromwell's orders, or at least with his concurrence, that Cornet Joyce, with a strong party of cavalry, made a sort of raid on the captive king's guard at Holdenby, in Yorkshire, where he was on his way to be given up to the Parliament, and snatching the king from the hands of the Scots and Parliamentary commissioners, brought him to the head-quarters of the army. The army at that time was in open quarrel with the Parliament on the subject of the limitations which that body had thought fit to place upon the authority and influence of the military. The Parliament itself was divided into many factions, all pulling a different way, none of them seeking the general good, but only the advancement of their own petty interests. Cromwell, whose influence with the army was at this time paramount, resolved to crush the rival but divided power, and knowing the immense importance of the possession of the king's person, gladly acquiesced in, if he did not order, the violent taking of Charles from the custody of the Parliamentary commissioners.

Immediately he heard of the king's re-arrest he left London, hastened to the army, and putting himself at its head, marched to St. Albans', where he opened negotiations with the Parliament in London. The nation looked on approvingly, being disgusted with the way in which the Houses had used their power, with the taxes they levied, the harsh laws they enacted, and the tyrannical manner in which the exegutive was carried on; and though London held out in favour of the Parliament, the army marched up and demanded admittance, which was conceded to them without show of resistance. This was in June, 1647.

On November 11, in the same year, King Charles, who was a sort of prisoner at large at Hampton Court Palace, fled to the Isle of Wight, where he was detained at Carisbrook Castle by the governor Colonel Hammond. Meantime the army, represented by Cromwell, had completely overawed the Parliament, which was allowed, however, still to exist till the dictator had used them for his purposes. The negotiations between it and the king having proved futile, Cromwell summoned a council of the principal officers of the army to devise some means of settling the nation. At this council it was resolved, after much prayer and much deliberation, to bring the king to trial for having committed treason against the people by levying war upon them.

Plots and counterplots now took place, some having in view the overthrow of the officers, some of the Parliament, some the restoration of the king, the result being that a second civil war broke out, aided by the Scots, and England was ablaze again from end to end. Promptly, skilfully, successfully, Cromwell and his friends crushed the rebellion and the invasion; and that being done, they resolved to bring the king to punishment for the part he had had in them. The Parliament resisting, the army came to London; and the Houses having still declared their willingness to treat with the king, and their entire disapproval of the course taken by the army, Cromwell resolved to coerce them still more, and on the 6th of December, 1648, "purged" the

House by seizing some two hundred of the members inimical to his interests, and allowing no more than some sixty of the most partisan-like to remain. It was by a High Court of Justice appointed by this "Rump" Parliament that King Charles was brought to trial in Westminster Hall, and by a sentence of that court, signed, amongst others, by Oliver Cromwell, he was publicly executed "in the open space before Whitehall," on the 30th of January, 1648-9. There was no other way in the state to which things had come; it was war to the knife, and so wide had become the difference in political and religious feeling between the opposed parties, that the intolerant absolutism of one of them was inevitable.

For four years after this event the government of England was nominally republican, and really a sort of parliamentary executive under the control of the army. The prime mover, though he kept himself in the background, was Oliver Cromwell, whose will made itself law, and whose policy guided the state. Ireland, the state of which was more wretched and deplorable, perhaps, than at any other time in her history, was to be "tranquillised," and Cromwell marched through it in inexorable fashion, putting whole garrisons to the sword, burning, killing, and destroying, in pursuance of what his stern, strong nature conceived to be the only efficacious way of dealing with her. Ireland was tranquil in the sleep of death, and never again was able to trouble the sister island with her aspirations after life. It was an awful opiate the Puritan leader gave her, and deadly and bitter was the hatred with which she woke from the effects of it. With no worse malediction can an Irishman curse to-day than with "the curse of Crom'ell."

The Dutch were punished for the aid they gave to the king's cause by a naval war, which was singularly brilliant, and in which the names of De Ruyter, De Witt, Van Tromp, Blake, Ayscue, Venables, and Monk, shine out in bold relief. Scotland, which had espoused the cause of Charles II., and had proclaimed him king, was overrun by the same irresistible man who had crushed the opponents of the Commonwealth and Puritanism in Ireland. At Dunbar, at Stirling, and then at Worcester, whither the Scots' army had penetrated in order to be overthrown, the strong hand and wise head of Oliver Cromwell prevailed, and the royal cause was irretrievably lost.

In 1653 it became obvious to the army, or to the man who commanded it, that parliamentary government must cease in form as well as in reality. The exceptional state of England rendered it impossible to have a divided government, and in divisions and petty squabbles the Parliament, mutilated as it was, was only strong. Every day the civil and the military powers were coming into collision. In the face of smouldering war at home, avowed hostility abroad, and the still unsettled state of the realm, this sort of thing would not do. Cromwell resolved to take the helm himself, and alone to steer the ship of the state. On the 20th of April, 1653, he dismissed the sham Parliament, over which Praise God Barebones presided, and was forthwith made Protector of the Commonwealth of England.

From that moment England rose to be a first-rate power in Europe. The Dutch were ruinously beaten in a two days' naval battle, in which Van Tromp, their great admiral, was killed. Spain, the greatest power in Europe, was victoriously withstood, and lost, among other possessions, the island of Jamaica; France, under Cardinal Mazarin, was glad to be well with the Republic of England; and Portugal received condign punishment for some assistance she gave to the exiled prince. At home a firm and disinterested rule served to heal many of the wounds from which poor England bled; and with a commerce protected afloat, and industry encouraged on shore, the English people grew prosperous, wealthy, and in some sort contented. Now and again the royalists, and those enemies of theirs who were enemies of the Commonwealth also, gave the government trouble; and it was seriously proposed, in order to put an end to their hopes, that Cromwell should make himself king, and found a new dynasty. In 1657 the crown was actually offered to him, but he firmly refused it, and accepted instead "the humble petition and advice," wherein were laid down rules for his guidance in the government, and in which his authority was defined.

For twelve months he continued to carry on his work, hoping against hope that it might be an abiding one; welding the disintegrated masses of English society into a strong, united community; striving to do justice to all, though many would not suffer him; making the country he had been called upon to govern prosperous at home and respected abroad. Space fails to tell of all he did, or to seek out a knowledge of the intentions he was not allowed to fulfil. Regarded with respectful hatred by the royalists, with envy by those whom he had outstripped in the race, with admiration by those who loved their country more than themselves, and prized the objects for which England had struggled and fought; loved by very few, unhappy in himself, Cromwell sank to rest; and enough has been said here to make it intelligible why to many of his countrymen a funeral and a tomb less than the most splendid seemed all unworthy of him, and also why, when Charles II. was restored to his father's throne, there were found men to suggest and approve the senseless barbarity which led to the exposure of his dead body on Tyburn gallows. Perhaps even these men, after "the merry monarch" had reigned a few years, might have looked back and said—when they saw the Dutch in the Medway, the French all-powerful through money, the Spaniards insulting the English flag in all places in the world, and the revenues of the kingdom squandered on mistresses and frivolity, while the servants of the state died of hunger—that sombre, harsh, ungenial as Cromwell might have been, he never allowed an Englishman to have cause to blush for his nationality, never made the state interests subservient to his own, never gave the people such provocation as did the restored line of princes, that in less than thirty years after the day of their unfortunate restoration they hurled them off the throne, and forbade firmly and for ever their re-accession to it.

Sovereigns Contemporary with Oliver and Richard Cromwell.

Denmark, King of.		*Portugal, Kings of.*		*Sweden, Sovereigns of.*	
Frederick III.	1648	John IV.	1640	Christina III.	1633
France, King of.		Alphonso VI.	1656	Charles X.	1654
Louis XIV.	1643	*Rome, Popes of.*		Charles XI.	1660
Germany, Emperors of.		Innocent X.	1644	*Turkey, Sultan of.*	
Ferdinand III.	1637	Alexander VII.	1655	Mahomet IV.	1649
Leopold I.	1658	*Russia, Czars of.*		*United Provinces of the Netherlands, Stadtholders of.*	
Poland, Kings of.		Alexis	1645		
John II. (sometimes styled Casimir V.)	1649	*Spain, Kings of.*		William II.	1647
		Philip IV.	1621	*Interregnum*	1652

Synopsis of Events in the Life of Oliver Cromwell, Lord Protector of the English Commonwealth.

Oliver Cromwell, who virtually held supreme sway over England from the surrender of Charles I. by the Scotch in 1647, was the son of a gentleman of Huntingdonshire, and grandson of Sir Henry Cromwell, of Hinchinbrook. By his wife, Elizabeth Bourchier, daughter of Sir John Bourchier, he had two sons and six daughters.

Born at Huntingdon	April 25, 1599	Execution of Moutrose,	May 21 1650
Elected Member of Parliament for Huntingdon	1628	Battle of Dunbar	Sept. 3, 1650
Prevented from emigrating to New England by Charles I.	1637	Charles II. crowned at Scone	January 1, 1651
Elected Member of Parliament for Cambridge	1640	Battle of Worcester,	Sept. 3, 1651
Civil War between the King and Parliament began	August 25, 1642	Navigation Laws enacted	October, 1651
[*For Events and Battles in Civil War, see page* 122.]		Dutch Admiral Van Tromp defeats the English Fleet in the Channel	Nov. 29, 1652
Members expelled from the House of Commons by "Pride's Purge"	Dec. 6, 1648	Blake defeats the Dutch Fleet off Portsmouth,	Feb. 18-20, 1653
"Rump" or Barebones' Parliament		"Long Parliament" ended by Cromwell	April 20, 1653
Charles I. executed	Jan. 30, 1649	Blake defeats the Dutch off the North Foreland,	June 2, 1653
Temporary Abolition of House of Lords	1649	Blake defeats the Dutch off the coast of Holland,	July, 1653
Cromwell goes to Ireland	1649	Cromwell made Lord Protector	December 16, 1653
Proclamation of Charles II. by the Scots	1649	Expedition under Blake sent against the Pirates of the Mediterranean	1654

*

ainsi. 14. Resterez-vous jusqu'à ce que j'aie mis ordre à mes affaires? 15. Je resterai jusqu'à ce que vous les ayez réglées. 16. Ne faudra-t-il pas que je fournisse des provisions à cette famille? 17. Il faudra que vous lui en fournissiez, pourvu que vous en ayez. 18. Ne vaudra-t-il pas mieux que vous lui prêtiez de l'argent, que de la laisser manquer du nécessaire? 19. Il vaudra mieux que nous lui en prêtions. 20. Que faut-il que nous fassions? 21. Il faut que vous portiez ce linge chez moi. 22. N'est-il pas temps que je me couche? 23. Il est temps que vous vous couchiez. 24. Faut-il que je me lève? 25. Il **faut** que vous vous leviez.

Exercise 142.

1. What must our friend do? 2. He must remain at our house until I come. 3. What must our neighbour do? 4. He must put his affairs in order. 5. Is it not right that you should pay your creditors? 6. It is right that I should pay them. 7. Is it time for your little boy to go to school? 8. It is time for him to go to school, it is ten o'clock. 9. Must I write to your correspondent to-day or to-morrow? 10. You must write to him to-morrow morning. 11. Is it not a pity that your brother has torn his cap (*casquette*)? 12. It is a pity that he has torn it. 13. Is it necessary for your mother to finish her letter? 14. It is not necessary that she finish it. 15. Is it certain that your son has forgotten his money? 16. It is certain that he has forgotten it. 17. It is by no means certain that he has forgotten it. 18. Must you furnish money to that mechanic? 19. I must furnish him some, he has none. 20. Whatever you may do you will not succeed (*réussir*). 21. Whatever your brother may say, nobody will believe him (*croire*, ir.). 22. Must I write to you? 23. You must write to me. 24. Do you wish me to be ill? 25. I do not wish you to be ill. 26. Do you require me to tell you that? 27. It is necessary that you tell me all. 28. Do you wish me to go to your house? 29. I wish you to go there. 30. Must I get up? 31. You must rise immediately (*à l'instant*). 32. Must your brother retire? 33. He must go to bed immediately. 34. It is time for him to go to bed, it is twelve o'clock.

SECTION LXXIV.—USE OF THE SUBJUNCTIVE (*continued*).

1. The verbs **croire**, *to believe;* **dire**, *to say;* **espérer**, *to hope;* **gager** and **parier**, *to bet;* **penser**, *to think;* **sentir**, *to feel;* **voir**, *to see;* and others expressing affirmation or something certain and positive, are, when conjugated affirmatively, followed by the indicative present or future [§ 123]:—

Je pense, je crois, je dis qu'il viendra.	*I think, I believe, I say that he will come.*

2. The above verbs, when used in the same connection and conjugated negatively or interrogatively, are followed by * either the indicative or the subjunctive [§ 123 (2)]:—

Je ne crois pas qu'il vienne, *or* qu'il viendra.	*I do not believe he will come.*

3. A verb, preceded by another verb and by a relative pronoun, is put in the subjunctive when there is an idea of uncertainty, and in the indicative when there is certainty [§ 123 (2)]:—

J'ai un homme qui me rendra service.	*I have a man who will oblige me.*
J'ai besoin d'un homme qui me rende service.	*I want a man who will (may) oblige me.*

4. A verb, preceded by a superlative, relative, or by the words, **le seul, le premier, le dernier**, is put in the subjunctive [§ 123 (6)]:—

Voilà le seul chapeau que j'aie.	*That is the only hat I have.*
Voilà le meilleur homme que je connaisse.	*There is the best man I know.*

* The student should bear in mind that the subjunctive is essentially the mood of doubt. Its use is not absolutely a matter of grammar, and in the case mentioned in No. 2 above, it would be employed if the speaker had a doubt to express, while he would use the indicative mood if he had not.

Miscellaneous Examples.

Je crois que le concert a eu lieu.	*I believe that the concert took place.*
Je ne pense pas que notre ami vienne.	*I do not think that our friend will come.*
J'espère que vous apprendrez cela par cœur.	*I hope that you will learn that by heart.*
Je ne pense pas qu'il puisse apprendre tout cela par cœur.	*I do not think that he can learn all that by heart.*
Je crois que ce marchand s'enrichit aux dépens d'autrui.	*I believe that this merchant grows rich at the expense of others.*
Je ne crois pas qu'il s'enrichisse à vos dépens.	*I do not believe that he enriches himself at your expense.*
Je ne crois pas que vous réussissiez à gagner votre vie.	*I do not believe that you will succeed in earning your living.*
J'ai une carafe qui contient un litre.	*I have a decanter which holds a litre.*
Je cherche une carafe qui contienne un litre.	*I seek a decanter which holds a litre.*
Je vous prête le meilleur chapeau que j'aie, à condition que vous me le rendiez demain.	*I lend you the best hat I have, on condition that you will return it to me to-morrow.*

Exercise 143.

Compt-er, 1. *to depend.*
Cristal, m. *crystal.*
Debout, *standing.*
Dur-er, 1. *to wear, last.*
Fort, *strong.*
Litre, m. *litre, about a quart.*
Négociant, m. *merchant.*
Parasol, m. *parasol.*
Portier, m. *porter.*
Rentr-er, 1. *to come in again.*
S'asse-oir, 3. ir. ref. *to sit down.*
Sorte, f. *kind.*
Suffi-re, 4. ir. *to suffice.*
Tanneur, m. *tanner.*
Tard-er, 1. *to tarry.*

1. Pensez-vous que ce drap dure longtemps? 2. Je crois qu'il durera bien, car il est fort. 3. Croyez-vous que notre portier tarde à rentrer? 4. Je crois qu'il ne tardera pas. 5. Désirez-vous que nous restions debout? 6. Je désire au contraire que vous vous asseyiez. 7. Croyez-vous que ces étudiants puissent apprendre cinq pages par cœur en deux heures? 8. Je crois que c'est impossible. 9. Espérez-vous que notre ami arrive de bonne heure? 10. J'espère qu'il arrivera bientôt. 11. Quelle sorte de carafe vous faut-il? 12. Il m'en faut une qui contienne un litre. 13. J'en ai une de cristal, qui contient deux litres. 14. Pensez-vous que ce négociant s'enrichisse à vos dépens? 15. Je sais qu'il s'enrichit aux dépens d'autrui. 16. Quel parasol pensez-vous me prêter? 17. Je pense vous prêter le meilleur que j'aie. 18. Le tanneur réussira-t-il à gagner sa vie? 19. Je ne crois pas qu'il y réussisse. 20. Pensez-vous que cet argent suffise à votre père? 21. Je crois qu'il lui suffira. 22. Croyez-vous que ces messieurs comptent sur moi? 23. Je sais qu'ils comptent sur vous. 24. Pensez-vous que le concert ait lieu aujourd'hui? 25. Je crois qu'il n'aura pas lieu.

Exercise 144.

1. Do you believe that the concert has taken place? 2. I believe that it has taken place. 3. Do you believe that your sister's dress will wear well? 4. I think that it will wear well, for the silk is very good. 5. Do you believe that our friend will succeed in earning a livelihood? 6. I believe he will succeed in it (*y*), for he is very diligent. 7. Do you think that the tanner grows rich at my expense? 8. I think that he enriches himself at the expense of others. 9. Does the merchant grow rich at my father's expense? 10. He grows rich at your expense. 11. What kind of a house must you have (*vous faut-il*)? 12. I must have a house which has ten rooms. 13. I have a good house which has twelve rooms. 14. What kind of a decanter do you seek? 15. I seek one which holds three litres. 16. I have one which holds two litres, I will lend it to you. 17. What coat will you send me? 18. I will send you the best I have, take care not to stain it. 19. Do you think that the student will learn all that by heart? 20. I do not think that he will learn it. 21. Do you believe (that) he will come? 22. I believe that he will come soon. 23. Do you think that your father depends upon me? 24. I know that he depends upon you. 25. Does not that gentleman depend upon me? 26. I think that he depends upon your brother. 27. Will the porter soon come in again? 28. I hope that he will not tarry long. 29. Will you not lend me your umbrella? 30. I will lend it to you with pleasure. 31. Does my brother remain standing? 32. He does not wish to sit down. 33. Do you wish me to sit down? 34. I wish you to remain standing. 35. I wish that he may come.

KEY TO EXERCISES IN LESSONS IN FRENCH.

Exercise 23 (Vol. I., page 87).

1. Have you a good guitar? 2. Yes, Sir, I have an excellent guitar. 3. Have you good coats? 4. Yes, Madam, I have good black coats and beautiful white dresses. 5. Has not your mother a silk shawl? 6. Yes, Miss, she has a silk one and a woollen one. 7. Has the innkeeper good English horses? 8. The innkeeper has English, French, and Arabian horses. 9. He has very beautiful ones. 10. Has your brother's friend gold jewels? 11. Yes, Sir, he has. 12. Has he also silver jewels? 13. He has also. 14. Has he many? 15. No, Sir, he has not many. 16. Has your friend relations? 17. Yes, Sir, he has. 18. Has that gentleman a good steel pen or a handsome gold pen? 19. He has a steel one, and we have a gold one. 20. Has not the general good soldiers? 21. He has some very brave. 22. Have not the Americans good land? 23. They have excellent. 24. Has the merchant English or French knives? 25. The merchant's knives are neither English nor French, they are Belgian.

Exercise 24 (Vol. I., page 87).

1. Votre frère a-t-il des chevaux arabes? 2. Oui, Monsieur, il en a. 3. En a-t-il de beaux? 4. Oui, Monsieur, en a de beaux. 5. Les bons Américains ont-ils tort? 6. Non, Mademoiselle, ils n'ont pas tort, ils ont raison. 7. Avez-vous un châle français? 8. Oui, Monsieur, j'en ai un, j'ai un beau châle français. 9. Votre aubergiste a-t-il votre couteau d'argent ou le mien? 10. Il n'a ni le vôtre ni le mien, il a le beau couteau d'acier de sa sœur. 11. Le Belge a-t-il une bonne guitare? 12. Il a une guitare française excellente. 13. Il en a une excellente. 14. Le Monsieur a-t-il des livres amusants? 15. Oui, Monsieur, il en a deux. 16. Le général a-t-il des chevaux français ou des chevaux arabes. 17. Il n'a ni chevaux français ni chevaux arabes, il a des chevaux anglais. 18. Qui a des chevaux arabes? 19. L'Arabe en a. 20. L'Anglais en a-t-il? 21. L'Anglais en a. 22. La sœur de votre ami a-t-elle une bonne plume d'acier? 23. La sœur de mon ami en a une, mais mes parents n'en ont pas. 24. N'avez-vous pas tort, Monsieur? 25. Oui, Madame, j'ai tort. 26. Ces couteaux sont-ils anglais? 27. Non, Monsieur, ils sont belges. 28. Avez-vous des parents? 29. J'en ai deux, et ils sont ici. 30. Le boucher anglais a-t-il de la viande? 31. Oui, Monsieur, il en a beaucoup. 32. A-t-il beaucoup d'argent? 33. Il n'en a guère. 34. Le général belge a-t-il des soldats braves? 35. Oui, Monsieur, il en a de bons.

Exercise 25 (Vol. I., page 114).

1. Are you as pleased as my brother? 2. I am as pleased as your brother. 3. Has your father as much courage as modesty? 4. He has less modesty than courage. 5. Has the bookseller as many manuscripts as engravings? 6. He has more of these than of those. 7. Has he as many friends as enemies? 8. He has more of these than of those. 9. Has he as much bread as cheese? 10. He has quite as much of this as of that. 11. Has the blacksmith more horses than your brother? 12. He has more than my father and more than my brother. 13. Are you not cold? 14. No, Sir, I am not cold, I am very warm. 15. Have you two cloth cloaks? 16. I have one of cloth and one of blue velvet. 17. Have you not more glasses than plates? 18. We have more. 19. Has the blacksmith more iron than steel? 20. He has not so much of this as of that. 21. He has less of this than of that. 22. Have the Dutch handsome gardens? 23. Their gardens are very beautiful. 24. The gardens of the Italians are more beautiful than those of the Spaniards.

RECREATIVE NATURAL HISTORY.

ENGLISH SNAKES.

Some years ago we witnessed a scene which illustrated in a very plain fashion the hatred shown by most people to all members of the serpent family. Five or six country boys were pelting with flints some creature crawling close to a garden-wall. A glance showed the object of their natural but ignorant wrath, and we could not help saying, "That can't hurt you, it never harmed anybody." They stared, as we proceeded to explain to them that the reptile was as "harmless as a baby." They were silenced, it is true, but doubtless believe to this day in the venomous powers of the *blind-worm*. Thousands of English peasants would, probably, support the boys in their view, and we therefore begin this notice of English snakes with a few remarks on this timid member of the family.

Some naturalists might object to class it among serpents at all; but there seems to be no sufficient reason on this occasion for departing from the popular notion.

Have any of our readers ever seen a blind-worm? No? Then look out for the first opportunity. They will see an eel-like creature, about twelve inches long, of a greyish colour, somewhat ruddy along the sides, which are marked by small darkish spots. Observe that the tail is not pointed, but blunt, as if a point had been chopped off. Now you may put the worm safely in your pocket, if you please; it cannot hurt you, having no fangs, and the teeth being too small to harm a fly. Marvellous stories and some fibs have indeed been told of its destructive bite. One ancient writer boldly declares it would poison a full-grown ox. No wonder that the reptile led a sad life, after getting so bad a name. Why is it called the blind-worm? From ignorance at first, and then from custom. It was supposed to be blind; but why, is one of the puzzles constantly presented by popular names. Any one can see two very bright, though small eyes in its head. The popular lines express the common belief on this point—

> "If the snake could hear, and the blind worm could see,
> Neither man nor beast should e'er go free."

Well, the creature can see, and man does go free. The other name, *slow-worm*, is a much more suitable designation, as the reptile's motions are by no means active; and even the old West country term for a snake, namely, *long cripple*, would not involve any error. The name fragile snake (*Anguis fragilis*), given by Linnæus, refers to the singular manner in which the animal stiffens its whole body when seized, and especially to the ease with which it is then broken. Thus the reptile has more reason to dread man than he has to fear it. Not only has the slow-worm eyes, but three eyelids for the protection of vision, resembling in this respect the birds, and differing from all the true serpents. Whether the reptile can hear may be debated; it has ears, but they lie concealed under the skin. This harmless creature forms the link between the lizards and the true snakes, and it can thus boast of a large circle of relations, from the chameleon on the one side to the boa-constrictor on the other.

On what does the blind-worm feed? Chiefly on the fat white slug, so common in fields and gardens; it has also no objection to a plump earth-worm. But how does the reptile manage to live through the winter, when even the most stupid slug is cautious of showing himself? Nothing is easier: the slow-worm benefits itself by a long fast in that season, retiring into warm holes at the close of autumn, and sleeping comfortably until spring returns.

The young make their appearance in June or July, and grow rapidly under the fostering heat, which aids both reptiles and men. The slow-worms manage to get a new suit of clothes once or twice in the season, casting their skins with some little trouble and wriggling. Some of the old doctors made a peculiar broth by stewing the unhappy blind-worms, and the preparation was then given to equally unhappy patients. This singular medicine was deemed a first-rate remedy against the plague. Whether it was more allopathic or homœopathic may be sagely debated. Now, the blind-worm is not so very fearful after all; surely even St. Patrick would have tolerated it.

We must next notice a better known reptile, the common or ringed snake (*Natrix torquata*). This, too, in spite of popular prejudice, is quite harmless, and must not be carelessly confounded with the venomous viper. How, then, may the two be distinguished? Chiefly by the black spots on the body being distinct in the ringed snake, instead of running together and forming one continuous line, as in the adder.

The ringed snake is a type of all the non-poisonous serpents, which, though they may bite fiercely enough, have no venom to pour into the wound.

In the spring the snake leaves its winter retreat, and becomes a formidable enemy to the frogs and mice. Not that it bears them the least malice, but they furnish very good breakfasts, which are absolutely necessary for the snake's happiness. The mode in which this reptile swallows a frog well illustrates the peculiarity of jaw in all the non-venomous serpents. Let us suppose the chase to be over, and that the snake has caught the frog by its hind leg. The struggle then begins; the frog remonstrates against being eaten, but the serpent cannot possibly do without its breakfast. Notice how gradually the frog's body is drawn, or rather sucked, into the mouth of its foe. The four-legged reptile utters a peculiarly plaintive cry as it struggles, but Nature provides no police to interfere in such a case, and at last the frog is swallowed. Even then some naturalists declare that the frog lives for several minutes in the stomach of the snake, and that a faint cry has been heard for two or three minutes after the victim has disappeared. The snake does not deserve the name of a glutton; he eats simply for the good

War declared against Spain	1654	Richard Cromwell, Lord Protector.	
Defeat of Peru and Venables at Hispaniola, or Hayti	1654	Born at Huntingdon	1625
Capture of Jamaica	1655	Became Lord Protector, September 3,	1658
Cromwell refuses the Crown.	1657	Deposed by the Army, April 22,	1659
Destruction of the Spanish Fleet at Santa Cruz by Blake. April 20,	1657	Restoration of Charles II. May 29,	1660
Capture of Dunkirk. June,	1658		
Death of Blake. August 27,	1658	Richard Cromwell dies at Hursley, Hampshire, July 17,	1712
Cromwell dies at Whitehall September 3,	1658		

LESSONS IN BOTANY.—XIV.

SECTION XXV.—UMBELLIFERÆ, OR APIACEÆ: THE UMBELLIFEROUS, OR PARSLEY TRIBE.

Perhaps there does not exist a natural family of vegetables more distinctly marked than this. Their general aspect alone, without going into anatomical minutiæ of structure, is almost sufficient to distinguish them; nevertheless, we will indicate the botanical characteristics of this great natural order.

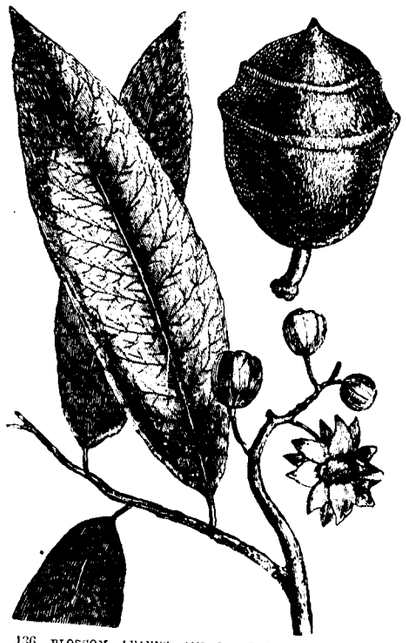
Characteristics: Calyx adherent to the ovary; petals, five, inserted upon an epigynous disc; æstivation valvular, involute; stamens, five, alternate with the petals; ovary, inferior, two-celled uniovular; ovule, pendent, reflexed; styles, two; carpels separating at the base; seed, dicotyledonous; leaves, alternate, simple, often divided, petiolate, in an involucre. The word *epigynous*, the only one in the preceding description of the characters of the *Umbelliferæ* that we have not met with before, means "growing on the summit of the ovary," from the Greek επι (ep'-i), *upon*, and γυνη (gu'-ne), *a woman*.

Such are the precise botanical characteristics by which the umbelliferæ, or *umbrella-bearers*, as we may call them, are known; but, we repeat, their aspect is almost enough to distinguish them from other plants; not but that a few plants of other orders bear umbels, and many seem to bear umbels without doing so; but, generally speaking, the aspect of an umbelliferous plant is sufficient to characterise it.

Taking for our example a specimen of Fool's Parsley (*Æthusa Cynapium*, Fig. 138), we shall find the floral part to consist of a compound umbel; that is to say, little umbels attached to the stems which constitute large ones (Vol. I., page 217, Fig. 66). We shall find, both in the small and large umbels, that the petioles, or flower-stalks, shoot forth from points exactly opposite each other, otherwise the structure would not be an umbel. Take, for example, the elder-tree. A general examination of its flower would lead one to suppose that the elder was an umbelliferous plant; but, on examining it more attentively, the petioles do not branch off at a point exactly opposite each other; hence the inflorescence of the elder-tree is not that of an umbel, but of a cyme. Nevertheless, in the geraniums, and some other plants, the inflorescence is really umbelliferous; hence the existence of an umbel is not quite sufficient for the botanist to rely upon in the discrimination of a plant belonging to the natural order *Umbelliferæ*. Let us, therefore, examine some of the remaining characteristics enumerated at the beginning of this description.

If we examine the flower of a parsley plant, we shall discover that the calyx is almost absent. The petals, five in number, spring from a narrow line or border. There are five stamens, each arising from between two petals.

As in the apple, the ovary in an umbelliferous plant is inferior—that is to say, it appears below the calyx and corolla, inasmuch as the latter springs from above it.



136. Blossom, leaves, and fruit of the sapucaya tree (lecythis ollaria).

What, then, is the fruit of an umbelliferous plant? We hear frequently enough of carrot, parsley, celery, and carraway seeds, but we do not hear of carrot, parsley, celery, and carraway fruits. Nevertheless, all these are fruits, not seeds. The real seed is embedded within the structure of a surrounding mass, as we found to be the case in the apple and pear. There the surrounding mass is fleshy and easily separable; here it is hard and firmly adherent; therefore the so-called seeds of umbelliferous plants are fruits of the kind which botanists denominate by the term *achænium*. All these fruits separate naturally when ripe, or admit of ready separation into two parts, and they are all furrowed; moreover, the nature and direction of these furrows differ in each species; of the order, consequently, they are an important means for enabling the botanist to distinguish umbelliferous species. The two grand peculiarities, then, of the umbelliferous tribe are, first, the presence of umbels; secondly, the inferior fruit separable into two portions. Why did we select a sprig of Fool's Parsley, as a specimen to illustrate the tribe *Umbelliferæ* when so many more readily obtainable plants existed? For this reason: to show in what respect Fool's Parsley, which is poisonous, may be distinguished from the culinary parsley.

If the reader examines each terminal umbel of the Fool's Parsley, he will recognise at the base of it three leaf-like things, which are bracts, and which, when they are arranged as we find them in umbelliferous plants, constitute each set an involucre. The student will observe that in the *Æthusa Cynapium*, or Fool's Parsley (Fig. 138), these bracts all point outwards, by which characteristic sign may the Fool's Parsley be distinguished not only from common parsley, but from all wild umbelliferous plants.

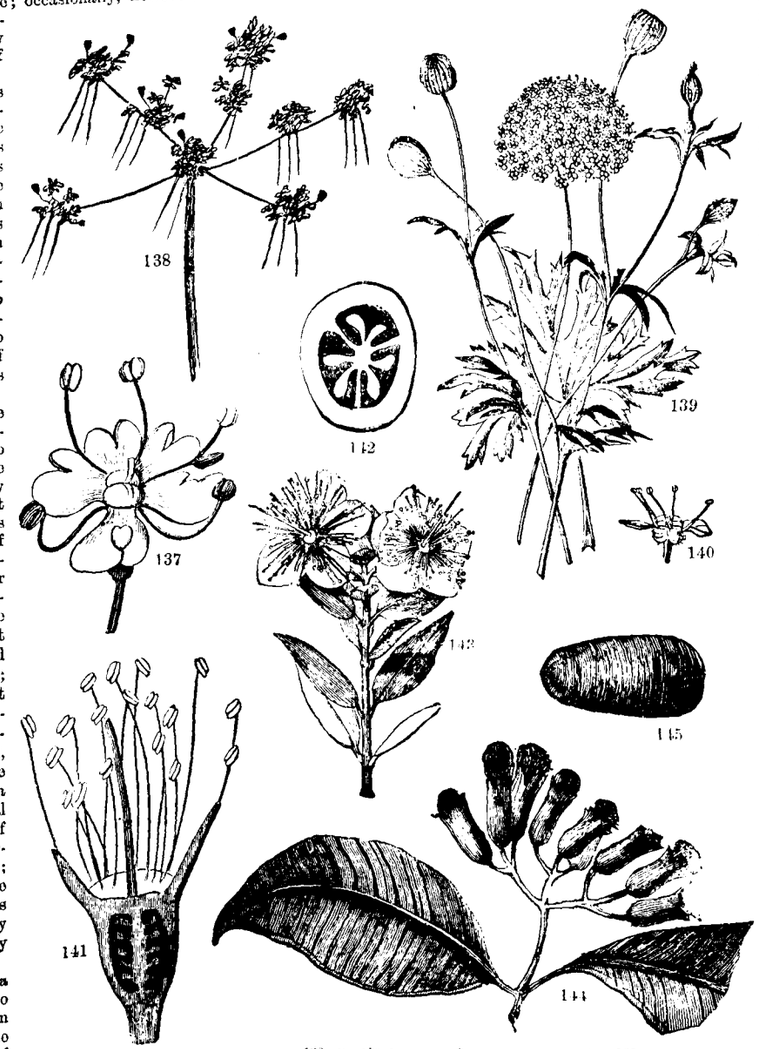
Whilst treating of these bracts, which in *Umbelliferæ* constitute the involucrum, the reader's attention may as well be directed to certain modifications of form which bracts are capable of assuming. Thus, in the oak they grow together and give rise to the acorn cup (Fig. 87, p. 341); in the pine-apple they grow together, become fleshy, and constitute the part we eat; in the fir-cone they constitute the scales; in *Umbelliferæ*, however, they assume the appearance of leaves, which, indeed, is their general or normal aspect. With regard to the physiological and chemical characteristics of the *Umbelliferæ*, they may be stated to depend on the presence either of an odorous volatile oil, or a poisonous matter. Everybody is aware how agreeably odorous are the so-called carraway seeds; everybody is aware of the poisonous nature of the hemlock; and the noxious character of the Fool's Parsley has already passed under notice. Umbelliferous plants may, therefore, be designated in general terms as *suspicious* plants, comprehending, however, a far greater number of innoxious than noxious species; the latter may be generally discovered by their agreeable, the former by their disagreeable odour.

In certain species of this natural order the innocent and the noxious principles are combined. This is the case in the wild celery, which in this condition is a rank plant, altogether unfitted for food. The change which ensues when celery is cultivated in gardens we are all aware of; but the reason of that change merits a few remarks. Garden celery, as the reader knows, is carefully buried in the earth, not only its root, but much of its stem being totally deprived of light. Under this treatment, the buried portion of the plant becomes etiolated or bleached; becomes, in point of fact, botanically considered, diseased; that is to say, the poisonous secretion of the plant, no longer elaborated, the odorous principle alone being formed. A consideration of the nature and effects of etiolation leads us to a correct appreciation of the functions which those parts of vegetables exposed to the air and sun, especially leaves, are destined to perform, and points out the necessity of giving vegetables abundant air and light, if we would have them bring forth their natural productions. To stimulate those natural productions is, in most cases, the main object of agriculture and horticulture; occasionally, however, as in the example of celery, the object kept in view is the reverse of this.

The odorous principle in certain *Umbelliferæ* is of a resinous character; thus assafœtida is the produce of an umbelliferous plant growing in Persia. Opoponax and ammoniacum, both so valuable in medicine, are also the produce of umbelliferous plants.

Many of the *Umbelliferæ* contain sugar, so like that of the cane in every respect that sugar-loaves may be made of it. Thus the presence of sugar may be recognised by the taste in the root of the carrot and the parsnip; also, in the root of celery, although less evidently. Indeed, sugar may be regarded as a pretty general concomitant of the umbelliferous structure; even in the juice of the poisonous hemlock it may be discovered by chemical tests.

It would be a needless task to occupy space in pointing out the various uses of umbelliferous plants to man. The so-called carraway, coriander, and anise-seeds, flavour our pastry and confectionery; carrots and parsnips are amongst the most favoured articles of our food; even the noxious hemlock yields a valuable medicinal substance, *conia*; and the resin-yielding umbel-bearers pour forth their treasures in great profusion. By far the greater number of this family have white flowers; some, like the fennel, have yellow flowers, and a few have blue ones. Of the latter kind are most of the *Eryngo* genus, and the beautiful *Didiscus Cæruleus*, of which we now give a representation (Fig. 139).



137. Blossom of parsley, enlarged. 138. Fool's parsley (æthusa cynapium). 139. didiscus cæruleus. 140. flower of didiscus cæruleus, enlarged. 141. section of blossom and ovary of myrtle. 142. transverse section of ovary of myrtle. 143. the common myrtle (myrtus communis). 144. blossom and leaf of the clove-tree (caryophyllus aromaticus). 145. fruit of the clove-tree.

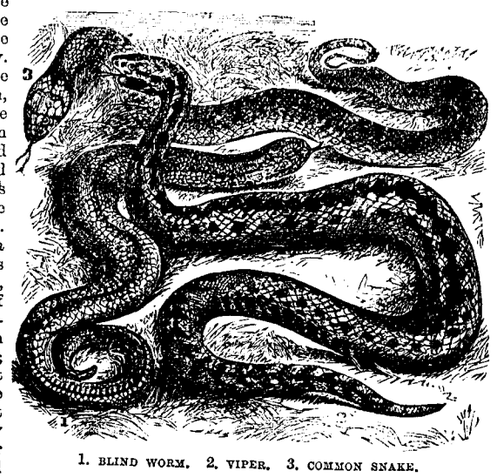
SECTION XXVI.—MYRTACEÆ, OR THE MYRTLE TRIBE.

Characteristics: Calyx, adherent; petals, in number equal to the divisions of the calyx, inserted on a disc around the throat of the latter; æstivation imbricated, rarely absent; stamens, ordinarily indefinite; ovary, usually two to six-celled, pluriovular, or containing many ovules; ovules, pendulous, reflexed or curved; style, simple; fruit, dry, or a berry; seed, dicotyledonous, exalbuminous.

Such is the long list of general characters by which botanists recognise a plant of this great natural order; nevertheless, myrtles, like many other members of the vegetable world, have a sort of physiognomy of their own, more easily recognised than described. Perhaps the fragrant odour diffused by these beautiful plants is one of their most prominent characteristics. All the substance of a myrtle is more or less saturated with this odorous matter. Now we find it assumes its greatest power in the bark, now in the flower buds, now in the leaves; but it is everywhere present more or less. Supposing the reader to have before him a leaf of the common myrtle, he need not be told that the leaf is odorous, especially when crushed between the fingers. Now, in what does the odour consist, and where does it come from? This, like the greater number of odorous principles furnished to us by the vegetable kingdom, is a volatile oil, and in the myrtle leaf it is secreted by specific organs, denominated *glands*. If a myrtle leaf be held between a candle, or other source of light, and the eye, these little glandular bodies will be seen like so many specks; it is within these glands that the volatile oil remains encased. Glands are not necessary for the secretion of volatile oil, nor are they necessarily confined to leaves. They exist in large quantities in the skin of members of the orange tribe, and it is from them that the inflammable volatile oil is emitted when a piece

reason that he is hungry, and after a dinner submits to a fast of several days' duration. Some readers may ask how a respectably-grown frog can pass down the small throat of a snake? Such inquirers have probably never seen a boa-constrictor swallow a goat, horns and all. Those who have witnessed this most demonstrative but unpicturesque spectacle, will be aware of the wonderful elasticity and expansive power of a serpent's jaw.

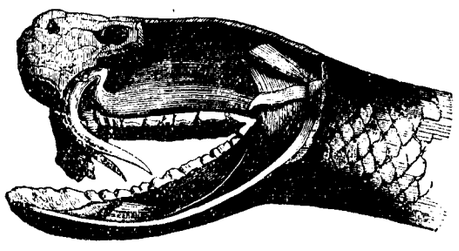
The snake deposits her eggs, to the number of sixteen, twenty, or even thirty, in some place where the young are hatched by the heat of the sun. These eggs are soft, held together by a glutinous substance, and thus have the appearance of a chain. The mother has, of course, no trouble in nursing or educating her family.



1. BLIND WORM. 2. VIPER. 3. COMMON SNAKE.

They who see the ringed snake just after the change of its skin, will be disposed to admit the existence of some beauty even in this reptile. The brilliant and varied tints of "the enamelled skin" might make some creatures vain, but the snake takes the whole as a matter of course. How often does the reptile get a new coat in the season? Snakes are, in this respect, like men, some having few changes of raiment, others many. A vigorous and growing snake will, in some summers, get five new skins; others may find one fresh suit sufficient. How is the change made? The creature, as it throws off the old skin, completely reverses it, so that the inner side becomes the outer. The old covering splits at the neck, like an over-tight coat, and the snake then wriggles out by rubbing against bushes and brambles. One fact is especially worthy of notice, that the new skin is completely formed underneath before the old one is thrown off. Thus the reptile has not to seclude itself from society until a new dress is ready. Though the snake is its own tailor, it does not obtain new suits without some trouble, and probably suffering. The animal seems to become blind for a short time before the change, and its torpor is a sign of general ill-health. Perhaps the reptile would agree with Gilbert White in his description of its condition at such times, as "an awkward, uneasy situation." Such is the price paid, even by a snake, for a new coat.

Some readers may have seen our common English snake wriggling through the meadow grass, or crossing a country lane. Such will smile at the absurd pictures of a serpent's movements in old popular prints. The reptile really pushes itself forwards by the friction of its ribs against the earth, thus "gripping the ground" like the feet of a caterpillar. The body is not *lifted up*, in a series of wave-like coils, pretty to look at in a picture, but impossible to perform in fact.



HEAD OF A POISONOUS SNAKE, SHOWING THE POISON BAG (A) AND THE CURVED FANG (B) THROUGH WHICH THE POISON IS INJECTED.

These animals can easily cross pools or rivers, being first-rate swimmers. The ringed snake is as fond of the water as a duck, and may sometimes be seen swimming merrily on the surface of a brook, its head raised a little above the water. Some persons may here ask whether the snake which thus delights in the water is not a distinct species, and therefore to be classed among the "water-snakes?" Let any careful observer catch one of these so-called "water-snakes," and then point out the difference between it and the common ringed snake. He will not, we think, be able to find any distinction between them. Persons seeing a snake in the water, and forgetting the fondness of the *Natrix torquata* for a bath, have inferred that the aquatic reptile must be a distinct species. We venture to think that the "water-snake" is only the ringed species in its swimming moods. No doubt there are water-serpents in tropical climates, and even the "great sea serpent" may yet be brought to the Zoological Gardens, but these peculiar forms of serpent life are not found in England.

Can a snake be educated or tamed? Yes; our ringed specimen has been so far civilised and domesticated as to distinguish its master, come at his call, and seek for shelter and warmth under his coat-sleeve. However, very few persons, except the travelling showman, undertake the training of these reptiles.

The *viper*, or venomous British serpent, now demands attention. Our opportunities for examining this creature are not likely to be numerous, and most persons will decline a close acquaintance. In some counties the country people regard the adder and viper as distinct animals, looking upon the former as the male, and the latter as the female. This supposition is entirely wrong. The two names denote the same reptile. Though the *running together* of the spots along the back of the viper may seem to distinguish it from the ringed snake, not much reliance can be placed on the colour of the skin. This is sometimes of an olive tint, at others brownish, ruddy, whitish, or almost black. The viper, or adder, is our only British type of the poisonous serpents. The fang of this snake deserves an attentive consideration, as it shows how completely the reptile has been fitted with a perfect poisoning machine. The venom tooth or fang is laid down on the gum of the upper jaw when the viper is not excited, but suddenly raised by a peculiar action of the jaw-bones at the moment of attack. The sharp fang first pierces the flesh of the victim, and in that instant the poison is poured through a tube in the fang, and so injected into the wound. But whence does the venom come? At the bottom of the perforated tooth are many little receptacles for holding the poison, and also a complex apparatus for producing the deadly fluid. When the fang pierces the skin of an animal, the poison is at that moment pressed out of the reservoirs and through the tooth. Though the yellowish poison is so powerful in its operation on the bitten animals, it appears to be without either taste or smell. Experimenters have swallowed the viper's poison without harm, but this bold test is not likely to be often repeated. Is the bite fatal? To small animals, and sometimes even to dogs, but very rarely to human beings in this climate, unless they are in an unhealthy state when bitten. Olive oil rubbed on the part is deemed the best remedy, but it is sure not to be at hand just when wanted.

Wonderful medicinal virtues were formerly ascribed to soup made from stewed adders, and some enthusiasts thought it capable of preserving female beauty. Woe to the vipers if this opinion should ever become popular among the ladies. Such soup would, probably, be less injurious to the digestion than some of the modern cosmetics to the skin.

One last word to the reader. We ask no pity for the viper; kill him, if it so please you; but let the harmless ringed snake and the innocent slow-worm pass without assault and battery. They are quite willing to keep the peace with all, if permitted. Is this agreed upon? Very well; then we part as friends; both reader and writer being at liberty to make war on the viper only.

LESSONS IN BOTANY.—XIX.

SECTION XXXV.—LABIATÆ, OR THE LIP-FLOWER TRIBE.

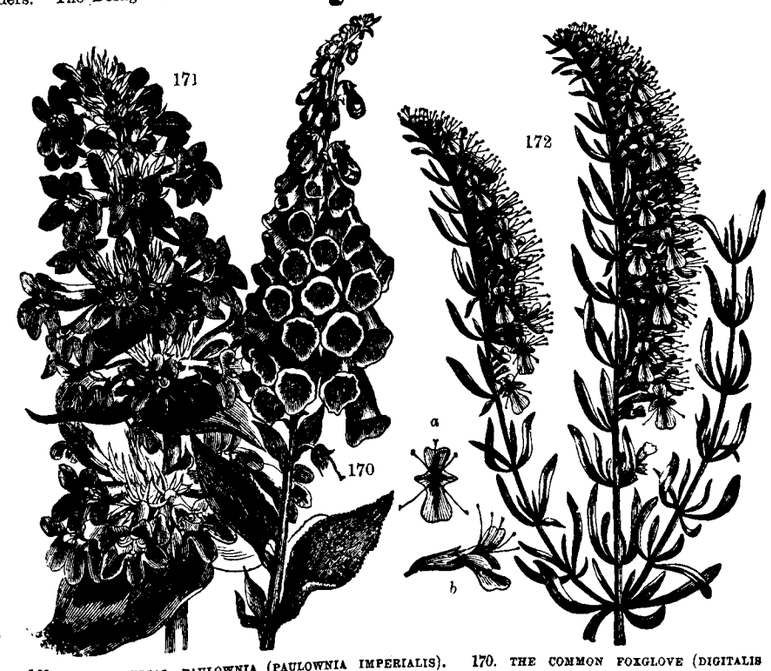
EVERY person who has attentively examined the flower of a mint, sage, or lavender plant, cannot fail to have remarked the general similarity which its mouth bears to the open jaws of an animal; hence the term *labiate*, or *lipped*, from the Latin labium, *a lip* (a more expressive one might be found), which has been applied to them.

Characteristics: Calyx free, regular or irregular; corolla hypogynous, monopetalous, bilabiate; stamens inserted on the tube of the corolla, four, didynamous, or two; fruit composed of four achænia; seeds dicotyledonous, exalbuminous; radicle inferior; leaves opposite or verticillate. Such are the scientific points which characterise the *Labiatæ*, but we shall be able to recognise them by superficial characteristics.

Reversing the usual order of our investigation, let us first pay attention to the ovary. When ripe, it displays the four nut-like fruits, termed by botanists *achænia*, as we found in the Borage tribe; and when it is considered that this kind of fructification does not exist in any natural order, save the *Boraginaceæ* and *Labiatæ*, the value of this characteristic will be evident. Further than this, there is no similarity between the two natural orders. The Borage tribe is insipid, the Labiate tribe powerfully odorous. The Borage tribe has gyrate inflorescence; the Labiate tribe has not. The Borage tribe has round, hairy stems; the Labiate tribe, stems which are square and angular. The flowers of the Borage tribe have a regular corolla, in those of the Labiate tribe the corolla is irregular; those of the Borage tribe have five stamens, whereas those of the Labiate tribe have four—two long and two short (Fig. 172, *a*, *b*).



169



171 170 172 a b

169. THE IMPERIAL PAULOWNIA (PAULOWNIA IMPERIALIS). 170. THE COMMON FOXGLOVE (DIGITALIS PURPUREA). 171. AN EXAMPLE OF A LABIATE PLANT. 172. THE COMMON HYSSOP (HYSSOPUS OFFICINALIS.

The principal habitat of this natural order is the zone bounded by the fortieth and fiftieth parallels of northern latitude. Their number diminishes towards the tropics and either pole. Beyond the Tropic of Capricorn they are seldom found, and are altogether banished from the polar regions.

Most of the *Labiatæ* contain a volatile oil, a bitter gum-resinous principle, and gallic acid. The purely aromatic species mint, thyme, sage, rosemary, are employed in domestic economy, and as perfumes, in addition to their medicinal uses.

SECTION XXXVI.—SCROPHULARIACEÆ, OR THE FOXGLOVE TRIBE.

Characteristics: Calyx free; corolla hypogynous, monopetalous, generally irregular and bilabiate; stamens inserted on the tube of the corolla, four didynamous, or two; ovary, bilocular, many-seeded; fruit capsular, rarely fleshy; seeds dicotyledonous, albuminous.

Taking a foxglove as our specimen, the student cannot fail to be struck with a general resemblance subsisting between a flower of a labiate plant and a flower of the foxglove, as shown in Figs. 170, 171, the example of the labiate plant being drawn on a larger scale than the foxglove.

In the latter, however, the irregularity of corolla (Fig. 99, page 280, Vol. I.) is still more marked.

The ovary, moreover, is different from the former; we no longer see four lobes, but two, each of which is a cell, which, if cut open, displays a great number of seeds.

The Foxglove tribe is not completely banished from any region, although it more especially belongs to warmer parts of temperate climes. Between the tropics and in the polar regions they are comparatively rare. The Scrophularia, from which the name of the order is derived, was so called on account of its supposed efficacy in the cure of scrofulous diseases. Unfortunately, the opinion is not borne out by experience. The foxglove (*Digitalis purpurea*, Fig. 170) is an exceedingly valuable plant, owing its efficacy to the presence of a chemical substance termed *digitaline*. Its great use is to diminish the action of the heart, and consequently to lessen the violence of the blood's circulation. Digitalis, however, and all its preparations, are so powerful in their action, that they should never be administered except under the sanction of a medical man. The foxwort, veronica, snapdragon, monkey-flower, and verbascum, all belong to the natural order we are now considering; but perhaps the most beautiful species in this family is that of which a representation is shown above in Fig. 169, the *Paulownia imperialis*,

of orange peel is squeezed between the fingers. Although the characteristic of agreeable odour is a very good common sign by which we may be justified in expecting that a plant may, in certain cases, belong to the *Myrtaceæ*, nevertheless it is a very loose sign when taken apart from others. We can only arrive at a correct botanical comprehension of the *Myrtaceæ* by studying some of the generic characters that have been mentioned in our preceding list.

If the specimen of common myrtle under examination be a sprig, not a single leaf, the student, before he lays it down, should observe that the leaves are *opposite*, not alternate (Fig. 143). Let us now examine the flower. The particular species under consideration has a calyx of five divisions, and there are also five petals, but in certain species these floral parts are generally four. The stamens are numerous, as will be readily observed; and the reader need not be told at this period of our labours that it is necessary to ascertain whether these stamens grow from the calyx or the receptacle. They grow from the calyx, as will be readily distinguished. The ovary is inferior; it contains three little cells, and each cell contains many ovules; and it shoots up a single style, which terminates in a small stigma so very minute that it cannot be seen by the naked eye.

Figs. 141 and 142 are representations of a vertical section of the flower and ovary of a common myrtle, and a transverse section of the ovary with adherent calyx, or rather the fruit with adherent calyx. If the reader examines Fig. 142, he will observe that the number of seed-cells in the species of myrtle under consideration is three, or, to use the language of Botany, the ovary is *trilocular*, or three-celled. If the reader now refer to the list of characteristics of this family, he will find the expression, "ovary, usually two to six-celled," which signifies that the number of cells may vary between two and six.

By well considering the characteristics already discussed, the student will be at no loss to recognise an individual of the myrtle tribe, even without taking into consideration minute microscopic peculiarities.

Let us now proceed to mention a few particulars in connection with the dimensions, natural habitation, and properties of this beautiful and useful botanical order.

The stem of the *Myrtaceæ* is generally woody, the leaves opposite or alternate, simple, entire, rarely stipulated; frequently, as we have seen, provided with secretive glandular appendages, embedded in the parenchyma. The flowers are complete, regular, solitary, or irregularly agglomerated. The greater number of myrtaceous plants have berries for their fruits; but some others, the principal of them being Australian plants, have a dry hard fruit; these, too, have alternate leaves, which is not usual in the myrtle tribe. The great districts for myrtles are the intertropical regions and Australia; only a few species existing in temperate climes. The spice sold as cloves is the produce of one of the myrtle tribe, *Caryophyllus Aromaticus* (Fig. 144), of which cloves are the dry flower-buds. Allspice is the berry of another (*Eugenia Pimenta*). Guava jelly, so valued and esteemed wherever it can be procured, is the conserve made of the mashed berries of a myrtle which grows in the West Indies. The pomegranate, too, a native of Northern Africa, but which now grows in the south of Europe, furnishes another example of a fruit-bearing myrtle.

In reviewing, then, the chemical and physiological characteristics of the *Myrtaceæ*, we learn that none of the tribe are poisonous. The greater number contain an abundance of fragrant oil. Some yield fruits which are delicious to eat; and all are imbued with a certain, but variable amount of astringent matter, similar to that contained in oak bark, whence it has been denominated *tannic acid* by the chemist.

In this country the myrtle requires protection during the winter months in all districts north of the Thames, but in the the south of England, and especially along the coast of the western counties, it flourishes against a wall, often growing to a great height, and covering a considerable space with masses of dark-green foliage.

Many of the species of the myrtle tribe are very large trees. The Sapucaya tree, as it is called in Brazil (*Lecythis Ollaria*), is one of the tallest trees amongst the very tall ones that grow in Brazilian forests. In Fig. 136 the reader will find a representation of a branch of this species. How different from a branch of the common myrtle!

LESSONS IN GERMAN.—XXIV.

SECTION XLV.—PECULIAR IDIOMS.

Sich erinnern corresponds, in signification, to the English verb "remember," as:—Er erinnert sich meiner (§ 126), he remembers me (literally, he remembers himself of me). Ich erinnere mich jener schönen Zeit, I remember (remind myself of) that sweet time.

In referring to a thing already learned, the verb behalten, "to keep, to retain," is generally used, as:—Ich kann die Wörter nicht (im Gedächtniß) behalten, I cannot retain or remember (keep in memory) the words. Er macht so viele Fehler, weil er die Regeln nicht behält, he makes so many mistakes, because he does not retain (remember) the rules.

1. The dative of a *personal* pronoun is frequently used instead of a *possessive* pronoun, as:—Ich habe mir den Finger abgeschnitten, I have cut off my finger (I have to me the finger cut off). Er gab es mir in die Hände, he gave it into my hands (he gave it to me in the hands).

2. The phrases es fällt schwer or es hält schwer are nearly synonymous, and signify "to be hard, to be difficult," as:—Diesem armen Manne fällt es schwer, zu betteln, it is hard (it comes hard) for this poor man to beg. Es hielt schwer, ihn zu beruhigen, it was difficult to calm him.

VOCABULARY.

Ankunft, *f.* arrival.	Eigenschaft, *f.* quality.	Hülfe, *f.* help, assistance.
Aussehen, to appear.	Erinnern (sich), to remember.	Spielen, to play.
Bedienen, to serve.	Erzählung, *f.* narrative	Verbrechen, *n.* crime.
Begreifen, to comprehend.	Faulenzer, *m.* idler.	Widerwärtigkeit, *f.* adversity.
Berauben, to rob.	Gedächtniß, *n.* memory	Zuweilen, sometimes.
Diebstahl, *m.* theft.	Gründlich, thoroughly, fundamentally.	
Drücken, to press.		

RÉSUMÉ OF EXAMPLES.

Er erinnert sich noch des alten Matrosen.	He still remembers the old sailor.
Napoleon hatte ein so gutes Gedächtniß, daß er die Namen seiner meisten Soldaten behalten konnte.	Napoleon had so good a memory that he could remember (retain) the names of most of his soldiers.
Er flüsterte ihm etwas in's Ohr.	He whispered something in his ear.
Es hält schwer, einen Eigensinnigen zu überzeugen	It is difficult to convince an obstinate (person).
Es fällt den meisten Menschen schwer, sich dem Schicksal geduldig zu unterwerfen.	It is difficult for most people to submit patiently to their destiny.

EXERCISE 86.

1. Können Sie sich des Tages meiner Ankunft nicht mehr erinnern? 2. O ja, ich erinnere mich desselben noch sehr gut. 3. Es giebt viele Menschen, die sich lieber ihrer schlechten, als ihrer guten Thaten erinnern. 4. Es hielt schwer, ihn von der Wahrheit dieser Erzählung zu überzeugen. 5. Es hält zuweilen schwer, etwas zu glauben, was wir nicht begreifen können. 6. Es fällt dem armen, aber fleißigen Manne schwer, die Hülfe fremder Leute in Anspruch nehmen zu müssen. 7. Die englische Sprache fällt mir schwerer, als die französische. 8. Bei seinem Geize, seinen Verwandten und seinen Kenntnissen fiel es ihm nicht schwer, eine eben so gute, als angenehme Stelle zu finden. 9. Warum lernt Ihr Bruder so viel schneller, als Sie? 10. Weil er ein besseres Gedächtniß hat, und die Wörter besser behalten kann. 11. Können Sie sich nicht mehr erinnern, wem Sie die Bücher und das Papier gegeben haben? 12. Ich kann mich dessen nicht mehr erinnern. 13. Der Faulenzer behält die Regeln nicht, weil er dieselben nicht gründlich lernt und lieber spielt, als arbeitet. 14. Der Diebstahl ist ein Verbrechen. 15. Er drückte dem armen Manne einen Thaler in die Hand. 16. In der Ferne erinnern wir uns gern der Freunde. 17. Junge Leute tragen zuweilen Brillen, um gelehrt auszusehen.

EXERCISE 87.

1. Do you remember the day of the arrival of your friend? 2. Yes, I remember the day very well. 3. Most people remember the years of their youth with pleasure. 4. There are many who remember their follies with shame. 5. It is difficult to remember every rule of a language. 6. It is not so difficult to convince a learned as an unlearned man. 7. Is it difficult to submit to the adversities of life? 8. Yes, it is very difficult; but the thinking man conquers them. 9. Can you not remember to whom you have lent my book? 10. No, I cannot remember. 11. To lie is a sin.

SECTION XLVI.—VERBS GOVERNING THE GENITIVE.

Some verbs in German govern the genitive (§ 125), while those in English of corresponding signification require the objective, as:—Gedenke meiner, remember me (*or*, think of me). Ich achte seiner nicht, I do not regard (notice) him. Er bedarf des Geldes, he needs (wants) money. Er denkt or gedenkt meiner, he thinks of me. Er erwähnte unser, he mentioned (spoke of) us. Er beraubte ihn all seiner Schätze, he robbed him of all his treasures. Das Haus entbehrt des Vaters, the house lacks (misses) the father (master). Der Unglückliche harrt besserer Zeiten, the unfortunate (waits for) expects better times. Schonet mein (§ 57. 1), spare me. Sie spotten meiner, Prinz, you mock me, prince! Vergesset meiner nicht, forget me not. Er bediente sich der besten Mittel, he used (served himself of) the best means.

Some verbs of the above class (§ 125) more commonly take the accusative, as:—Vergiß deine Bücher nicht, do not forget your books.

VOCABULARY.

Alterschwäche, *f.* decrepitude.	Erwähnen, to mention.	Regiment', *n.* regiment.
Bedürfen, to need, want.	Gefälligkeit, *f.* complaisance, kindness.	Sehnsucht, *f.* longing.
Bekümmern, to grieve, trouble.	Harren, to hope, wait for.	Schonen, to spare.
Bereuen, to repent, regret.	Hierfür, for this, for it.	Spotten, to mock, scoff at.
Bescheiden, modest.	Jammern, to distress, grieve, lament.	Sterben, to die.
Bitte, *f.* request, petition.	Längst, long since (ago).	Strenge, severely.
Californien, *n.* California.	Leid, *n.* pain, sorrow.	Ueberstehen, to overcome, endure.
Cholera, *f.* cholera.	Lohnen, to reward.	Unentbehrlich, indispensable.
Dann, then.	Nachlässigkeit, *f.* negligence, remissness.	Unleidlich, insufferable.
Dumm, stupid.	Rede, *f.* speech, harangue.	Unwahrheit, *f.* falsehood.
Endlich, at length.	Regieren, to govern, rule.	Verweisen, to reprimand.
Entbehren, to be in want of, dispense with.		Wahrnehmen, to observe.
Erbarmen (sich), to have pity on.		Zuletzt', at last.

RÉSUMÉ OF EXAMPLES.

Bedürfen Sie noch ferner meiner Dienste?	Are you still further in need of my assistance?
Ja, mein Herr! ich brauche Geld, denn ich entbehre selbst (Sect. LXII. 1) der nothwendigsten Lebensmittel.	Yes, sir; I need some money, for I am in want even of the most necessary provisions.
Derjenige, der ein Vergnügen nicht entbehren kann, zeigt, daß er nicht verstehet, dasselbe zu genießen.	He that cannot dispense with a pleasure, shows that he does not know how to enjoy it (the same).
Ich würde seiner gar nicht erwähnen, wenn er nicht mein Verwandter wäre.	I would not speak of him at all if he were not my relative.
Genieße des Lebens, aber mit Ehren:	Enjoy (the) life, but with honour!
Er wurde eines Verbrechens angeklagt, das er nicht begangen hatte.	He was accused of a crime that he had not committed.
Vergessen Sie meiner nicht.	Do not forget me.
Ich vergaß' meinen Bleistift; geben Sie mir einen Augenblick den Ihrigen.	I forgot my pencil; give me yours a moment.

EXERCISE 88.

1. Wer alte Leute nicht achtet, ist nicht werth, selbst geachtet zu werden. 2. Wenn man auf jede Rede achten wollte, hätte man sich um viele Sachen zu bekümmern. 3. Er entbehrte der nöthigen Mittel, um seine Pläne auszuführen. 4. Wer wird sich meiner annehmen, wenn ich verlassen bin? 5. Wenn er seine Fehler bereut, so will ich ihrer auch nicht mehr gedenken. 6. Ich würde noch viel mehr Sachen bedürfen, wenn ich nicht gewohnt wäre, die Gegenstände zu entbehren, die (Sect. XXI. 3) viele Leute für unentbehrlich halten. 7. Der General erwähnte Ihres Sohnes, als eines der tapfersten Männer in seinen Regimentern. 8. Gewähre meine Bitte, O Herr! und schütze mich vor meinen Feinden. 9. Gedenke meiner Bitte. 10. Nichts ist unleidlicher, als auf Jemanden lange zu warten, der zuletzt gar nicht kommt. 11. Längst schon harrte ich Ihrer mit Sehnsucht, als ich Sie endlich kommen sah. 12. Erbarme dich des Kindes, das verlassen auf der Straße läuft. 13. Wenn den Fürsten das Volk jammerte, so würde er anders regieren. 14. Aber das Volk wird ihm hierfür noch lohnen, und dann seiner nicht schonen. 15. Es könnte wohl der Mühe lohnen, nach Californien zu reisen. 16. Ich würde gern diese Kleider schonen, wenn ich andere hätte. 17. Ich wünsche keine andern Tod zu sterben, als den Tod vor Altersschwäche. 18. Vergiß meine Worte nicht. 19. Vergiß der überstandenen Leiden, aber vergiß nicht die genossenen Freuden. 20. Wenn die Fürsten könnten, so schonten sie weder der Freiheit, noch sonst eines Rechtes ihrer Völker.

EXERCISE 89.

1. She nursed her father in his old age, and nursed me when I had the nervous fever. 2. He mocked me, but observed not how the people mocked him. 3. Has he accepted my present? 4. No, he told me he needed not the present. 5. Do not mention his kindness. 6. The teacher dares not spare the negligence or falsehood of his scholars, but must reprimand them severely when he observes it. 7. Forget not the warning voice of your parents. 8. Remember the Sabbath-day. 9. Who can believe a man who sneers at everything and scoffs at everybody? 10. We waited with longing for the arrival of our friends. 11. When thou repentest of thy faults, then shall I remember thee with pleasure. 12. Conscientious people make no vain speeches, nor make parade of qualifications which they do not possess.

*** Appended to this and subsequent lessons the student will find a Key to the Exercises in German. Our reasons for not beginning this key before are the same as those which we have given for not commencing the Key to Exercises in Lessons in French at an earlier period.

KEY TO EXERCISES IN LESSONS IN GERMAN.

Exercises 1 *and* 2 *are on Pronunciation. Exercise* 3 *is on Handwriting.*

EXERCISE 4 (Vol. I., page 38).

1. Who has bread? 2. The baker has bread. 3. Has the baker flour? 4. Yes, he has flour also. 5. What has the miller? 6. The miller has flour and grain. 7. Who has meat? 8. The butcher has meat. 9. Have you beer? 10. No, the brewer has beer. 11. Have you wine? 12. No, I have coffee. 13. What has the girl? 14. The girl has tea. 15. Has the brewer grain? 16. No, he has only beer and wine. 17. What has the child? 18. It has water. 19. Has it bread also? 20. Yes, it has bread and meat also.

EXERCISE 5 (Vol. I., page 38).

1. Do you love the child or the man? 2. I love the child. 3. Have you the sugar? 4. No, the child has the sugar. 5. Does the child love the girl? 6. Yes, and the girl loves the child. 7. Who has the glass? 8. The child has the glass. 9. Has the brewer the wagon? 10. No, the peasant has the wagon. 11. Who has the beer? 12. The brewer has the beer and the wine. 13. Has the miller the flour or the bread? 14. He has the flour. 15. Has the baker the wine or the water? 16. He has the water. 17. Do you love the peasant? 18. No, I love the teacher. 19. Have you meat or wine? 20. I have the meat. 21. Have you the bread or the sugar? 22. I have the bread. 23. Has the father the book or the comb? 24. He has the book.

EXERCISE 6 (Vol. I., page 61).

1. Are you the baker's friend? 2. No, I am the joiner's friend. 3. What has the butcher's friend? 4. He has the peasant's dog and horse. 5. Where is the flour? 6. It is in the miller's bag. 7. Where is the grain? 8. It is in the peasant's basket. 9. Who loves the teacher? 10. The scholar loves the teacher. 11. Are you sleepy? 12. No, I am thirsty. 13. Where is the brother's ball? 14. The child has the brother's ball in the father's hat. 15. Where is the teacher's horse? 16. It is in the stable. 17. Does the joiner praise the carpenter? 18. No, the carpenter's son praises the teacher's son. 19. Where is the joiner's chair? 20. It is in the teacher's room. 21. Does the carpenter love the teacher? 22. Yes, he loves and praises the teacher. 23. The man is at the table, the book is on the table, and the dog is under the table.

EXERCISE 7 (Vol. I., page 62).

1. Who has this girl's paper? 2. This child has it. 3. Whose book has this scholar? 4. He has the teacher's book. 5. From whom have you this leather? 6. I have it from the shoemaker. 7. For whom is this apple? 8. It is for the saddler's child. 9. Whose coat has the tailor's son? 10. He has this friend's coat. 11. From whom has this hatter's son money? 12. He has money from the father. 13. Where is the peasant's wagon? 14. The teacher's friend has it. 15. Whose house and garden has the teacher? 16. He has the mayor's house and garden. 17. From whom have you this hat? 18.

so named after a Russian princess. It is a native of Japan, remarkable for the beauty of its heart-shaped leaves, and its long, blue, odorous flowers, disposed in panicles.

SECTION XXXVII.—COMPOSITÆ, OR COMPOUND-FLOWER TRIBE.

Characteristics: Inflorescence; a capitulum receptacle or torus common, surrounded by an involucre; calyx tubular, adherent to the ovary; corolla epigynous, monopetalous; stamens five, rarely four, inserted on the corolla; anthers united into a tube by their edges; ovary inferior, unilocular, uniovular; ovule erect; fruit, an achænium; seed, dicotyledonous, exalbuminous; radicle inferior.

The *Compositæ*, of which at the present time not less than 9,000 species are known, constitute the tenth part of the flowering plants, and, therefore, perhaps ought to form a class rather than a natural order; nevertheless, the type which they present is so uniform that, in spite of their great numerical superiority over other natural groups, botanists have continued to regard them as an order.

For the most part the *Compositæ* are herbs, generally perennials; certain species are ligneous; indeed, a few are arborescent, constituting trees of large size. The leaves are generally alternate, various as to their form, but always without stipules. The capitula, as a whole, present the appearance of a corymb; the aggregate inflorescence is therefore definite; but each capitulum entering into the corymb is indefinite, as is sufficiently made known by the order of floral development—the external florets always being the first to expand. Perhaps the best manner of studying the compound inflorescence is to regard each capitulum as a spike flattened down upon itself in such a manner that what it loses in length is gained in thickness. Upon this normal spike each floret grows from the axilla of a bract; therefore, we ought to find upon this compound spike bracts in equal number to the flowers, and situated externally to them. But the normal state is still further disturbed by the perishing, or *abortion*, to use a phrase common in botanical descriptions, of some of the florets, in consequence of pressure made upon them by their fellows. Hence it follows that only the bracts appertaining to the outside florets arrive at maturity, and form the general involucrum. The internal bracts are merely represented by minute scales, silk-like filaments, or hairs.

When we analyse in this manner the nature of a capitulum, the explanation is seen of the different aspect assumed by the torus, or flower-disc, in various genera of compound flowers. In the chamomile it is covered with hair; in the blue corn-flower it is silky; in the Onopordon, or cotton thistle, it is alveolar (Latin, alveolus, *a socket*, the diminutive of alveus, *a large hollow vessel*), that is to say, studded with socket-like indentations, similar to those in which are embedded the teeth of animals. Finally, in certain *Compositæ* of which the Dandelion may be taken as an example, it is absolutely naked.

In the greater number of cases, each floret of a compound flower bears stamens and pistils, as in the corn centaurea (Fig. 93, page 280, Vol. I.), the full representation of which will be given in Fig. 173; but in others the florets of the circumference alone are pistilliferous, as is seen in the chrysanthemum (Fig. 101, page 280, Vol. I.); or even sterile, or devoid of both pistils and stamens. Again, certain remaining members of the Composite order have staminiferous flowers in the centre and pistilliferous flowers on the circumference; of this kind is the marigold. Finally, there are yet others, the flowers of which are entirely staminiferous, or entirely pistilliferous; and these flowers may be on one or two separate plants.

The calyx, the tube of which is adherent to the ovary and altogether confounded with it, terminates in a limb or free portion, which is subject to numerous modifications of form; thus furnishing excellent characters for the distinction of genera. It is completely effaced in the chrysanthemum (Fig. 101); it forms a crown in the wild chamomile and tansy; and is developed in tooth-like protuberances, or lamellar scales, in the sunflower (Fig. 83, page 241, Vol. I.), French marigold, and chicory. Frequently it has the form of hairy or silk-like filaments, forming a plume, called the *pappus*.

The stamens are inserted upon the tube of the corolla, and are alternate with its divisions; the pistil is composed of a single carpel; the ovary one-celled, uniovular. Certain botanists, having regard to the aggregation of many individual florets in a compound flower, have imagined this great natural order to be the most highly developed of all the flowering plants, and as deserving to take precedence of all the other natural families. To decide on the matter of precedence is in no case an easy task; but it is certain that the *Compositæ* contain a very large number of highly valuable plants; it is certain, too, that extraordinary means are taken by nature for their generation and preservation. How beautiful is the provision which is made for the dispersion of their ripe fruits, commonly termed seeds! These fruits, which the reader will now remember are termed by botanists *achænia*, remain upon the torus, or receptacle enclosed by the withered bracts, until ripe; they are then dispersed. Various methods are adopted to bring about this dispersion, and they are all beautiful. In some species, the torus, after the withering of the floral envelopes, shoots up in the form of a spire, thus presenting every facility for the achæniums to escape. In other species, as the colt's-foot, the torus becomes, during the ripening of the fruit, inverted in such a manner that the fruits are emptied, as it were, out of their sockets. In the chamomile the same result is accomplished by the assumption by the torus, as the fruits ripen, of a globular instead of a plane condition. In the cotton thistle, the alveolar processes become so contracted during the ripening of the fruits, that the latter are extruded; but amongst all provisions made by Nature for the distribution of the fruit of *Compositæ*, perhaps the most beautiful consists in the plume, or aigrette, with which some are furnished. This plume is nothing else than the dried limb or free portion of the calyx. In the genera which have this appendage, it is worthy of remark, that the involucrum is supplied with long, serrated, imbricated bracts, which surround the achænia, protect them, and favour their ripening. In certain species, the involucrum opens of itself as soon as the fruits arrive at maturity, thus allowing the latter to escape and float on their winged appendages. In others there is another provision. The involucrum, instead of opening spontaneously, has a tendency to remain closed; whilst the wing-like appendages of the achænia are yet unripe and devoid of elasticity, there is nothing to prevent the closing tendency of the involucrum from taking effect; but no sooner do the fruits ripen than their plumes or wings, tending to expand the outermost ones to a horizontal position, force open the involucrum by their spring-like elasticity, and the fruits are now free to move in obedience to the first passing breeze. In this way the achænia are transported often to the distance of several miles. Not content even with this beautiful provision in all its simplicity, the plumes of certain *Compositæ*, mindful, as it would seem, of their citizen-like traditions, aggregate together. In this manner occasionally a mimic cloud of dandelion fruits may be seen pursuing their devious course to some unknown spot.

LESSONS IN GERMAN.—XXIX.

SECTION LVII.—EXAMPLES ILLUSTRATING THE VARIOUS USES OF THE PREPOSITIONS.

An.

Im Innern Deutſchlands geſchah', was von jeher geſchah', wenn es dem Throne an einem Kaiſer, oder dem Kaiſer an einem Kaiſerſinne fehlte. (Schiller.)	In the interior of Germany events took place which have ever occurred before, when the throne was without an Emperor, or the Emperor without an imperial mind.
Wir ſtehen weit von einander ab an Jahren, an geprüftem Werth. (Göthe.)	We stand far from each other in years, in recognised worth.
Er iſt an der Auszehrung geſtorben.	He (has) died of consumption.
Muß ich auch an deiner Liebe zweifeln? (Schiller.)	Must I likewise doubt of thy love?
Die Freunde werden irr' an dir! (Schiller.)	(The) thy friends are becoming perplexed about thee.
An die Angſt der Mutter denkſt du nicht.	Of the anxiety of the mother thou dost not think.
Er ſchrieb einen Brief an mich. (Er ſchrieb mir einen Brief.)	He wrote a letter to me. (He wrote [to] me a letter.)
Man kennt den Vogel an den Federn.	One knows the bird by its (the) feathers.
Die Nachkommenſchaft des ſo gefürchteten Karl V. ſchwebte in Gefahr, einen Theil ihrer Beſitzungen an die Türken, den andern an die Proteſtanten zu verlieren. (Schiller.)	The descendants of the formidable Charles V. were in danger of losing one part of their territories to the Turks, and the other to the Protestants.
Halte unverbrüchlich feſt an dem Glauben an Gott, den Vater unſer Aller.	Hold inviolably fast to thy (the) faith in God, the Father of us all.

Auf.

Wir waren auf einen Augenblick auf die Straße gegangen, um uns den Zug anzuſehen.	We had gone for a moment into the street, in order to look at the procession.
Der Bürgermeiſter iſt auf dem Rathhauſe, und ſein Sohn iſt auf der Univerſität.	The burgomaster is at the council-house, and his son is at the university.
Wir waren geſtern auf der Jagd, und gehen heute auf eine Hochzeit.	We were yesterday at the chase, and are going to-day to a wedding.
Sind Sie böſe auf mich?	Are you angry with me?
Auf Sonnenſchein folgt Regen.	Rain follows (upon) sunshine.

Bei.

Es ſteht bei mir, es zu thun, oder zu laſſen.	It depends upon me to do it or to leave it undone.
Bei jedem Abſchied zittert mir das Herz. (Schiller.)	At every farewell (departure) my heart trembles.
Bei aller ſeiner Klugheit läßt er ſich zu Thorheiten verleiten.	With all his prudence he suffers himself to be beguiled into foolish actions.
Solch ein Geiſt, bei ſolch einem verdorbenen Charakter!	Such a mind, with such a depraved character!
Guſtav Adolph gewann' mit ſeinem Leben die Schlacht bei Lützen.	Gustavus Adolphus won with his life the battle at Lützen.
Das iſt nicht Sitte bei uns.	That is not the fashion with us.
Er nannte mich bei meinem Vornamen (or Taufnamen).	He called me by my Christian name.
Ich leſe nicht gern bei einer Lampe.	I do not like to read by a lamp.
Er ſcheint nicht recht bei Sinnen zu ſein.	He seems not to be right in mind (in his right mind).
Er verbot' es bei Leibesſtrafe.	He prohibited it on pain of death.
Er hat ſchon Geld bei Seite gelegt'.	He has already laid money aside (up).
Er faßte ihn bei der Hand.	He took him by the hand.

Bis.

Bis dieſen Augenblick.	Till this moment.
Wir bleiben bis Abend.	We remain till evening.
Bis dieſe Stunde weiß ich nicht, wie es ihm möglich geweſen iſt, ſo zu leben, wie er lebte.	To this hour I do not know how it was possible for him to live as he did (live).
Er geht bis nach* Wien.	He goes as far as (to) Vienna.
Das Waſſer reichte ihm bis an den Hals.	The water reached up to his neck.
Bis auf Einen Punkt ſind ſie einig.	One point excepted, they are agreed.
Er geht nicht eher, als bis er ſeine Geſchäfte beendigt hat.	He does not go before he has finished his business.

Nach.

Der Vater reiſt nach Amerika.	The father is going (journeying) to America.
Der Ritter greift nach ſeinem Schwerte.	The knight grasps (after) his sword.
Die armen Waiſen ſchreien nach Brod.	The poor orphans cry for bread.
Umſonſt' ſpäh' ich nach einem Auge, das empfindet. (Schiller.)	In vain I look for an eye that feels.
Laßt uns tagen nach den alten Bräuchen des Landes. (Schiller.)	Let us meet according to the ancient customs of the land.
Thu, was vor dir kein Weib gethan', nach dir kein Weib mehr thun wird. (Schiller.)	Do what before thee no woman has done: after thee no woman will do again.

* Bis is often placed before the prepositions auf, etc., as, bis auf, bis nach, bis zu, etc. The pupil will observe, that some of the prepositions are employed in this section as adverbs.

Seit.

Seit der Ankunft ſeines Vaters ſcheint er zufrieden zu ſein.	Since the arrival of his father he appears to be contented.
Er iſt ſeit einer Woche hier.	He has been (is) here a week.
Seit Menſchengedenken iſt kein ſolches Mißjahr geweſen.	There has not been such a sterile year within the memory of man.
Seit geſtern habe ich ihn nicht geſehen.	Since yesterday I have not seen him.

Ueber.

Der Faule ſtirbt über ſeinen Wünſchen.	The sluggard dies over his wishes.
Das geht über meinen Verſtand.	That is (goes) beyond my comprehension.
Sie ſind ſchon über ein Jahr hier.	You are (have been) here already more than a year.
Er erhält' Brief über Brief.	He receives letter upon letter.
Sie zog den Schleier über das Geſicht.	She drew the veil over her (the) face.
Er war über dieſe Antwort ganz entrüſtet.	He was perfectly indignant at this reply.
Er hat über dieſen Punkt noch nicht entſchieden.	He has not yet decided concerning this point.
Cook's Begleiter ſchwiegen von den Mineralien Neuholands, und ſcheinen über den Reizen der dortigen Flora vergeſſen zu haben, daß auch der Boden, über den ſie hineilten, die Blicke des Kenners verdiente. (G. Forſter.)	Cook's companions were silent respecting the minerals of New Holland, and appear, amidst the charms of the Flora of that country, to have forgotten that the soil over which they hurried was likewise deserving of the scrutiny of the philosopher.
Laß den Herbſt in ſchwarzen Wettern hoch über unſerm Haupte ziehn.	Let the autumn in dark storms sweep high above our heads.

Um.

Um ſein Leben zu retten, verrieth' er ſeinen Freund.	In order to save his life he betrayed his friend.
Die Ritter ſetzten ſich um den runden Tiſch.	The knights seated themselves about the round table.
Der Sieger hatte einen Kranz um das Haupt.	The victor had a wreath around the head.
Der Feind lagerte ſich um die Stadt herum.	The enemy encamped (himself) around the city.
Sie rennen um die Wette.	They run for a wager.
Was thut man nicht um Geld?	What does one not (do) for money?
Es dreht ſich Alles um mich.	Everything turns about me.
Er iſt um halb zwei angekommen.	He arrived at half-past one.
Man hat ihn um ſein Vermögen (um ſein Geld) gebracht.	They have deprived him of (got away) his property.
Es muß um einen Zoll länger ſein.	It must be (by) an inch longer.
Sie kümmern ſich mehr um den Krug, als um den Krieg. (Schiller.)	They concern themselves more about the wine (jug) than the war.

Unter.

Die Soldaten ſtehen unter Waffen.	The soldiers are under arms.
Das ganze Land ſteht unter Waſſer.	The whole land is (stands) under water.
Es iſt unter ſeiner Würde, ſo zu handeln.	It is beneath his dignity so to act.
Er iſt unter einem andern Namen zu uns gekommen.	He came (Sect. XVII. 8) to us under another name.
Iſt keiner unter uns, der dieſe Schmach räche?	Is there no one among us who may avenge this outrage?
Es iſt unter uns kein Geheimniß.	There is no secret among us.

Vor.

Sie führten ihn vor den Richter.	They brought him before the judge.
Der Frühling iſt vor der Thür.	The spring is at (before) the door (at hand).
Ich will mich nicht vor dir verbergen.	I will not conceal myself from thee.
Vor ihr habe ich keine Geheimniſſe.	Before her I have no secrets.

I have it from the hatter. 19. For whom is it? 20. It is for the tailor's son. 21. Have you gold, silver, or copper for the teacher? 22. I have silver for him. 23. Whom does the child love? 24. It loves the teacher's brother.

EXERCISE 8 (VOL. I., page 62).

1. Where is the *mate's* brother? 2. He is with the captain in the ship. 3. Is the nobleman's son with him also? 4. No, he is in Germany. 5. Where is the father? 6. He is with the captain in the custom-house. 7. Does the captain praise the nobleman's son? 8. Yes, and he praises the father also. 9. Does the nobleman love the captain? 10. Yes, he loves and praises him very much 11. Is this man the captain's son? 12. No, he is the mate's son. 13. Is this sailor rich? 14. No, he is poor and merry. 15. How old is this man? 16. He is not very old. 17. Is he sick? 18. No, he is hungry. 19. What does this girl give the child? 20. She gives it only sugar. 21. What do you give the servant? 22. I give him money. 23. What does the servant give the horse? 24. He gives it hay. 25. Does this child love the teacher? 26. Yes, and the teacher praises the child. 27. Is the hunter still in the forest? 28. Yes, and the nobleman's son is with him. 29. The huntsman goes to the forest to the father, and I go to the brother.

EXERCISE 9 (Vol. I., page 66).

1. Has a man or a child this friend's stick? 2. This man has an enemy's sword, and this child has a friend's stick. 3. What has the hunter? 4. He has a dog and a gun. 5. Who has the peasant's plough? 6. The father of this child has the plough. 7. Has this blacksmith the merchant's money? 8. No, he has only iron from a merchant. 9. Have you the baker's wagon? 10. No, I have this wagon from a carriage-maker. 11. Have you this girl's ribbon? 12. No, I have cloth from a draper. 13. Have you this friend's coat? 14. No, I have this coat from a tailor. 15. Have you the teacher's paper? 16. No, I have this paper from a stationer, and a letter of recommendation from the teacher. 17. Is the horse a draught-animal? 18. Yes, and it is also a beast of burden. 19. Is the camel a draught-animal also? 20. No, it is only a beast of burden. 21. Whose law-book has the nobleman's son? 22. He has the law-book of the judge of the superior court.

LESSONS IN GEOMETRY.—XIV.

THE CIRCLE AND ITS PROPERTIES.

HITHERTO, in our lessons in Geometry, the attention of the student has been directed to the construction of rectilineal figures, or figures contained by *right* or straight lines: we shall now enter on what may be termed the "geometry of the circle," or the method of drawing circles and parts of circles under various conditions; concluding our lessons on this subject with instructions for drawing regular polygons by the aid of the circle, protractor, and scale of chords, as well as the ellipse and other figures bounded by curves or consisting of curved lines.

It may be useful to the student if we recapitulate briefly the names of various parts of the circle, and mention its chief properties as laid down in the Definitions (Vol. I., page 53), before explaining one or two other points that will be necessary for him to understand before he reads the problems that we are about to bring under his notice.

Firstly, let us ask, What is a circle? It is a form that meets the eye often enough as we go about our daily tasks. As we pass through the streets of town or city, or along the highways and byways of the country, it is brought before us in the wheels of every vehicle we meet. It is exhibited in the form of the majority of our cooking utensils. If we turn our eyes to the face of the clock that stands on the mantel-shelf, or the watch that is carried in the waistcoat-pocket, it is there. Nay, more, it is found in every button that we wear on our attire, in the cups and glasses out of which we drink, and in the plates off which we eat our daily food. It is the most perfect, the most elegant, the most useful of all forms. Under the figure of a snake holding its tail in its mouth, the ancients adopted it as the emblem of eternity, which had no beginning, and which has no end. It is a figure which any one can describe by the aid of a pair of compasses with the greatest ease, but one which it would be most difficult to draw without the assistance of this useful instrument.

There was a man once, though, who could draw a perfect circle with a simple sweep of his unerring arm and hand, and mark its centre with the same rapidity and precision. His name was Giotto or Angiolatto, an Italian painter, sculptor, architect, and engineer, born at Vespignano in 1276. As a boy he was employed as a shepherd, but Cimabue, who accidentally discovered his innate talent for drawing, took him by the hand, and made him a greater painter than himself. He had learnt the rudiments of his art in the fields by sketching his sheep on the earth with the end of his shepherd's crook, or with a nail on any flat piece of stone that might come in his way. These small beginnings had great results in Giotto's case, for he went on step by step until he became the greatest Italian painter of his time. When Benedict XI. was Pope of Rome, artists were wanted to work at the decorations of the great cathedral dedicated to St. Peter, and invitations were sent to the principal painters of Italy to forward specimens of their skill for the pope's inspection. Giotto contented himself with drawing a circle on a piece of paper with a bit of charcoal, and handing it to Pope Benedict's messenger. It was in vain that the messenger urged that his master required some design as a specimen of Giotto's skill, for the painter refused to send anything else. The circle so hastily drawn was found to be perfect when tested with a pair of compasses, and so struck was the pope and his advisers with this surprising proof of the artist's capacity as a draughtsman, that he was immediately summoned to Rome to carry out the work that Benedict wished to contribute as his quota to the adornment of the finest cathedral that has yet been built.

But to return from this digression. The circle, in geometrical terms, is a plane figure; that is, a figure drawn on a plane or level surface, and bounded by a curved line called the circumference or periphery. Let us explain these terms; for there is nothing so well calculated to fix the meaning of a word and the peculiar property of the figure that it is intended to describe as to trace it to the primary source or root from which it is derived. The word *plane* is derived from the Latin *planus*, flat, smooth, level. It is merely another form of the word *plain*, which we apply to a level tract of country because it is flat and devoid of hills or any striking inequalities in its surface. A joiner or cabinet-maker will now see at once the reason why the tool he uses to give an even level surface to a piece of wood is called a plane. The word *circumference*, which is applied to the line which is carried round about, or which bounds any figure, is derived from the Latin words *circum*, round, and *fero*, I bear or carry. The word *periphery* means precisely the same thing, but it traces its source to the Greek instead of the Latin, being derived from the Greek περι (per-ry), *around*, and φερω (fer'-ro), *I bear or carry*.

Look at the annexed figure. The whole of the superficies or surface of the paper that lies within the curved line A C B E is called a *circle*. The curved line A C B E itself is called the *circumference* or *periphery* of this circle. The point O is called its *centre*, a word derived immediately from the Latin *centrum*, and more remotely from the Greek κεντρον (ken'-tron), *a sharp point*. The position of this point has this peculiar property: it is such that all straight lines drawn from it to the circumference are equal to one another. Thus the straight lines O A, O B, O C, O E, drawn from the centre O to the points A, B, C, E, in the circumference, are equal to one another. These lines are called *radii* of the circle A C B E, from the Latin *radius*, a sunbeam or ray of light, and hence applied to any line or any number of lines that *radiate* in various directions from the same point, as rays of light seem to proceed from the sun or any luminous centre, as may be seen by looking at a candle or gas-light with half-closed eyes, when the rays that seem to issue from it will become distinctly visible. Any two radii that proceed from the centre in opposite directions, and therefore lie in the same straight line, form together a straight line called a *diameter* of the circle. In the above figure (Fig. 49), A B is a diameter of the circle A C B E. Its name, derived from the Greek δια (di'-a), *through*, and μετρειν (met'-rine), *to measure*, implies that it is a line that measures the circle across its superficies and through its centre. Having arrived at the meaning of the word *diameter*, we arrive at the full significance of the term "diametrically opposite." Thus, when we say that the opinions entertained by any two men are diametrically opposite, we mean that they are as contrary to each other as it is possible to be—as opposite, in fact, in

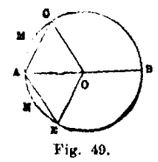


Fig. 49.

direction and aim as the two radii proceeding from the centre of a circle that together form a diameter of that circle.

Any portion of the circumference of a circle, no matter how great or how small, is called an *arc* of that circle. Thus the portion A C of the circumference of the circle A C B E is an arc of that circle. For the sake of clearness we will call this portion the arc A M C. The remainder of the circumference, C B A, is also an arc of the circle, as are also the portions A C B, B E A, E A C, C B E, etc. etc. The straight line that joins the extremities of an arc is called the *chord* of that arc. Thus A C is the chord of the arc A M C, A E is the chord of the arc A N E, and A B is the chord of the arc A C B or the arc A E B. The student may ask why a portion of the circumference of a circle is called an *arc*, and to this we may reply by two counter-questions—Why is a man who shoots with a bow and arrow called an *archer*? and, What does the arc and its chord resemble? It may not be easy to give a reply to our first counter-query, but it will suggest a reply to our second, namely, that the arc and its chord look very much like a bent bow and its string tightened to its utmost tension. Let it now be said that the Latin word for a bow is *arcus*, and the meaning of the words *arc* and *archer* becomes clear enough. The word *chord* is derived from the Latin *chorda*, the string of a harp or lyre, and hence any kind of string. It is from this word that we have "cord," a term applied to any small rope, or thick or closely-twisted string. From this it may be seen how much a letter more or less disguises an otherwise familiar word.

A *segment* of a circle is any part of the surface of the entire circle enclosed by an arc and its chord. The word *segment* is derived from the Latin *segmentum*, a piece, shred, or paring. Thus in Fig. 49, A M C represents a small segment of the circle A C B E contained by the arc A M C and the chord A C. In like manner, the portion of the circle C B E A, contained by the arc C B E A and the chord C A, is a segment of the circle A C B E, as is also A C B, contained by the arc A C B and the chord A B. This chord, however, is a diameter of the circle A C B E; and when a diameter is the chord of an arc that encloses a segment in conjunction with it, the portion of the surface thus enclosed is called a semicircle or half-circle.

The figure enclosed between any two radii of a circle and the arc of the circumference intercepted between the extremities of the radii that touch or meet the circumference, is called a *sector*, from *sectum*, a part of the Latin verb *seco*, to cut. Thus O C E, the portion of the circle A C B E bounded or enclosed by the radii, O C, O E, and the arc C A E, is the sector of that circle, as is also the remainder of the surface; namely, the portion bounded by the radii O C, O E, and the arc C B E.

We shall have occasion in the course of future problems to speak of circles touching or meeting one another, and of straight lines that are tangents to a circle. In Fig. 50, the smaller circles A D E, C F G *touch* the larger circle A B C, the former in the point A, and the latter in the *point* C. One circle can touch another in only one point. The circumference of the touching circles meet in one point only. If, however, the surface of one circle overlaps the surface of the other in the slightest degree, contact is destroyed, and the circumferences of the circles are said to *cut* one another. Thus in Fig. 51, the circumference of the circle B C D, which overlaps the circle A C E, cuts the circumference of the last-named circle in the points C and F. When, therefore, two circles touch one another, they touch or meet in one point only. They cannot touch each other by any possibility whatever in more points than one. When one circle is said to cut another circle, the circumference of the one cuts the circumference of the other in two points only; it cannot by any possibility whatever cut the circumference of the other in more points than two.

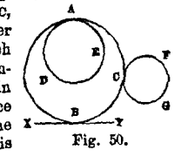


Fig. 50.

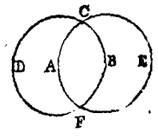


Fig. 51.

In Fig. 50, the straight line X Y which touches the circle A B C in the point B is called a *tangent* to that circle. Now in speaking of a line in plane geometry as the tangent of or to a circle, nothing more is meant than this, that it touches the circle. The word *tangent* is derived from the Latin *tango*, I touch. In Fig. 52, the straight lines P Q, R S, are tangents to the circle A B C, P Q touching it in the point B, and R S in the point C. Straight lines drawn at right angles to the tangents of a circle intersect in the centre of that circle. Thus in the annexed figure, the straight lines B O, C O drawn at right angles to the tangents P Q, R S respectively, intersect in the point O, the centre of the circle A B C. The straight lines B O, C O are radii of the circle A B C; and thus, conversely, if a straight line be drawn through the extremity of a radius that meets the circumference of any circle, at right angles to that radius, the straight line thus drawn at right angles to the radius is a tangent of that circle.

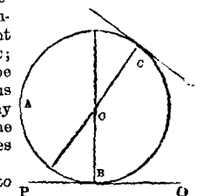


Fig. 52.

The ratio of the diameter of a circle to its circumference is as 1 to 3½, or very nearly so, expressed in figures in the simplest way possible—that is, the circumference of a circle is equal in length to three times the length of the diameter, and one-seventh of its length; or it may be written as 7 to 22, which means that if a diameter of a circle be divided into 7 parts, the length of the circumference is equal to 22 of those parts. Expressed in decimals, the ratio is as 1 to 3·14159. Of course a greater degree of exactness may be obtained by increasing the number of decimal places in the above, but the number given is sufficient for all practical purposes.

The following remarks have been made on the ratio of the diameter of a circle to the circumference by General T. Perronet Thompson, whose name has been already mentioned in our Lessons in Music:—

"If it is asked, what after all is the proportion between the diameter of a wheel and its circumference? it is as 1 to 3·14159, etc. etc., to as many figures of decimals as anybody shall think it worth while to discover and add; but, as in the case of the square root of 5, coming to the end, No! As the Irish sailor said of the rope, the end is cut off. It is not quite so easy to add figure to figure as in the case of the square root of 5, but the conclusion is the same. . . . . The simplest proportion for common purposes is as 7 to 22. The next, which there is very seldom any occasion to go beyond, is as 113 to 355, on which may be given a useful piece of what is called 'artificial memory.' The ablest man it was ever my chance to know, professor of mathematics in the University of Cambridge, wanted this proportion one day, and was observed to be fidgeting with a pen and a piece of paper. At last he broke out, 'There it is, sir. Write down the first three odd figures in pairs, and cut them in two—

113 | 355.'

I remember telling this to the driver of a French cabriolet on the Pont Neuf, to his great delight. He will never forget it; nor should any working man to whom it may be ever likely to be of use."

READING AND ELOCUTION.—XIV.

ANALYSIS OF THE VOICE (*continued*).

EXERCISES ON INFLECTIONS.

Rising Inflection.

Rule 1.—"High rising inflection."

Há!—say you *só?*

Whát!—confer a crówn on the author of the public calamities?

Indéed!—acknowledge a tráitor for our sovereign?

Rule 2.—"Moderate rising inflection."

In every station which Washington was called to fill, he acquitted himself with honour.

As the evening was now far advanced, the party broke up.

Where your tréasure is, there will your hèart be also.

Though we cannot discern the reasons which regulate the occurrence of events, we may rest assured that nothing can happen without the cognisance of Infinite Wisdom.

Despairing of any way of escape from the perils which surrounded him, he abandoned his struggles, and gave himself up to what seemed his inevitable doom.

Had I suffered such enormities to pass unpúnished, I should have deemed myself recreant to every principle of justice and of duty.

Er ist ganz außer sich vor Zorn.	He is perfectly beside himself with rage.
Das Schiff liegt vor Anker.	The ship is lying at anchor.
Er ist vor drei Wochen an'gekommen.	He arrived three weeks ago. (Sect. XXVIII. 1.)
Er hat ihn vor den Kopf geschos'sen.	He has shot him in the head.
3 u.	
Er reist zu Lande, und ich zu Was'ser.	He travels by land, and I by water.
Er liegt noch zu Bette.	He is still (lying) in bed.
Ich stehe Ihnen zur Seite.	I (will) stand at your side (*i.e.*, to aid).
Ich möchte diesen Mann nicht zum Nachbar haben.	I should not like (to have) this man as a neighbour.
Er nimmt meinen Rock zum Muster.	He takes my coat as a pattern.
Kommen Sie morgen zu meinem Vater; Sie können die Sache mit ihm besprə'chen.	Come to my father to-morrow; you may talk the matter over with him.
Wir haben Abraham zum Vater.	We have Abraham to (our) father.
Gehen Sie doch zu meinem Bruder.	Pray go to my brother.
Deines Grames Zeugen werden auf zum Himmel gehn. (Bürger.)	The witnesses of thy grief will rise to heaven.

SECTION LVIII.—PECULIAR IDIOMS.

Stehen, when referring to articles of dress, answers to our words "become" or "suit;" as:—Der Hut steht ihm nicht, the hat does not *become* him; whereas passen signifies, more properly, "to *fit*;" as:—Diese Stiefel stehen ihm sehr gut, allein sie passen ihm nicht; sie sind zu klein, these boots *become* him very well, but they do not *fit* him; they are too small. Anpassen (as also anprobiren) signifies "to try on;" as:—Er paßt (or probirt) den Rock an, he is trying on the coat.

1. Reihe, when employed to denote the order in which anything is to be obtained or done, answers to our word "turn;" as:—An wem ist die Reihe? (on whom is the turn?) whose turn is it?

2. Tag für Tag, day by day, as:—Tag für Tag rühmen wir Dich, day by day we praise Thee.

VOCABULARY.

Aehn'lichkeit, *f.* resemblance, similarity.	Gemse, *f.* goat of the Alps, chamois.	Passen, to fit.
Betrübt', sorrowful, desolate.	Gestalt', *f.* figure, form, stature.	Pisto'le, *f.* pistol.
Doctor, *m.* doctor.	Kappe, *f.* cap.	Platz, *m.* room, space, place, square.
Entwe'der . . . oder, either...or.	Kleidung, *f.* suit, dress.	Portrait', *n.* portrait, picture.
Farbe, *f.* colour, paint.	Mantel, *m.* cloak.	Saal, *m.* assembly-room, saloon.
Festung, *f.* fortress, fort.	Markus, *m.* Mark.	Schleier, *m.* veil.
Gazel'le, *f.* gazelle, antelope.	Maulthier, *n.* mule.	Stricken, to knit.
Gehö'ren, to belong.	Medici'ner, *m.* physician, medical student.	Verstor'ben, deceased.
	Nähen, to sew.	Weste, *f.* vest.
	Pantoff'el, *m.* slipper.	Wogen, to wave, roll.
		Zierlich, elegant, neat.

RÉSUMÉ OF EXAMPLES.

Wilhelm paßt so eben einen Rock bei dem Schneider an.	*William is just trying on* a coat at the tailor's.
Der Rock steht ihm sehr gut, allein' er paßt ihm nicht ganz; er ist ihm ein wenig zu klein.	The coat *becomes* him very well, but it does not quite fit him; it is a little too small for him.
Wem gehört' dieses Pferd?	To whom does this horse belong?
Ein auf'merksamer Schüler weiß, wenn die Reihe an ihm ist zu lesen.	An attentive scholar knows when it is his turn to read.
Der Mensch wird Tag für Tag älter.	Man becomes day by day older.
Die Gei'zigen sind den Eseln gleich, welche Gold tragen und Disteln fressen.	(The) misers are like the donkeys that carry gold and eat thistles.
Der Sohn gleicht dem Vater, wie ein Ei dem andern.	The son resembles the father as one egg (the other) another.
Der Bruder sieht seiner Schwester sehr ähnlich.	The brother looks very much like his sister.

EXERCISE 110.

1. Diesem Manne paßt sein Rock nicht. 2. Ich und mein Bruder, der Mediciner, gehen Tag für Tag an den Fluß. 3. Diese beiden (Sect. XXXII.) Schwestern nähen und stricken Tag für Tag. 4. Dieses Bild gehörte meinem verstorbenen Freunde. 5. Diese Farbe gehört dem Maler. 6. Diese Stadt hat große Aehnlichkeit mit einer Festung. 7. Finden Sie in diesem Portrait keine Aehnlichkeit mit meinem Vater? 8. Nein, es gleicht mehr Ihrem Vetter. 9. Wie kommt es, mein Freund, daß du heute so betrübt bist? 10. Dieser Mantel steht mir besser, als der meinige. 11. Ein Mantel braucht nicht gut zu stehen, wenn er nur warm hält. 12. Wie steht mir dieser Rock? 13. Die Weste steht Ihnen besser, als der Rock. 14. Ich denke, diese Handschuhe passen Ihnen nicht. 15. Diese hier werden mir besser passen, denn sie sind etwas größer. 16. Diese Kleidung paßt dem Knaben sehr gut. 17. Steht mir diese oder jene Kappe besser? 18. Es scheint, deine Pantoffeln passen dir nicht gut. 19. Sie kaufen nur Kleider, welche ihnen gut stehen. 20. Wem gehört dieses Haus? 21. Es gehört entweder ihr oder ihm. 22. Wem gehören jene Handschuhe? 23. Sie gehören dieser Frau. 24. Welchem Mädchen gehört dieser Schleier? 25. Zu welchem Schiffe gehören diese Matrosen? 26. Wessen Maulthiere sind diese? 27. Sie gehören mir. 28. Wessen Hut ist dieser auf dem Tische? 29. Es ist entweder der meinige oder der seinige.

EXERCISE 111.

1. Whose coat is this on the wall? 2. It is either mine or thine. 3. Those gentlemen go every day to bathe. 4. Can you tell me to whom those pistols belong? 5. So far (Sect. XXXIV. 4) as I know, they belong to the doctor. 6. Whose turn is it this night to watch? 7. It is my turn. 8. The turn falls now to me. 9. St. Mark's Square in Venice is so clean and elegant, that it resembles a large assembly-room. 10. The antelope has a figure and height resembling the goat of the Alps. 11. The life of a man is like a ship which goes upon the rolling sea. 12. To whom belong all those beautiful pictures? 13. They belong to my friend the painter. 14. The resemblance between him and his sister is very striking. 15. The doctor asked the medical student to accompany him to the assembly-room. 16. The tailor has just sent home Mark's new coat and cap. 17. The figure was hidden from view by a large cloak. 18. Where are my slippers? 19. The flag floats proudly over the fortress. 20. The painter will begin to paint a new picture to-morrow.

KEY TO THE EXERCISES IN LESSONS IN GERMAN.

EXERCISE 24 (Vol. I., page 151).

1. Der Lehrer schenkte dem Schüler ein sehr schönes Buch. 2. Sie hat ihre Freundin getäuscht. 3. Die Kinder werden den alten Vater gekränkt haben. 4. Ein ungerathenes Kind kränkt den Vater und die Mutter. 5. Ich habe deine Stimme in dem Zimmer gehört. 6. Er wird den Boten gerüstet haben, ehe er ihn zu dem Freunde schickte. 7. Der Bauer hat sein Haus mit Stroh gedeckt. 8. Dieses Unglück wird ihn gelehrt haben, vorsichtig zu sein. 9. Ich habe viele Fische in dem Flusse gesehen. 10. Ein kalter Trunk im Sommer stärkt den Körper, wie der Thau das welke Gras des Feldes. 11. Der Schmerz liebt den Mond als einen Tröster, die Einsamkeit liebt ihn als einen Begleiter, und die Frömmigkeit als den Aufenthalt einer reinen Seele.

EXERCISE 25 (Vol. I., page 163).

1. What has your brother? 2. He has new clothes and new books. 3. Why have you had my white gloves to-day? 4. I had them yesterday, but to-day I have not had them. 5. We shall have an agreeable day to-morrow. 6. My father will have had my letter before his departure. 7. This poor man went to my uncle the day before yesterday. 8. He gave him two handkerchiefs and a new hat. 9. Do you often see my brother, and do you sometimes speak to him? 10. I saw him yesterday, but I have not spoken to him. 11. Did you sing this morning, or did your daughter sing? 12. I have sung in my youth, but now I sing no more. 13. Have you my new German grammar? 14. No, not now, but I had it yesterday. 15. No one is happy but the contented man, and no one is wise but only the pious. 16. Has your wife written a letter to your cousin? 17. No, not yet, but she will write to him to-morrow. 18. Cæsar wrote to Rome, "I came, saw, and conquered." 19. I gave this poor man my old shoes.

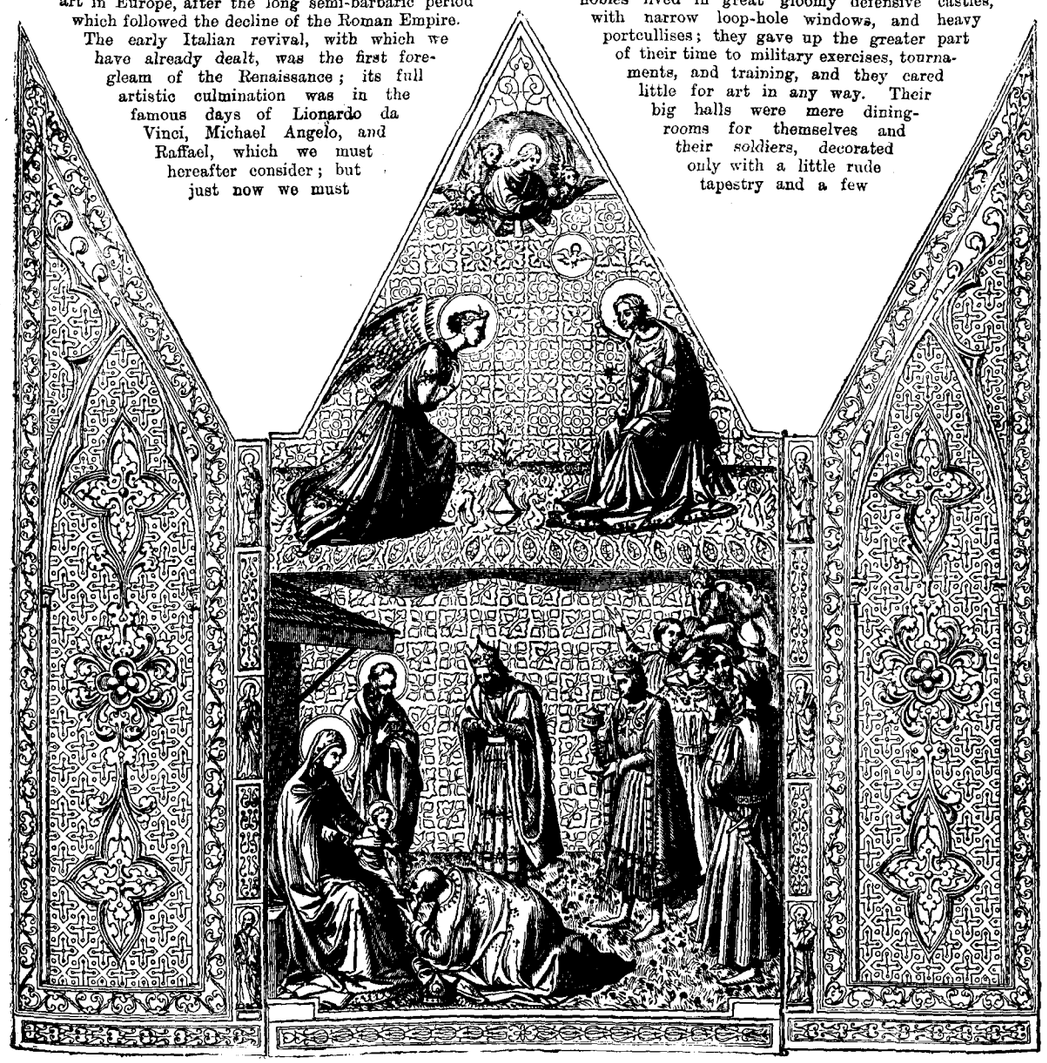
EXERCISE 26 (Vol. I., page 163).

1. Haben Sie meinen Bruder gesehen? 2. Nein, ich habe ihn nicht gesehen, aber meine Frau hat ihn vorgestern gesehen. 3. Er schrieb einen langen Brief, und sprach nicht ein Wort. 4. Sie hat mir ein neues Kleid und ein schönes Taschentuch gegeben. 5. Glauben Sie, daß wir morgen schönes Wetter haben werden? 6. Nein, sondern ich glaube, es wird regnen.

THE HISTORY OF ART.

VIII.—THE DAWN OF THE RENAISSANCE.

THE great revival from which we date all distinctively modern art, all that style of art in the midst of which we now live, is known as the Renaissance; that is to say, the "new birth" of art in Europe, after the long semi-barbaric period which followed the decline of the Roman Empire. The early Italian revival, with which we have already dealt, was the first foregleam of the Renaissance; its full artistic culmination was in the famous days of Lionardo da Vinci, Michael Angelo, and Raffael, which we must hereafter consider; but just now we must



THE ADORATION OF THE MAGI. (*Triptych by Fra Angelico.*)

glance at the intermediate period which elapsed between the date of Giotto and the rise of the three great painters above mentioned. We have here to inquire into the origin of the Renaissance.

Art, we have already said, is an outgrowth of national development, and the great modern revival of art is a portion of the general modern European civilisation which has been gradually growing up ever since the breaking up of the Roman power. All through the Middle Ages, in every part of Europe, slow progress was being made in many directions. In the North, however—in England, France, and Germany—this progress was constantly retarded by war and the military spirit. In our own country, for example, whenever we were not fighting the French under Edward III. and Henry V., or the Scotch under Edward I., we were fighting among ourselves in the Wars of the Roses. Hence the organisation of Northern Europe during all this period was wholly military and feudal. Our nobles lived in great gloomy defensive castles, with narrow loop-hole windows, and heavy portcullises; they gave up the greater part of their time to military exercises, tournaments, and training, and they cared little for art in any way. Their big halls were mere dining-rooms for themselves and their soldiers, decorated only with a little rude tapestry and a few trophies of hunting or of war. The manufacture of arms and armour was almost the only native industrial art of any importance. Under such circumstances as these, it is clear that artistic life was almost impossible; and as a matter of fact, in England and France, the great mediæval cathedrals, like Salisbury, Lincoln, and Westminster Abbey, are almost the only works of art which have come down to us from the Middle Ages.

In Italy, however, and along the Mediterranean generally, civilisation had never died down as it had done in the North

*

Note and Exception.—"Words and phrases of address."

Listen, Americans, to the lesson which seems borne to us on the very air we breathe, while we perform these dutiful rights. Ye winds, that wafted the pilgrims to the land of promise, fan, in their children's hearts, the love of freedom! Blood which our fathers shed, cry from the ground;—echoing arches of this renowed hall, whisper back the voices of other days;—glorious Washington! break the long silence of that votive canvas;—speak, speak, marble lips: teach us THE LOVE OF LIBERTY PROTECTED BY LAW!

Rule 3.—*Note.*—"Poetic series."

Power, will, sensation, mémory, failed in turn.
Oh! the dread mingling, in that awful hour,
Of all terrific sounds!—the savage tone
Of the wild horn, the cannon's peal, the shower
Of hissing darts, the crash of walls o'erthrówn,
The deep, dull, tambour's beat!

All the while,
A ceaseless murmur from the populous town,
Swells o'er these solitudes; a mingled sound
Of jarring wheels, and iron hoofs that clash
Upon the stony ways, and hammer clang,
And creak of engines lifting ponderous bulks,
And calls and cries,* and tread of eager feet
Innumerable, hurrying to and frò.

Onward still the remote Pawnee and Mandan will beckon, whither the deer are flying, and the wild horse roams, where the buffalo ranges, and the condor soars,—far towards the waves where the stars plunge at midnight, and amid which bloom those ideal scenes for the persecuted savage, where white men will murder no more for gold,* nor startle the game upon the sunshine hills.

Rule 4.—"Questions which may be answered by *Yes* or *No*."

Has not the patronage of peers increased? Is not the patronage of India now vested in the crown? Are all these innovations to be made to increase the influence of the executive power; and is nothing to be done in favour of the popular part of the constitution, to act as a counterpoise?

Your steps were hasty;—did you speed for nóthing?
Your breath is scanty;—was it spent for nóthing?
Your looks imply concern;—concern for nóthing?

Exception.—"Emphasis."

Tell me not of the honour of belonging to a free country,—I ask, does our liberty bear *generous fruits?*

Was there a village or a hamlet on Massachusetts Bay, which did not gather its hardy seamen to man the gun-decks of your ships of war? Did they not rally to the battle, as men flock to a feast?

Is there a man among you, so lost to his dignity and his duty, as to withhold his aid at a moment like this?

Rule 5.—"Penultimate Inflection."

All is doubt, distrúst,* and disgrâce; and, in this instance, rely on it, that the certain and fatal result will be to make Ireland hate the connèction, contemn the councils of England and despise her pòwer.

I am at a loss to reconcile the conduct of men, who, at this moment, rise up as champions of the East India Company's charter; although the incompetence of that company to an adequate discharge of the trust deposited in them, are themes of ridicule and contempt to all the world; and although, in consequence of their mismanagement, connivance, and imbecility, combined with the wickedness of their servants, the very name of an Englishman is detested, even to a proverb, through all A'sia; and the national character is become disgraced and dishonoured.

It will be the duty of the historian and the sage, in all ages, to omit no occasion of commemorating that illustrious man; and, till time shall be no more, will a test of the progress which our race made immortal name of Washington.

Exception.—"Emphasis."

Let us bless and hallow our dwellings as the homes of freedom. Let us make them, too, the homes of a nobler freedom,—of freedom from vice, from evil passion,—from every corrupting bondage of the soul!

If guilty, let us calmly abide the results, and peaceably submit to our sentence; but if we are traduced, and really be innocent, tell ministers the truth—tell them they are tyrants; and strain every effort to avert their oppression.

Heaven has imprinted in the mother's face something beyond this world, something which claims kindred with the skies,—the angelic smile, the tender look, the waking, watchful eye, which keeps its loud vigil over her slumbering babe.—In the heart of man lies this lovely picture; it lives in his sympathies; it reigns in his affections; his eye looks round, in vain, for such another object on earth.

Falling Inflection.

Rule 1.—"Intensive downward slide."

Up! all ye who love me! BLOW on BLÒW!
And lay the outlawed felons LÒW!

"MACGRÈGOR! MACGRÈGOR!" he bitterly cried.
ÒN! countrymen, ÒN!—for the day,—
The proud day of glory,—is come!

To ÀRMS! gallant Frenchmen, to ÀRMS!

Oh! shÀME on us, countrymen, shame on us ÀLL!
If we cringe to so dastard a race!

TRÈMBLE, ye traitors! whose schemes
Are alike by all parties abhorred,—
TRÈMBLE! for, roused from your parricide dreams,
Ye shall soon meet your fitting reward!

Rule 2.—"Full" falling inflection, in the cadence of a sentence.

The changes of the year impart a colour and character to our thoughts and feelings.

To a lover of nature and of wisdom, the vicissitude of seasons conveys a proof and exhibition of the wise and benevolent contrivance of the Author of all things.

He who can approach the cradle of sleeping innocence without thinking that "of such is the kingdom of heaven," or see the fond parent hang over its beauties, and half retain her breath, lest she should break its slumbers,—without a veneration beyond all common feeling,—is to be avoided in every intercourse of life, and is fit only for the shadow of darkness, and the solitude of the desert.

Exception.—"Modified cadence."

This monument is a plain shaft. It bears no inscription, fronting the rising sun, from which the future antiquarian shall wipe the dúst. Nor does the rising sun cause tones of music to issue from its súmmit. But at the rising of the sun, and at the setting of the sun, in the blaze of noon-day, and beneath the milder effulgence of lunar light, it speaks, it acts, to the full comprehension of every British mind, and the awakening of glowing enthusiasm in every British heart.

I speak not to you, sir, of your own outcast condition.—You perhaps delight in the perils of martyrdom. I speak not to those around me, who, in their persons, their substance, and their families, have endured the torture, poverty, and irremedial dishónour. They may be meek and hallowed men,—willing to endure.

The foundation on which you have built your hopes, may seem to you deep and firm. But the swelling flood, and the howling blast, and the beating rain, will prove it to be but treacherous sand.

Rule 3.—"Moderate" falling inflection, of complete sense.

Joy is too brilliant a thing to be confined within our own bosoms: it burnishes all nature, and, with its vivid colouring, gives a kind of factitious life to objects without sense or motion.

When men are wanting, we address the animal creation; and, rather than have none to partake our feelings, we find sentiment in the music of birds, the hum of insects, and the lowing of kine; nay, we call on rocks and streams and forests to witness and share our emotions.

I have done my dùty:—I stand acquitted to my conscience and my country:—I have opposed this measure throughout; and I now protest against it, as hàrsh, oppressive, uncalled for, unjust,—as establishing an infamous precedent, by retaliating crime against crime,—as tyrannous,—cruelly and vindictively tyrannous.

Exception.—"Plaintive expression."

I see the cloud and the tempest near,
The voice of the tròubled tide I hear;
The torrent of sorrow, the sea of grief,
The rushing waves of a wretched life.

No deep-mouthed hound the hunter's haunt betrayed,
No lights upon the shore or waters played;
No loud laugh broke upon the silent air,
To tell the wanderers man was nestling there.

The dead leaves strew the forest walk,
And withered are the pale wild flowers;
The frost hangs blackening on the stalk,
The dew-drops fall in frozen showers:—
Gone are the spring's green sprouting bowers.
Gone summer's rich and mantling vines;
And autumn, with her yellow hours,
On hill and plain no longer shines.

What is human life, but a waking dream,—a long reverie—in which we walk as "in a vain show, and disquiet ourselves for naught?" In childhood we are surrounded by a dim, unconscious present, in which all palpable realities seem for ever to elude our grasp; in youth, we are but gazing into the far future of that life for which we are consciously preparing; in manhood, we are lost in ceaseless activity and enterprise, and already looking forward to a season of quiet and repose, in which we are to find ourselves, and listen to a voice within; and in old age, we are dwelling on the shadows of the past,* and gilding them with the evanescent glow which emanates from the setting sun of life.

Rule 4 *and Note* 1.—"Simple commencing series."

The old and the young are alike exposed to the shafts of Death.

The healthy, the temperate, and the virtuous, enjoy the true relish of pleasure.

Birth, rank, wealth, learning, are advantages of slight value, if unaccompanied by personal worth.

Gentleness, patience, kindness, candour, and courtesy, form the elements of every truly amiable character.

Sympathy, disinterestedness, magnanimity, generosity, liberality, and self-forgétfulness, are qualities which universally secure the esteem and admiration of mankind.

"Compound Commencing Series."

In a rich soil, and under a soft climate, the weeds of luxury will spring up amid the flowers of art.

All the wise instructions of the lawgiver, all the doctrines of the sage, all the ennobling strains of the poet, had perished in the ear, like a dream related, if letters had not preserved them.

The dimensions and distances of the planets, the causes of their revolutions, the path of comets, and the ebbing and flowing of tides, are now understood and explained.

The mighty pyramid, half buried in the sands of Africa, has nothing to bring down and report to us, but the power of kings, and the servitude of the people. It asked for its moral object, its admonition,† its sentiment, its instruction to mankind, or any high end in its erection, it is silent;—silent as the millions which lie in the dust at its base, and in the catacombs which surround it.

Yes,—let me be frèe;‡ let me go and come at my own will; let me do business, and make journeys, without a vexatious police or insolent soldiery to watch my steps; let me think, and do, and speak what I please, subject to no limit but that which is set by the common wèal; subject to no law but that which conscience binds upon me; and I will bless my country, and love its most rugged rócks, and its most barren soil.

Exception 3.—"Poetic and pathetic series."

Wheresoe'er thy lot command,
Brother, pilgrim, stránger,
God is ever near at hand,
Golden shield from danger.

Rocks of granite, gates of brass,
Alps to heaven sóaring,
Bow, to let the wishes pass
Of a soul imploring.

From the phantoms of the night,
Dreaming horror, pale affright,
Thoughts which rack the slumbering breast,
Fears which haunt the realm of rest,
And the wounded mind's remorse,
And the tempter's secret fórce,
Hide us 'neath Thy mercy's shade.

From the stars of heaven, and the flowers of earth;
From the pageant of power, and the voice of mirth;
From the mist of the morn on the mountain's brow;
From childhood's song, and affection's vow;
From all save that o'er which sóul* bears sway,
There breathes but one record,—"passing away!"

When the summer exhibits the whole force of active nature, and shines in full beauty and splendour; when the succeeding season offers its "purple stores and golden grain," or displays its blended and softened tints; when the winter puts on its sullen aspect, and brings stillness and repose, affording a respite from the labours which have occupied the preceding months, inviting us to reflection, and compensating for the want of attractions abroad, by fireside delights and home-felt jóys; in all this interchange and variety, we find reason to acknowledge the wise and benevolent care of the God of seasons.

In that solemn hour, when exhausted nature can no longer sustain itself; when the light of the eye is waxing dim; when the pulse of life is becoming low and faint; when the breath labours, and the tongue falters; when the shadow of death is falling on all outward things, and darkness is beginning to gather over the faces of the loved ones who are weeping by his bédside, a ray of immortal hope is beaming from his features: it is a Christian who is expiring.

Note 2.—"Repeated and heightening rising inflection."

I ask, will you in silence permit this invasion of your rights, at once wánton, míschievous, uncálled for, and unnécessary? Will you patiently tolerate the annihilation of all frèedom,—the appointment of a supreme dictátor, who may, at his will, suspend all your rights, liberties, and privileges? Will you, without a murmur of dissent, submit to a tyranny which nearly equals that of the Russian áutocrat, and is second to that of Bónaparte?*

"Repeated and increasing falling inflection."†

Was it the winter's stórm, beating upon the houseless heads of women and children? was it hard labour and spare méals? was it disèase? was it the tòmahawk? was it the deep malady of a blighted hòpe, a ruined énterprise, and a broken hèart?—was it sóme, or all of these united, that hurried this forsaken company to their melancholy fate?

Yes, after he has destroyed my belief in the superintending providence of Gòd,—after he has taught me that the prospect of an hereafter is but the baseless fabric of a vision,—after he has bred and nourished in me a contempt for that sacred volume which alone throws light over this benighted wòrld,—after having argued me out of my faith by his sophistries, or laughed me out of it by his ridicule,—after having thus wrung from my soul every drop of consolation, and dried up my very spirit within me;—yes, after having accomplished this in the season of my health and my prosperity, the sceptic would come to me while I mourn, and treat me like a drivelling idiot, whom he may sport with, because he has ruined me, and to whom, in the plenitude of his compassion—too late and too unavailing—he may talk of truths in which he himself does not believe, and which he has long exhorted me, and has at last persuaded me, to cast away as the dreams and delusions of human folly.

LESSONS IN BOOKKEEPING.—VI.

THE next book that is journalised is the *Bill-Book*. In performing this operation, you make *Bills Receivable Dr. to Sundries* for all the Bills received, that is, which are drawn by you or transmitted to you during the month; you then specify the names of all the *Persons on whose Account* the Bills have been received, at the same time collecting the sums of all those received on the *same person's* account into one amount, as done in journalising the Cash Book; and if Bills have been received on only *one person's* account, make *Bills Receivable Dr. to that person*. Next make *Sundries Dr. to Bills Payable*, for all the Bills accepted during the month; then specify the names of all

* The penultimate inflection of a concluding series, or of a clause that forms perfect sense, is the same in kind with that which precedes a period, except in verse and poetic prose, which, in long passages of great beauty, retain the suspensive slide.

* Falling slide of contrast to the preceding clause.

† All the emphatic series, even in suppositive and conditional expression, being, like enumeration, cumulative in effect, and corresponding, therefore, to climax in style, are properly read with a prevailing downward slide in the "suspensive" or slight form, which belongs to incomplete but energetic expression, and avoids, accordingly, the low inflection of cadence at a period.

‡ Emphasis, and length of clause, may substitute the "moderate" falling slide for the slight "suspensive" one. But the tone, in such cases, will still be perfectly free from the descent of a cadence, which belongs only to the period.

* The inflection of any clause always lies on the emphatic word; and, if that word is a polysyllable, on the accented syllable chiefly, although not always exclusively.

† This inflection both begins higher, and ends lower, every time it is repeated.

after the barbarian invasions. The Italian towns had continued their existence in unbroken descent from the Roman days; and when Europe as a whole began to settle down into something like a regular political order, after the chaos of the dark ages, Italy still remained the centre of civilisation for the Christian world. Florence, Venice, and Genoa were already great mercantile towns, while London and Paris were still mere small and rude trading communities. The merchants of the Italian cities, trafficking as they did with Constantinople and the East on the one hand, and with France, Spain, Flanders, and England on the other, grew wealthy and prosperous at a time when the North was still only slowly settling down into peaceable pursuits. Industrial life was common in Italy when military life was almost the only type in France and England. Hence the great palaces which line the streets of Florence, Venice, and Genoa differ wholly in style from the castles of the same date in our Northern countries. Instead of being constructed for war and defence, such a house as the Pitti Palace at Florence is constructed for state and splendour in a peaceful city. Its broad façade, with open windows, its wide staircases, its long galleries, its splendid reception-rooms, are all widely different from the gloomy, menacing fronts, the narrow slit windows, the tortuous stairs, and the small dark chambers of a contemporary English castle. Living in such a world as this, passing a city life of wealth and security, and holding in their hands the trade of the civilised world, the Florentines and Venetians soon learned to develop high artistic tastes; and with enlightened criticism and patronage came, as usual, marked advance in handicraft. This forms one side in the origin of the Italian Renaissance.

The other side is supplied us by the industrial character of the people themselves. The Italians were not all soldiers, agriculturists, and blacksmiths, like the northern nations; they were workmen in every kind of industrial art. As builders of churches, palaces, and villas; as workers in gold and metal; as painters, decorators, and carvers of wood and ivory; as manufacturers of ecclesiastical ornaments; as makers of glass, pottery ware, and upholstery—the Italian handicraftsmen were always practising manual arts which easily led on to higher artistic pursuits. For all these crafts were performed throughout by hand. Machines were unknown, and every workman turned out all his work with his own fingers. Thus the mechanic was also to some extent an artist; and this was especially the case in the higher trades, such as those of the wood-carver, the brass-founder, and the goldsmith. Moreover, the mediæval religious spirit, attaching great importance to the internal decoration of churches, did much towards promoting the growth of art-handicrafts. Every cathedral, nay, every village church, was filled with frescoes and wall-paintings, with wooden crucifixes and images of saints, with bronze ornaments and stained glass windows. To this day, in Italy there is far more artistic handicraft than anywhere else in the world; in the Middle Ages, however, Italy not only supplied its own churches and palaces with all the decorations they required, but also exported works of art to every part of civilised Europe. Thus the growth of wealth and industrial society in Florence and other Italian towns naturally had for its first result an immense increase in the artistic impulse.

One other point must also be considered. Italy was growing more enlightened. While the North was still a mere rude battle-ground for conflicting military parties, as in our own Wars of the Roses, men in the South were beginning to read the old literature of Greece and Rome, and to think a little beyond the narrow circle of earlier mediæval thought. Hence their art began to be freer than of old—to go more directly to nature, and to emancipate itself more and more fully from the old, stiff, wooden conventionalisms of the Byzantine style. Giotto had begun this fresh departure in painting; and after his time it was continued by his successors. From age to age, and therefore more free in their scope of thought, and therefore more free in their artistic ideas. The great upward movement of the human intellect, which resulted in the Renaissance, in the revival of learning, and in the Protestant Reformation, had now set in, and art moved onward with the rest of the stream. When men's minds were daily expanding and widening, it was impossible for painting, sculpture, and architecture to remain at the early wooden stage in which even Giotto had largely left it. The world could see that these older works were yet far from having attained perfection, and new artists were ready to make further attempts towards the realisation of a better and more natural style.

In painting, the great master-art of all, the upward movement is very noticeable. The great painters of the fifteenth century belonged for the most part to Florence, Siena, and the other Tuscan cities, where wealth and consequent ease were more common than elsewhere, and where art therefore found the greatest stimulus and the most intelligent criticism. Not, of course, that mere patronage can ever produce great artists; but wherever there is the largest thoughtful and appreciative cultivated public, wherever the greatest number of people interest themselves in art, wherever the whole atmosphere is, as it were, steeped in artistic ideas, there will art naturally best flourish. Among purely commercial people, no amount of mere money reward or even of fame is sufficient to bring forth artists; but in communities like those of Italy in the fifteenth century, brought up from childhood to take an interest in all that pertained to painting or sculpture—born critics and connoisseurs from their very cradles—the production of great painters was as natural as the production of great inventors and engineers in our own industrial and mechanical nation. The Florentines took as naturally to art as the Manchester or Birmingham folk take to machines. Among them it was not a carefully tended exotic, but a part and parcel of the every-day life of every-day people. And as the Florentines grew in intelligence and developed in breadth of mind, their painting grew and developed with them. To such people, improvements in art were watched and fostered in somewhat the same way as improvements in railways, or telegraphs, or telephones are watched and fostered among ourselves.

Nevertheless, painting still remained tied down, for the most part, to sacred subjects. Its great employment was still in the decoration of churches, and it was usually practised in the form of frescoes on panels in walls, where the subject was largely subordinated to the necessities of space and the needs of decorative harmony or symmetry. In most Italian churches where these pre-Raffaelite pictures are preserved, they are found in particular bits of the wall, sometimes square or oblong, sometimes in round-topped arched niches, sometimes in triangular or irregular spaces. Here, two pictures will answer to one another in two corresponding corners of a side chapel; there, a fresco will be employed to decorate the otherwise blank space over a small shrine or a petty altar. In every case the painting is still largely subordinated to the architectural design, and its subjects are of course such as are fitted for churches, being ordinarily scenes from the life of the particular saint to whom the church or chapel is dedicated.

In spite of this restriction, however, there is a slow but decided increase in naturalness from the time of Giotto to the time of Lionardo. Anatomy is more and more studied: legs and arms and bodies are placed in simpler and more natural attitudes; and recourse is oftener had to living models and to the nude form. Instead of copying old fixed types, like the Byzantines, the Florentine artists of the fifteenth century began to take their ideas from life—from actual sitters then and there before them. Geometry and perspective were also more carefully attended to, though still for the most part as applied to human figures only, for the animal forms are yet very incorrect; there is little background, and what there is is chiefly architectural, while the few attempts at landscape, always as a mere accessory to back up the prominent figures, are very hard, mechanical, and badly drawn. The distant perspective is ill managed, and the mountains or trees are wooden-looking and unreal. The study of drapery, on the other hand, is well cared for, and the dress now begins to fall in natural folds, instead of standing stiffly, as if starched, around the figure. From the beginning of the fifteenth century onward, we find fidelity to nature and a correct rendering of details is more and more insisted on with every generation.

This naturalness of representation has one rather curious side to us moderns, accustomed as we are to a careful antiquarian rendering of every historical scene. If we nowadays wish to paint an incident from the Bible, we are particular to represent it with all the dresses and accessories as correctly reproduced as possible. If we paint Joseph before Pharaoh, we copy the Egyptian costumes from the temples of Thebes, and we lay the scene in a palace whose columns and decorations

are borrowed from those of Memphis. Or if we depict Esther and Ahasuerus, we go back for guidance to the monuments of Nineveh. But the mediæval Italian artist was troubled with no such scruples. He boldly and frankly transferred the scene to his own time and place. He represented the apostles or the prophets in the Florentine costume of the fifteenth century, and he dressed St. Elizabeth or St. Mary Magdalen in the robes of the ladies whom he saw about him. In other words, he chose some particular sitter who seemed to his fancy best to represent St. Paul or St. Cecilia, and then he painted the sitter, clothes and all, without any alteration. This frank habit of treating the past as present at least secured thorough naturalness and fidelity to life, instead of the stiffness and meaninglessness of the previous epoch.

There was another way, too, in which Italian art advanced greatly during this period, and that was in what is called "composition"—the grouping and arrangement of pictures. In the older style, the figures were for the most part stiff and solitary, in symbolical attitudes, not forming part of an action, or telling any story of their own. Giotto began to represent scenes from the New Testament and the lives of the saints in something like natural and speaking arrangement; he grouped his figures so that one could see at once what sort of story he wished to impress upon spectators. His successors carried out this tendency still further, and they also made great advances in the art of so disposing the personages as to produce a pleasing artistic effect.

Among the great painters of this transitional period, one of the most familiar names is that of Fra Angelico (1387—1455). A monk of Fiesole, he seems to have begun his artistic career as an illuminator of books, and to the last his style retained much of that careful, minute, elaborate workmanship which is characteristic of illuminations. He painted at Florence and Rome, and some of his best works are the frescoes in the convent of St. Mark, in the former town, and those in the chapel of Nicholas V. in the Papal palace of the Vatican. Our own National Gallery has two or three of his paintings, which very well exhibit the miniature-like character of his art. Fra Angelico, however, must be regarded as to some extent a survivor of the older school in its spirit, if not always in its technical detail. He was above all things a religious painter. He worked even as if under special inspiration, regarding his art as a gift from heaven, to be used for the glory of God; and his subjects are generally saints and angels, treated in an intensely devotional spirit, with much minute delicacy of drawing, but with a somewhat conventional use of gilding and halos. The evident earnestness of his work, and the intense beauty of his faces, redeems them from any tinge of earlier stiffness.

His younger contemporary, Masaccio (1402—1429), painted in a very different and much more modern style. While Fra Angelico was a conservative in his tendencies, clinging to the old decorative traditions of illumination, Masaccio was an innovator who went rather to nature herself for his ideas, endeavouring to represent scenes more as they might be conceived to have really occurred. His chief works are frescoes at Rome and Florence, representing Biblical scenes with much freedom and spirit, and with singularly little trace of conventionalism. He was also a great master of perspective, which he understood better than any of his predecessors, and his use of colour is good and effective.

Fra Filippo Lippi, another friar (1412—1469), and probably a student of Masaccio's works, carried on the movement started by his predecessors, and was one of a numerous school springing up about the middle of the fifteenth century in Florence and the other Tuscan towns. For though it is only possible to mention briefly the principal names, it must be borne in mind that painters, good and bad, abounded in Italy during all this period, and that most of them were gradually progressing onward towards the great ideals of the Renaissance. Filippo's pupil, Filippino Lippi (1460—1505), almost brings us down to the time of Lionardo and Raffael; indeed, they were to a great extent contemporaries. His paintings mark the gradual increase of naturalness, and also the predominance of what may be called a portrait style, in which the individual features of the model were copied with a certain hard fidelity to life—a want of idealisation, which makes the saints too closely resemble the more commonplace Florentines of his own time. This peculiarity is, perhaps, even more marked in Botticelli (1447—1515), who may be regarded as the last of the pre-Raffaelites. Originally, it is said, the apprentice of a goldsmith, he retained always something of that rather mechanical workmanship, which might be expected from his early training. Though his portraits have singular power and truthfulness as mere representations of human heads, they are wanting in ideality. The mediæval school had now done all that it could effect, and it needed to be waked up in some new direction by another fresh impulse, such as that which it had received from Giotto. This fresh impulse was given it by the great Renaissance painters, Raffael, Lionardo, and Michael Angelo; but the consideration of their work must be postponed till another paper.

COMPARATIVE ANATOMY.—V.

ACTINOZOA (RAYED ANIMALS).

So much was written about the radial arrangement of parts when treating of Cuvier's sub-kingdom Radiata, that it is unnecessary to dwell upon this plan of structure now that we have to describe the animals which best exhibit it. This arrangement, it will be seen, gives the name to the animals which are the subject of this lesson. It is, however, equally characteristic of the Hydrozoa. The *Cœlenterata*, which embraces both classes, are always radial in all their organs, and although it is not difficult to find a right and left side in many of these animals, this arrangement never entirely obliterates that pattern which we conventionally call star-like.

It is perhaps well to make some remarks here with regard to the places where, and the conditions under which these animals live. Technically, the place and conditions are called the habitat and station of a species. All the Cœlenterata, as we have observed, are inhabitants of the water, and all the Actinozoa are confined to the sea. Until we become acquainted with the lower and the lowest animals, we are apt to conclude that the conditions under which we live are those most favourable to life. Admirably adapted as the human body is to perform all the functions of life, man treads the solid earth and breathes the fluid air, furnished with senses and powers which enable him to escape the manifold dangers and to provide against the constant changes of aërial life, and he does this with such ease that he forgets entirely that he is living under difficult conditions, over which it is only his superior organism gives him the mastery. Whenever the most experienced swimmer or diver takes a "header" into the sea, he leaves behind him the better part of all his perceptive and locomotive powers. The eyes and ears seem muffled, and locomotion becomes a struggle in which he is conscious of wasted power, producing insignificant results. Helpless when thrown upon the ocean, he succumbs at once when plunged beneath its surface. Hence it is not at all unlikely that he should consider the air as the vital fluid and the water the abode of death. The landsman thinks of the continent as abounding with life, and rich with the forms of beauty to which life gives origin, but he thinks of the ocean as a waste, desolate and void. Of course the slightest reflection and knowledge would remove this extreme idea. Our fisheries, maintaining their ground as sources of wealth and means of employment, when the chase of all land animals has ceased to be remunerative, proclaim to the economist, though he be no naturalist, that the water, rather than the land, gives shelter to living beings. Nevertheless, few people sufficiently recognise that the converse of the common notion is correct. Life is far more easily maintained in water than in air. Structures which could not support their own weight in air may be locomotive organs in water, urging the body to which they are attached—slowly, it is true, but effectively—through a medium which, though of greater resistance, presses equally on all parts. Delicate and feeble organs, which would collapse in air, are floated forth in water to subserve the touching, or even the seizing function. Moisture, which is so necessary to almost all the organs, and to the performance of almost all functions, has not to be retained and husbanded with care and contrivance, but laves the whole body. As a striking instance of the importance of this last consideration, it may be stated that the respiration of any animal can only be maintained by having a moist membrane

the *Persons on whose account* the bills have been accepted, and collect the sums of all those accepted on the *same person's* account into one amount as before; and if bills have been accepted on *only one person's* account, make *that person Dr. to Bills Payable.*

The next book to be journalised is *the Day-Book.* As the form of the entries in the *Journal* is similar to that of the entries in the *Day-Book*, there are, in general, no other changes made upon the latter entries in transferring them from the one book to the other, than those which an abridgment or a condensation of entries by means of combination is naturally suggested to the Bookkeeper from their exact similarity. This abridgment or condensation is made in three ways:—1st. When the *same account is debited* to a number of different accounts at different dates of the same month; then make *that account Dr. to Sundries* for the amount of all the sums thus entered, specify the name of *each account*, and collect all the sums belonging to each account into one amount. 2nd. When a number of *different accounts* are *debited* to the *same account* at various dates of the same month; then make *Sundries Dr. to that Account* for the amount of all the sums thus entered, specify the name of *each account*, and collect all the sums belonging to each account into one amount, as before. 3rd. When the *same* two accounts are found in several entries, having the same relation to each other as *Dr.* and *Cr.*, and at different dates of the same month; you then make a single entry of the whole, and collect all the sums of the different entries into one amount. In these various cases of abridgment or combination, arrange the dates and the sums which belong to each *Specified Account*, in the proper columns of the *Journal* and in the same line with the name of each account, placing the latest date in a line with the first name or word in the combined entry, and the whole amount of all the sums in a line with the name of the general *Dr.* or general Cr. in the entry. The commencement of each month in the *Journal* is distinctly shown by writing the name of the month and the year across the page, in a space extending from side to side. The dates are inserted in a vertical column to the left hand of each page; and parallel to this column is one intended for the folio of the *Ledger* when the entries of each name and sum are posted into that Book. The numbers denoting the folios should be entered in this column of the *Journal* when these particulars are entered in the *Ledger*, *but not till then;* the absence of a folio figure in its proper column opposite the name of any account will then indicate that an entry has been omitted; and the absence of all such figures will indicate that the entries without them have not yet been *posted into the Ledger.*

In keeping Books by Double Entry, the various accounts which are opened in the *Ledger* correspond, of course, exactly to the nature of the transactions which occur in the business. In general, however, their object is threefold, as formerly stated in our third Lesson, viz.: The *Property* Accounts, the *Personal* Accounts, and the *Profit and Loss* Accounts. In the same Lesson rules were given for finding the *Debtor* and *Creditor*, and making the proper entry in every variety of transaction. As a general rule, in opening these accounts in the *Ledger*, it is both usual and proper *first* to open those accounts which are called *Property* Accounts, such as *Stock Account*, which represents the capital employed in a Merchant's business; and *Private Account*, which represents the Merchant himself and contains all the moneys abstracted from the business on his own *personal account*, and which, in the old Italian system—a system not remarkable for its simplicity—used to be entitled *Household Expenses.*

The *Property Accounts* which follow these are generally *Cash Account* and *Petty Cash Account*, the names of which sufficiently indicate their nature, and the transactions which must be ranged under these heads. Then follow the Accounts of *Bills Receivable* and *Bills Payable;* and here it may be useful to observe that, in order to prevent mistakes, these should be put in different folios of the *Ledger.* Next may follow *Goods Accounts* of various kinds, such as *Cotton Account*, *Flannel Account*, *Cloth Account*, or the account of any other article in which the Merchant happens to deal. It is important to remember the order in which these accounts come.

After the *Property Accounts* are opened in the *Ledger*, then follow the *Personal Accounts*, or the names of those persons with whom a Merchant deals, whether in buying or selling Goods, Lending or Borrowing Money, and acting as Agent or otherwise. Lastly, are opened the *Profit and Loss* Accounts, or those in which the *Loss or Gain* by certain transactions are at once rendered manifest from their nature; such as *Interest*, (including *Discount*), *Charges*, *Commission*, etc. Besides these, the general *Profit and Loss Account* itself is also opened, as a receptacle for a proper statement of all the *Losses* and *Gains* in business not classified under particular heads, and as a proper account for exhibiting at the end of any given period the actual state of a Merchant's business in respect of his real *Gains* and *Losses* on all the other accounts which have been opened in the *Ledger.* Although this explanation sounds intricate, it will be mastered with a little care.

In posting the entries from the *Journal* into the *Ledger*, it is plain that whatever the Journal says in any entry, the *Ledger* must say the *same thing*, sometimes in the same form, sometimes in a different form; but in Double Entry, this *same thing* must always be said *twice*, namely, *once* on the *Dr. side* of the *Debtor's Account*, and *once* on the *Cr. side* of the *Creditor's Account.* Let us illustrate this principle by some examples: *First*, suppose that the following entry occurred in a Merchant's *Journal*, and in the following form:—

Date.	Fol.	March, 1863.	Dr. £	s.	d.	Cr. £	s.	d.
3		Richard Watson, *Dr.*	100	6	8			
		To Cotton Account				100	6	8

This entry, single in the *Journal*, must be entered *twice* in the *Ledger*, viz., *once* on the Dr. side of Richard Watson's Account, and *once* on the Cr. side of Cotton Account; here, the word *Dr.* clearly points out the *Debtor*, and the word *To* points out the *Creditor.* These entries in the Ledger would be as follows:—

Dr. RICHARD WATSON. *Cr.*

1863.			£	s.	d.				
March	3	To Cotton Account . . .	100	6	8				

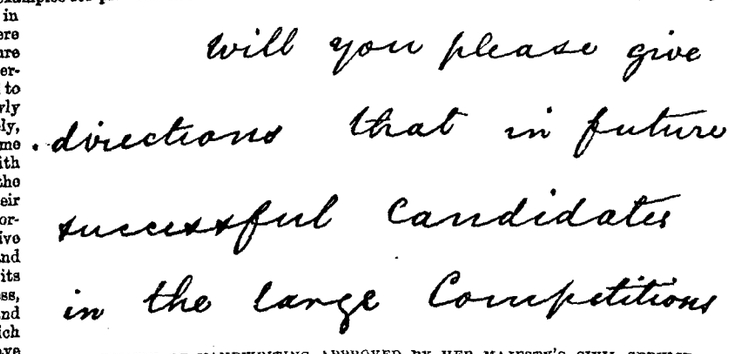
Dr. COTTON ACCOUNT. *Cr.*

						1863.			£	s.	d.
						March	3	By Richard Watson . .	100	6	8

LESSONS IN PENMANSHIP.—XXVII.

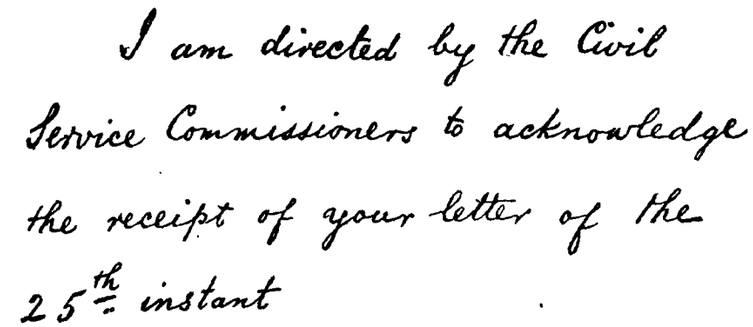
OFFICIAL HANDWRITING.—I.

In our early lessons in Penmanship—after giving the necessary preliminary instructions for regulating the position of the hand, arm, and body when engaged in writing, and the proper mode of holding the pen—we furnished the learner with ample details respecting the formation of the small letters of the writing alphabet, and brought him forward on his way, step by step, until he was able to write words and sentences involving the introduction of capital letters and figures. The copy-slips set before him, as examples for practice and illustrations of all that was advanced in our lessons, were of such a nature that he was perforce compelled to copy them slowly and deliberately, in order to become acquainted with the forms of the letters and their relative proportions, and to give each up-stroke and down-stroke its proper thickness, inclination, and curvature, which he could not have done had he attempted to execute his task with the rapidity with which writing of an ordinary kind is written.



SPECIMEN OF HANDWRITING APPROVED BY HER MAJESTY'S CIVIL SERVICE COMMISSIONERS.—NO. 1.

In order to write legibly, the first and most essential step is to acquire the habit of forming the letters of the writing alphabet correctly; copying each letter, whether singly or in combination with others, with the utmost care, and writing it slowly so as to gain sufficient time to note the shape of every part of it and its direction before imitating it with the pen or pencil. This degree of *proficiency* in writing, the only safe and sure basis and foundation of a clear and legible hand, we may fairly suppose all to have attained, who have been endeavouring to teach themselves how to write by means of the instructions given in our previous lessons. Having got thus far, it will now be necessary for them to endeavour to write rapidly as well as clearly, taking care, however, that they do not sacrifice legibility and plainness in causing the pen to move over the paper with too great a degree of quickness. And here it is necessary for us to say, that although we have done as much as is possible to give each learner the clearest instructions for making the letters of the writing alphabet, the ultimate formation of his handwriting, or, in other words, the adoption and acquirement of certain distinctive peculiarities that will eventually give a special character to his writing as he gradually becomes less and less of a mere copyist, imitating in every detail the set shape, inclination, and curvature of the letters set before him, must rest entirely with himself. His handwriting must be based, it is true, on the instructions we have given, and the more closely he adheres to them the more legible his writing will be. But having helped him thus far on his way, the rest remains entirely with himself; the best and only thing indeed that we can do to aid him in the acquirement of a distinctive and characteristic form of handwriting being to place before him models, consisting of various styles of writing, that have been approved by persons who are competent judges of what is desirable in handwriting calculated for the government office, the solicitor's desk, or the merchant's counting-house.



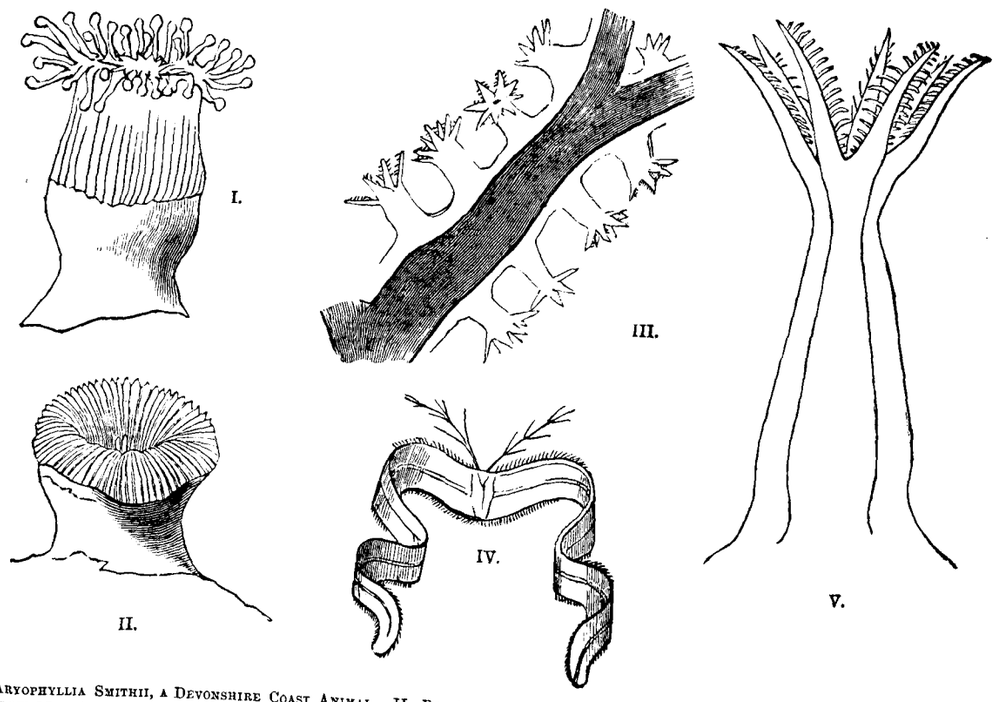
SPECIMEN OF HANDWRITING APPROVED BY HER MAJESTY'S CIVIL SERVICE COMMISSIONERS.—NO. 2.

As many of our readers are doubtless desirous of entering the Civil Service, and are anxious to know what style of writing will be deemed satisfactory by the examiners appointed to test the qualifications of candidates, we bring under their notice, in the present lesson, two specimens of official handwriting which have met with the approval of Her Majesty's Civil Service Commissioners, and of which we have their kind permission to give the accompanying fac-similes. We append an extract from the report itself, from which, aided by a careful study of the accompanying specimens of handwriting, our readers will be able to form a clear idea of what is required of candidates for the Civil Service, as far as writing is concerned.

"In our former reports," say the Commissioners, "we have observed upon the importance which we attach to good handwriting, as one of the most useful accomplishments which a clerk can possess, and one which any young man has it in his power to acquire. We believe that the effect of our examinations has been, upon the whole, to improve the general style of writing for official purposes. There is, however, room for much further improvement. In consequence, probably, of the insufficient attention paid to the subject in schools, the quantity of bad handwriting which comes before us is still very great; and we are therefore unable, without causing inconvenience to the public departments, by delay in supplying vacancies, to enforce so high a standard in this respect as we should desire. It is almost superfluous to state that we do not demand or desire that the writing should be of any particular *style*, provided that it possesses the main characteristic of legibility. What we require, as candidates are invariably informed, is 'the clear formation of the letters of the alphabet.'"

Speaking of the accompanying specimens of official writing, which are fac-similes of documents written in one of the public offices, the Commissioners further say, "Representing, as they do, the ordinary current work of the writers, they are not given as free from faults; but we think that they will show that the essential quality of distinctness may be obtained without the sacrifice of other desirable elements of a good official hand."

with the fluids of the body on one (internal) side, and oxygen on the outer side. These are the necessary conditions of respiration, and therefore of life. Now the water contains a sufficient amount of oxygen for the purposes of respiration dissolved in it, and the other condition—namely, the moisture of the membrane which contains the nutritive fluid of the body—is maintained in the water-animal without any contrivance whatever. Hence the exterior of the body, or a lobe or leaflet protruded into the water around, is quite sufficient to enable water-animals to breathe. On land it is different. The higher animals must have elaborate contrivances to maintain the moisture of the respiratory membrane. It must be placed internally, lest the external air and wind should carry off the moisture. It must be confined to small cavities, lest their large capacity should incommode the animals, and being thus limited the membrane must be folded elaborately to increase its area.



I. Caryophyllia Smithii, a Devonshire Coast Animal. II. Dry Coral of Caryophyllia Smithii. III. Diagrammatic Section, showing how red coral is secreted. IV. Cestum Veneris (Venus's Girdle), a Ctenophore. V. One of the Polypes of Alcyonaria.

In animals where these contrivances are not found, or not found in efficient condition, life in the air is difficult to maintain. Such animals are always in danger of being dried up. Thus the toad must keep to his dark, moist hole. The grey slug never comes out but at night, and the black slug only after rain. It is, in fact, scarcely too much to say that the water is both the home and the cradle of life. Not only are all the lower animals aquatic, but the lower forms of many of the higher classes are so too. Both zoology and geology proclaim this fact. Life teems in the ocean. Its countless myriads of forms people the main and crowd up even to the coast-line, despite the dangers of the beach. Every sweep of the entomologist's water-net in a fresh-water stream takes some living thing, and every drop of water contains countless animals. Though Nature is redundant of forms everywhere, yet this could scarcely be said of earth or air. With extreme difficulty do animated forms seem to have made conquest of the earth and air. Their mother country, their arsenal where they prepared and armed themselves for the expedition, was the water. Insects, more than any other living things, are at home in the air, but many of them pass their earlier stages, when they are feeble and need protection and easy conditions of life, in the water. The crust of the earth contains multitudes of animal remains, but the aquatic forms outnumber the aërial in an almost unlimited proportion. Further, the first forms found in the earliest strata are water-animals, and we have good reason to believe that fish existed before reptiles, birds, or brutes.

In conformity with the preceding remarks we find and have found that, in tracing upward the grades of the animal kingdom, we have not yet arrived at any animals suited for an aërial existence. Their parts are not sufficiently differentiated for such a life. With regard to many of the Cœlenterata, if placed where the water drains away from them they fall to pieces, or sink into a semi-fluid slimy condition, never to be restored to their original form.

The type of the class Actinozoa, which occupies the same relation to the rest of these animals that the simple hydra does to the Hydrozoa, is the common sea-anemone (*Actinia mesembryanthemum*). This animal has already been described, and its structure may be so well understood by looking at the diagram of its vertical and horizontal sections given in the illustration attached to the last lesson, that we need not refer to it further.

The common sea-anemone is wholly soft, but some of its near allies exhibit a tendency whose results are very complicated and interesting. This tendency is to deposit either externally or in the substance of their tissues carbonate of lime, which, being of the same nature as marble, is hard and enduring. This encrustation forms both a protection and a support to the otherwise soft animals, so that they can not only endure but enjoy the buffeting of the great surface billows of the ocean. Actinozoa of this kind are not so common in England as in the tropical seas, but the Devonshire coast furnishes the little coral-secreting animal represented in the engraving (Fig. I.). When this tendency to deposit a hard structure of carbonate

of lime is associated with the tendency to grow, and branch, and bud, which we have remarked in the Hydrozoa, the two united tendencies produce those most beautiful forms we call corals. Very various are the forms assumed by corals. One is called *Fungia Agariciformis*, or the mushroom-like coral, on account of its resemblance to that fungus. The likeness, however, is rather to what the mushroom would be if deprived of its stalk and the upper part of its dome, than what it really is. Another is called the brain coral, from the very much closer resemblance which it bears to the brain of a man, being grooved into sinuous channels just like those channels which are called the convolutions of the brain. Other forms are branched like a stag's horn, or spread out like a fan. A thousand different modifications are found, but each is made up of almost the same elements. Each element is almost identical with the hard part of the little English coral represented in the engraving (Fig. II.) as stripped of its soft parts. Each consists of an outer cup with plates developed from its walls, and stretching inwards as they grow towards a central part, where, when the soft parts existed, the stomach was situated, lying immediately under the central mouth. The great specific differences are the results of the manner in which budding takes place from the original parent element: as, for instance, whether the buds spring from the side wall, or from the disc between the mouth and tentacles; whether a great many are formed at the same time, or only two, or one, at once; whether they sprout out at a small or large angle, etc. etc.

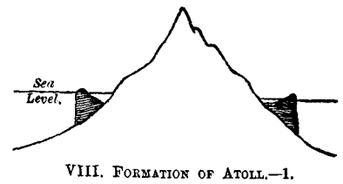


VI. An Atoll, or Circular Coral Island, with a Lake in the centre.

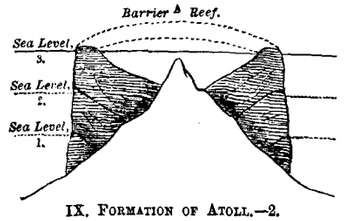


VII. Fringing Reefs.

All the forms hitherto referred to belong to one order called the Zoanthoria, or animal flowers. These are the only corals which have stony partitions developed from those membranes which, running from the stomach wall to the body wall, are called septa. A curious numerical law applies to these septa. However many of them there may be, and there are sometimes hundreds of them, they always are in some multiples of 5 or 6. This is always true, although their numbers are continually increasing as the animals develop in size. This results from the fact that in those animals where, for instance, 6 is the dominant number, whenever one new septum is developed it is always accompanied by five others at least, or if more than five then eleven others, making six or twelve in all. In the first instance, six are developed at equal distances round the wall. These six compartments are, in the next stage, each divided by six other septa. Then the twelve new compartments so formed are divided by the development of twelve new septa. At this stage it seems as though the animal, seeing no end to this kind of multiplication, refused to develop more than twelve at a time, so that all the chambers cannot be bisected at once, but only some of them. Nevertheless, so regular are the vital forces in their action that M. Milne Edwards has given a number of laws by which it may be predicted where the next septa will appear. These laws are too complicated to be given here. If the reader should be fond of wandering at the edge of the sea at ebb tide, in many parts of our coasts he will be almost sure to find some orange or yellow masses whose size and form will remind him of the roots of ginger. The livid appearance of these, together with their soft fleshy feel, has earned for them the cognomen of dead-men's fingers. If, however, these be placed in an aquarium, they put out, from all parts of their surface, little flower-like heads. Each of the heads is crowned with eight tentacles arranged in the form of a star, and each of these is fringed with secondary tentacles. In most other respects they resemble the Zoanthoria, but they are cut off from them by two other marked differences. All their parts are in multiples of 4, and their membraneous partitions never secrete hard septa. Sometimes, however, they develop tubular corals, which after budding from a common stock send out from the outsides of these tubes lateral platforms, which unite and support the several tubes. The parallel tubes so supported look not unlike organ pipes, or those reed instruments which are fixed under the mouth of that musician who so generally accompanies Punch and Judy. In consequence of this resemblance the animal which forms them is called *Tubipora musica*.



VIII. Formation of Atoll.—1.



IX. Formation of Atoll.—2.

The more general habit, however, is for the animals to secrete from their bases only. Nevertheless, this secretion is so managed as to raise the compound animal from the rock on which it grows. These animals put forth buds from the circumference of their basal discs, and thus a number of these polypes are placed horizontally with their bases united, so as to enclose an elongated hollow in which they secrete the dense, hard, and sometimes beautiful and branching coral. The red coral obtained from the coasts of Italy, which is so much prized for the manufacture of ornaments, is of this nature. Another family of the same order pro-

LESSONS IN GREEK.—II.

VOWELS, CONSONANTS, PUNCTUATION, ETC.

THE Greek alphabet, consisting of four-and-twenty letters, is made up of seven vowels and seventeen consonants. The vowels are *a*, *ε* (*η*), *ι*, *ο* (*ω*), *υ*. According to their quantity, long or short, they may be divided thus:—

VOWELS.

Short.	*Long.*	*Doubtful.*
ε̆, *ŏ*.	*η̄*, *ω̄*.	*ᾰ́*, *ῐ̆*, *ῠ̆*.

By "doubtful" is meant, that the vowels so termed are sometimes short and sometimes long: which they are, in any case, is learnt by usage, particularly by the usage of the poets.

By a union of vowels we produce

THE DIPHTHONGS.

αι, *αυ*.	*ει*, *ευ*.	*οι*, *ηυ*.	*υι*, *ου*.

Besides these there are the improper diphthongs, formed by *α*, *η*, or *ω*, and the iota *subscriptum*, or written under, as *ᾳ*, *ῃ*, *ῳ*. Both the proper and the improper diphthongs are long, or, in other words, receive the stress of the voice in pronunciation.

When two vowels commonly pronounced as one sound (a diphthong) are pronounced separately, a *dizeugsis* (separation) is produced, which is denoted by two dots set over the second vowel; as, *εϊ*, *οϊ*, *αϋ*.

The consonants are divided, first according to the organs chiefly employed in pronouncing them. Thus, in uttering some, we use the palate or upper part of the throat; these are termed gutturals (Latin, guttur, *a throat*). Others are designated labials, being such as come mostly from the lips (Latin, labium, *a lip*). Others, again, bear the name of linguals, from Latin, lingua, *a tongue*.

CONSONANTS.

Gutturals.	*Labials.*	*Linguals.*
κ, *γ*, *χ*.	*π*, *β*, *φ*, *μ*.	*τ*, *δ*, *θ*, *λ*, *ν*, *ρ*, *σ*.

Another division arises according to the different manner in which the organs of speech act in their formation. Thus we obtain

The semi-vowels or liquids, *λ*, *μ*, *ν*, *ρ*; the sibilant or hissing sound, *σ*; the mutes, *π*, *κ*, *τ*, *β*, *γ*, *δ*, *φ*, *χ*, *θ*.

These nine mutes are also divided into three gutturals, three labials, and three linguals. In this division regard is had to the organs of speech. If, however, we give attention to the predominant sound, then we classify these nine mutes thus:—1, those of the *k* sound; 2, those of the *t* sound; and, 3, those of the *p* sound. Once more, they may be considered according to the force or hardness of the utterance, and be separated into three soft, three hard (or middle), and three aspirated. The whole is presented in this tabular view of

THE CONSONANTS CLASSIFIED.

	Soft.	*Hard.*	*Aspirated.*	
Gutturals	*κ*,	*γ*,	*χ*,	K sound.
Linguals	*τ*,	*δ*,	*θ*,	T sound.
Labials	*π*,	*β*,	*φ*,	P sound.

From a union of the mutes with the sibilant *σ* there are produced these

DOUBLE CONSONANTS.

ψ (ps	Psi)	formed of	*πσ*,	*βσ*, *φσ*.
ξ (x	Ksi)	,,	*κσ*,	*γσ*, *χσ*.
ζ (z	Zeta)	,,	*δσ*.	

Sometimes a vowel at the end of a word or syllable, standing before another vowel which begins a word or syllable, is elided or struck out, when we produce what is termed elision (Latin e, *out of*, and lædo, *I dash*). Instead of the elided vowel, an apostrophe ' is put. Elision takes place in all the prepositions except *περι* and *προ*. When prepositions are compounded with verbs that begin with a vowel, the apostrophe is not used; thus, *απ' οικου* is the elided form of *απο οικου*, and *απεφερον* is the elided form of *απο-εφερον*.

When, however, the two vowels thus coming the one before the other, are melted or blended together, so as to form one long syllable or diphthong, what is grammatically called crasis (Greek, *a mixing*) takes place. Thus *το εκος* by crasis or krasis becomes *τουκος*. By resolving the double vowel into its component parts—that is, by the inversion of crasis or by dissolution—you obtain the two words entire; so *τουκος* becomes *το εκος*; also *ταγαθα* becomes *τα αγαθα*.

The Greeks paid great attention to euphony, or pleasing sound. Consequently they studied to prevent two vowels from coming into immediate succession, so as to cause an hiatus or stoppage of the flow of the sound—such a stoppage as would take place, if instead of saying *an* hiatus (Latin, *a gaping*), we were to say *a* hiatus. To avoid this unpleasant suspension of the breath, we, in English, convert *a* into *an*. In the same way, and for the same purpose, the Greeks employed an *ν* at the end—

1. Of the dative plural in *σι*, and adverbs of place ending in *σι*: as, *πασιν ελεξα*; *ἡ Πλαταιασιν ἠγεμονια*.
2. Of the third person singular and plural ending in *σι*, as *τυπτουσιν εμε*; *τιθησιν εν τῃ τραπεζῃ*; also with *εστι*, as *εστιν εμοι*.
3. Of the third person singular in *ε*, as *ετυπτεν εμε*.
4. Of the numerals, as *εικοσιν ανδρες*; but not always; therefore we find also *εικοσι ανδρες*.

Regard to euphony also led the Greeks to drop the *σ* in the adverb *ουτως* before a word beginning with a consonant: thus, *δυτως εποιησεν*; but *δυτω ποιεω*.

Thus the preposition *εκ*, as in *εκ της ειρηνης*, becomes *εξ* before a vowel, as *εξ ειρηνης*.

The same practice obtains in the negative *ουκ* (not, no), as *ουκ αισχρος*, *ου καλος*; also, *ουχ ἡδυς*. In the last example the aspirate in *ἡδυς* requires the aspirated form of *κ*, that is *χ*, immediately before it, for in Greek only letters of the same kind go together, that is, a soft sound with a soft sound, a hard with a hard, and an aspirated sound with an aspirated sound. But of this matter I shall have more to say by-and-by.

The points employed in punctuating Greek are few; by the original writers points were not at all used. The comma, the period, and the note of exclamation are employed as in English. What with us is called the semicolon is used in Greek as a note of interrogation; and the colon is one dot placed at the top of the word, thus—

Colon · Ει ελεξας·
Period . παντες ὡς ὡμολογησεν.
Interrogation ; τις ταυτα εποιησεν;

PRELIMINARY INSTRUCTION IN THE VERB.

Before I proceed to treat of nouns I must say a few words respecting the verb, inasmuch as without some knowledge of the verb you will be unable to form sentences, as I intend you should from your earliest acquaintance with the Greek grammar. Parts of the verb *ειναι*, *to be*, are indispensable. I here put down such as you will want, together with the corresponding English, or what is commonly called "the meaning."

PARTS OF THE VERB ειναι, TO BE.

ειμι, I am.	*εις* or *ει*, thou art.	*ισθι*, be thou.
εστι, he, she, *or* it is.	*ην*, he, she, *or* it was.	*εστω*, let him be.
εισι, they are.	*ησαν*, they were.	*εστε*, be ye.

Observe that *εστι* and *εισι* become *εστιν* and *εισιν* before a word beginning with a vowel.

Observe also that the Greek *εστι* is the Latin *est*, and the English *is*.

In the Greek language verbs have three voices, whereas in Latin and in English verbs have only two. If in English I say *I strike*, I express myself in what is called "the active voice;" but if I say *I am struck*, I express myself in what is termed "the passive voice." These two voices exist in Greek thus—

Active.	*Passive.*
τυπτω, I strike.	*τυπτομαι*, I am struck.

Here you observe that the passive is made by adding to the root *τυπτ* the suffix *ομαι*, instead of the letter *ω*, by which the first person singular of the active is formed.

The Greeks have a third voice. In the present tense this voice is not distinguished in form from the passive; being the same word *τυπτομαι*. In signification, however, the third voice differs from the active and the passive. This third voice, under the name of *the middle voice*, denotes a reflex action, that is, an action which turns back on the agent or actor, as *τυπτομαι*, *I beat myself*.

Commit thoroughly to memory this table of *βουλευω*, *I advise*, which contains such parts of the verb as you are likely to want in learning to form the nouns, the adjectives, etc.

INDICATIVE MOOD.

		Present Active.	*Present Passive.*
S.	1.	*βουλευ-ω*, I advise.	*βουλευ-ομαι*, I am advised.
	2.	*βουλευ-εις*, thou advisest.	*βουλευ-ῃ*, or *ει*, thou art advised.
	3.	*βουλευ-ει*, he advises.	*βουλευ-εται*, he is advised.
P.	1.	*βουλευ-ομεν*, we advise.	*βουλευ-ομεθα*, we are advised.
	2.	*βουλευ-ετε*, you advise.	*βουλευ-εσθε*, you are advised.
	3.	*βουλευ-ουσι* (*ν*), they advise.	*βουλευ-ονται*, they are advised.

IMPERATIVE MOOD.

1.	*βουλευ-ε*, advise thou.	*βουλευ-ου*, be thou advised.
2.	*βουλευ-ετε*, advise ye.	*βουλευ-εσθε*, be ye advised.

INFINITIVE MOOD.

βουλευ-ειν, *to advise*.	*βουλευ-εσθαι*, to be advised.

The *middle* signification is sometimes best rendered by another word; thus, instead of saying, *I advise myself*, we may say, *I consult*, or *I take advice*.

Observe how these several changes in the terminations are produced. The stem, or permanent form of the word, is *βουλευ*. To *βουλευ*, the endings, *ω*, *εις*, *ει*, *ομεν*, *ετε*, *ουσι*, are added, according to the person and number you may wish to form. Thus, to form the *infinitive active*, corresponding with our English *to advise*, you add *ειν* to *βουλευ*, and so produce *βουλευ-ειν*. If you wish to put into Greek our *advise thou*, you add *ε* to *βουλευ*, and so produce *βουλευ-ε*, the second person singular of the imperative mood. You proceed in the same way with any other verb. In order to make the matter clear, I put the endings here apart from any verb:—

PERSON-ENDINGS.

INDICATIVE MOOD.

		Present Active.	*English Sign.*	*Present Passive.*
Sing.	1.	*ω*	I	*ομαι*.
	2.	*εις*	thou	*ῃ*, or *ει*.
	3.	*ει*	he	*εται*.
Plur.	1.	*ομεν*	we	*ομεθα*.
	2.	*ετε*	you	*εσθε*.
	3.	*ουσι*	they	*ονται*.

IMPERATIVE MOOD.

Sing.	*ε*	thou	*ου*.
Plur.	*ετε*	ye	*εσθε*.

INFINITIVE MOOD.

	ειν	to	*εσθαι*.

VOCABULARY.

Αγαν, too much.	*Εσθιω*, I eat, consume	*Μη* (*with imperative, Latin* ne), not, do not.
Αει, always (*English aye*).	*Εχω*, I have; *εχει*, *with an adverb*, it is; as *ευ εχει*, it is well.	*Οδυρομαι*, I complain, bewail.
Αληθευω, I am true, I speak the truth.	*Ἡδεως*, sweetly, pleasantly.	*Ου* (*before consonants, ουκ or ουχ before vowels*), not, no.
Ανδρειως, bravely.	*Θαυμαζω*, I admire.	*Παιδευω*, I educate.
Αριστευω, I am the best, I excel.	*Και*, and.	*Παιζω*, I play.
Βιοτευω, I live.	*Κακως*, badly, ill.	*Πινω*, I drink.
Βλακευω, I am idle, luxurious.	*Καλως*, well, beautifully.	*Πιστευω*, I believe.
Γραφω, I write.	*Κολακευω*, I flatter.	*Σπευδω*, I hasten, strive after.
Διωκω, I pursue, strive.	*Μαχομαι* (*with dative*) I fight (*middle voice*).	*Φευγω*, I flee (*Latin* fugio).
Ει, if.	*Μετριως*, moderately.	*Ψεγω*, I blame.
Επομαι, I follow (*middle voice*).		

EXERCISE 1.

1. *Αει αληθευε*. 2. *Χαιρετε*. 3. *Επου*. 4. *Μη οδυρεσθε*. 5. *Ἡδεως βιοτευω*. 6. *Καλως παιδευομαι*. 7. *Καλως γραφεις*. 8. *Ει κακως γραφεις, ψεγῃ*. 9. *Σπευδει*. 10. *Ανδρειως μαχεται*. 11. *Ει κολακευετε, ουκ αληθευετε*. 12. *Ει κολακευεις, ου πιστευῃ*. 13. *Φευγομεν*. 14. *Ει φευγομεν, διωκομεθα*. 15. *Κακως φευγετε*. 16. *Ει βλακευτε, ψεγεσθε*. 17. *Ει ανδρειως μαχεσθε, θαυμαζεσθε*. 18. *Ει κολακευουσιν, ουκ αληθευουσιν*. 19. *Ου καλως εχει φευγειν*. 20. *Καλως εχει ανδρειως μαχεσθαι*. 21. *Ει διωκῃ, μη φευγε*. 22. *Ανδρειως μαχου*. 23. *Ει βλακευουσι, ψεγονται*. 24. *Ει αληθευεις, πιστευῃ*. 25. *Αει αριστευετε*. 26. *Μετριως εσθιε και πινε και παιζε*.

EXERCISE 2.

1. I am true. 2. Thou art true. 3. He is true. 4. We are true. 5. You are true. 6. They are true. 7. If I speak the truth, I am believed. 8. Do not fight. 9. They fight. 10. Follow ye. 11. Thou followest. 12. Ye follow. 13. He plays. 14. They fly. 15. If they flee, they are pursued. 16. I am admired. 17. They are admired. 18. If they are idle, they are not admired. 19. It is well to fight bravely. 20. Eat and drink moderately. 21. They do not hasten. 22. If thou flatterest, thou art not admired. 23. He writes well. 24. They write badly. 25. It is well to be always the best. 26. You live moderately. 27. They eat too much.

I will now give you some directions as to these exercises. First, then, you must repeat each word in the vocabulary until you have impressed it indelibly upon your memory. Then proceed, with the aid thus gained, to translate the Greek sentences into English, and put the English words into their corresponding Greek words, paying due regard to the model or pattern given you here and in other cases. In translating from the one language into the other, you may derive aid from consulting the Greek and the English as given in the exercises; that is, if you are translating from Greek into English, consult the exercise given in English, finding the example most like the one you have to translate; and if you are translating from English into Greek, then in the same way consult the exercise given in Greek. Be not in haste to advance, but be very careful to do everything thoroughly; make every first step sure before you attempt to take a second step. Bear in mind the Latin proverb "festina lenté," *hasten slowly*; in English, "slow and steady wins the race." Do not be content with writing an exercise once, write it again and again; and when you think you have made it quite correct, then commit it to memory.

The Greek is a language in which compounds are readily and copiously formed. The Greek may, in consequence, be acquired with comparative ease, provided the student is trained in the formation of the compounds. The necessary instructions I shall endeavour to impart. With this view I shall supply lists of words etymologically connected with those which are given in the vocabulary. A knowledge of one word will thus become to the learner a knowledge of several. Let us take, as an instance, the verb *βουλευω*, the present tense of which stands above. *Βουλευω*, *I advise*, comes from *βουλη*, *advice* or *counsel*; *βουλη* leads to *βουλεια*, *the dignity or office of a counsellor*; thence we derive *βουλειον*, *a council-house*; *βουλευμα*, *a determination*; *βουλευτης*, *a counsellor*; *βουλευγορεω*, *to speak in a council*; besides other terms. These words are again modified in meaning, as well as multiplied by means of prepositions; *e.g.*, in combination with *συν*, *with*, *βουλη* forms another set of terms, as *συμβουλευμα*, *a resolution*; *συμβουλευσις*, *the communication of a resolution*; *συμβουλευτης*, *a joint counsellor*; *συμβουλευω*, *I give counsel*; *συμβουλος*, *a senator*. It would be easy to extend this list. But without going further, here are eleven words connected in origin, form, and meaning with one word. When, then, you know that one, you have a key to all the rest. With a few roots, you thus see, you would soon become master of a copious vocabulary; and as the roots of the language are not numerous, the acquisition of it, when rightly studied, is by no means a very difficult task.

N.B.—The roots will be printed in capitals. Let the Etymological Vocabulary, no less than the above Vocabulary for the Exercises, be thoroughly committed to memory.

ETYMOLOGICAL VOCABULARY.

ΑΛΗΘΗΣ, true.	ΑΡΙΣΤΟΣ, best.	*Αριστοκρατεια*, government of the best, aristocracy.
Αληθευω, I am true.	*Αριστευω*, I am best *or* first.	ΒΙΟΣ, life.
Αληθεια, truth.	*Αριστοφυης*, of the best nature.	*Βιοτευω*, I live.
Αληθευσις, truthfulness.	*Αριστομαντις*, the best soothsayer.	*Βιοσσοος*, life-saving.
Αληθινολογια, truth-speaking.	*Αριστοπονος*, an excellent labourer.	*Βιοτεια*, the art of life.
Αληθινος, true, genuine.	*Αριστοτεχνης*, an excellent artist.	*Βιοφθορια*, a destruction of life.
Αληθομαντις, a true soothsayer.		*Βιοω*, I am alive.

duce corals in a similar way, but of different shape. These are not fixed like the red coral, but consist of a main axis from which many parallel branches, forming two series on opposite sides, spring. The appearance is so exactly like that of a wing-feather of a bird with its barbules, that the family is called *Pennatulidæ*, or the family of little quill-pens.

Another widely different order is represented by the *Pleurobrachiæ*, an illustration of which is given in the last lesson. This little animal may be found washed up at the edge of the wave on the eastern coast. It is about the size of a large gooseberry, but in shape more like a lemon, with a small elevation at one end and a depression at the other. The substance of the animal is as transparent and as clear as crystal, and it shines in the sun like opal. Attracted by the appearance of this little symmetrical lump of jelly, the beholder on further examination finds that a flickering motion is seen to play along eight bands which run from pole to pole of the animal. If he take the little glistening globe and place it in a tumbler of sea-water, it puts forth two long streaming tentacles, whose secondary branches look like long fringes. The anatomical study of this animal reveals that the flickering along the meridional zones is caused by an apparatus consisting of a number of semi-circular plates which are set on the body with their diameters applied to the surface, the half-circular side free and bearing a fringe of hairs which are constantly in motion, and which in fact are the means of propelling the animal. These plates with their cilia are considered to be like combs, and the order is called Ctenophora, or comb-bearing animals. The mouth opens at the end, where there is a slight protuberance, and it leads down to a curious branched system of canals, best understood by a reference to the illustration.

Another family of the Ctenophora is represented by a strap-shaped animal, which is called *Cestum Veneris*, or the girdle of Venus. This animal occurs in the Mediterranean Sea, and is described as very beautiful. The idea which suggested the name is poetic and appropriate, for from the foam of the sea which washes classic shores Venus was supposed to have sprung, and as she emerged, she left behind her zone.

The Actinozoa, especially the Zoanthoria, play an important part in modifying the earth's crust, for these are the animals which produce the coral reefs and coral islands. The animals mainly concerned in building up coral reefs cannot live at more than about 100 to 200 feet below the surface, and of course they cannot live above it, but they delight in the boisterous waters of the surface. Their instincts guide them to build up on almost all coasts of the tropical seas long banks or bars, which are always highest on the ocean side, and highest of all towards the direction from which the fiercest winds blow.

These banks or reefs come to the surface at some distance from the shore, and enclose a lagoon of still water which is a safe harbour for ships. Certain islands in the South Seas are entirely composed of coral, and they are almost all of a circular form, enclosing a basin of water. These ring-like islands are called atolls. The enclosed basin is shallow, but outside the island, even close to the shore, the sea is too deep to be fathomed. The phenomena of reefs furnished to our renowned naturalist, Darwin, a means of proving that the crust of the earth was being slowly upheaved or slowly depressed in different areas.

In Figs. VII., VIII., and IX., in the preceding page, the principal forms of reefs are represented as though we had cut perpendicularly down through land, reef, and sea, and so could see their relations.

In Fig. IX., A represents a volcanic island surrounded by a barrier reef with its enclosed lagoon. Suppose this to be slowly lowered in relation to the surrounding sea, the corals will continue to build upon their old foundation, maintaining their position at the surface, while the solid mountain disappears, until finally a ring-like reef, or atoll, will be formed.

If, on the other hand, the land rise the corals are killed, and fresh ones must begin further down on the submarine flanks of the mountain, while a *fringing* reef (Fig. VII.) is left on the side of the mountain above sea level.

The actual position of coral reefs corresponds well with this theory.

READING AND ELOCUTION.—XIX.

ANALYSIS OF THE VOICE.

RULES ON EXPRESSIVE TONE (*continued*).

Rule 10.—*Moderate grief and sorrow, pity,* and *tender love and admiration* are expressed by "softened force," "high" notes, and slow "movement;" by prolonged and swelling "medial stress;" and by "pure," but "chromatic," or plaintive utterance. The "rising inflection," in the form of "semitone" (half tone), prevails in the expression of these emotions.

Example of Moderate Grief.

Enamoured *death*, with sweetly pensive grace,
Was *awful beauty* to his silent face.
No more his sad eye looked me into *tears!*
Closed was that *eye*, beneath his *pale, cold brow;*
And on his *calm lips*, which had *lost* their *glow*,
But which, though *pale*, seemed *half-unclosed to speak*,
Loitered a *smile*, like *moonlight* on the *snow*.

Pity.

Morn came again;
But the young lamb was *dead.*
Yet the poor mother's fond distress
Its every art had tried
To shield, with sleepless tenderness,
The weak one at her side.
Round it, all night, she gathered warm
Her woolly limbs,—her head
Close curved across its feeble form;
Day dawned, and it was dead.
It lay before her stiff and cold;
Yet fondly she essayed
To cherish it in love's warm fold;
Then restless trial made,
Moving, with still reverted face,
And low complaining bleat,
To entice from their damp resting-place
Those little stiffening feet.

Tender Love and Admiration.

Hushed were his *Gertrude's lips*, but still their bland
And beautiful expression seemed to *melt*
With love that *could not die! and still his hand*
She presses to the *heart* no *more* that *felt.*
[*a*] *Ah! heart, where once each fond affection dwelt,*
And *features* | yet | that spoke a *soul more fair!*

Rule 11.—*Impatience, eagerness,* and *hurry* are denoted by "loud," "high," and "*quick movement;*" *impatience,* by "vanishing," or final "stress;" *eagerness,* by "expulsive medial stress;" *hurry,* by abrupt "radical" or initial "explosive" "stress:" all three emotions are sometimes marked by the "tremor," and by "aspirated," and sometimes "anhelose," or panting utterance—*eagerness* occasionally by the "orotund." The "falling inflection" characterises the tones of these emotions.

Example of Impatience.

Mortimer. Fie! cousin Percy—how you cross my father!
Hotspur. I cannot choose: sometimes he angers me,
With telling me of the *moldwarp* and the *ant*,
Of the dreamer *Merlin*, and his *prophecies;*
And of a *dragon*, and a *finless fish*,
A *clip-winged griffin*, and a *moulten raven*,
A *couching lion*, and a *ramping cat*,
And such a deal of SKIMBLE SKAMBLE STUFF,
As puts me from my *faith.* I tell you what,—
He held me, but *last night*, at least NINE HOURS,
In reckoning up the several DEVILS' names
That were his *lackeys:* I cried "*hum!*"—and "*well!*" "*go to!*"—
But marked him not a *word.* Oh! he's as tedious
As is a *tired horse*, a *railing wife;*
Worse than a SMOKY HOUSE:—I had rather live
With *cheese* and *garlic* in a WINDMILL, FAR,
Than feed on *cates* and have him TALK to me,
In any *summer-house* in CHRISTENDOM.

Eagerness.

Hotspur. Send danger from the *east* unto the *west*
So *honour* cross it from the *north* to *south*,
And let them *grapple:—Oh!* the blood more stirs,
To rouse a LION, than to start a HARE.
By *heaven*, methinks it were an easy leap,

To pluck bright honour from the *pale-faced moon;*
Or *dive* into the *bottom* of the *deep,*
Where fathom-line could never touch the *ground,*
And pluck up drowned* honour by the *locks:*
So he that doth redeem her thence, might wear,
Without co-rival, all her dignities.

Hurry.

Sisters! hence, with *spurs* of *speed!*
Each her *thundering falchion wield;*
Each bestride her SABLE STEED:
HURRY! HURRY to the FIELD!

Rule 12.—*Melancholy* is distinguished by "soft," or faint and languid utterance, "very low pitch," and "very slow movement;" a gentle "vanishing stress;" "pure" but "pectoral quality;" and the "monotone," or, occasionally, the plaintive "semitone."

Example.

To-morrow, and to-morrow, and to-morrow,
Creeps in this petty pace from day to day,
To the last syllable of recorded time;
And all our yesterdays have lighted fools
The way to dusty death. *Out, out, brief candle!*
Life's but a walking shadow—a poor player,
That struts and frets his hour upon the stage,
And then ‖ is heard no more.

Rule 13.—*Despair* has a "softened force," a "very low" note, and a "very slow movement;" "vanishing stress;" deep "pectoral quality;" and a prevalent "falling inflection" or an utter "monotone."

Example.

I have lived *long enough;* my way of life
Is fallen into the *sear*, the *yellow leaf:*
And that which *should* accompany *old age,*
As *honour, love, obedience, troops of friends,*
I must not look to have; but, in their stead,
CURSES, not *loud*, but DEEP, *mouth-honour,* BREATH,
Which the *poor heart* would *fain deny*, but *dare* not.

Rule 14.—*Remorse* has a subdued or "softened" force, very "low pitch," and "slow movement;" a strongly marked "vanishing stress;" a deep "pectoral" and "aspirated quality;" and a prevailing "falling inflection," with, occasionally, the "monotone."

Example.

Oh! my *offence* | is RANK,—it *smells* to HEAVEN:
It hath the *primal* | ELDEST | *curse* | upon 't,
A BROTHER'S | MURDER!—*Pray* can I not,
Though inclination be as sharp as will;
My *stronger guilt* ‖ *defeats* my *strong intent.*—
Oh! WRETCHED state! Oh! *bosom, black* as DEATH!
Oh! LIMED† *soul,* that, struggling to be *free,*
Art *more engaged!*

Note.—*Self-reproach* has a tone similar to the preceding, but less in the extent of each property, except "force," in which it exceeds *remorse,* and "pitch," in which it is higher.

Example.

Oh! what a *rogue* and *peasant slave* am *I!*
Is it not MONSTROUS that this *player* here,
But in a *fiction,* a DREAM of passion,
Could *force* his *soul so to his own conceit,*
That, from her working, all his visage *wanned,*
Tears in his *eyes, distraction in 's aspect,*
A *broken voice,* and his *whole function* suiting
With forms to his *conceit!* And all *for nothing!*
For HECUBA?
What's *Hecuba* to *him,* or *he* to *Hecuba,*
That he should *weep* for *her? What* would he do,
Had he the *motive* and the *cue* for passion
That *I* have? He would DROWN the STAGE | with *tears,*
And *cleave* the *general ear* with HORRID SPEECH!
Make MAD the GUILTY, and APPALL the FREE,
CONFOUND the IGNORANT, and AMAZE, indeed,
The *very faculties* of EYES and EARS.

Rule 15.—*Mirth* is distinguished by "loud," "high," and "quick" utterance; and an approach to the rapid, repeated "explosions" of laughter, in a greater or less degree, according to the nature of the passage which contains the emotion. To these properties are added "aspirated quality," and the "falling inflection," as a predominating one.

Example.

A FOOL, A FOOL! I MET A FOOL i' the forest,
A MOTLEY FOOL;—*a miserable world;*
As I do *live* by *food,* I met a FOOL;
Who laid him *down,* and *basked* him in the *sun,*
And *railed* on lady *Fortune* | in *good terms,*
In GOOD SE'T TERMS, and yet *a* MOTLEY FOOL!

Rule 16.—*Gaiety* and *cheerfulness* are marked by "moderate force," "high pitch," and "lively movement;" moderate "radical stress;" and smooth, "pure quality" of tone, with varied "inflections."

Example.

Celia. I *pray* thee, Rosalind, sweet my coz, be *merry.*
Rosalind. Well, I will *forget* the condition of *my'* estate, to *rejoice* in *yours.* From henceforth I *will,* coz, and devise *sports;* let me *see;* what think you of *falling in love?*
Celia. I prythee, *do,* to make *sport* withal; but love no man in good *earnest.*
Rosalind. *What* shall be our *sport,* then?
Celia. Let us *sit* and *mock* the *good housewife, Fortune,* from her *wheel,* that her *gifts* may henceforth be bestowed *equally.*
Rosalind. I would we *could* do so; for her benefits are *mightily misplaced;* and the *bountiful* | *blind* | *woman* | doth *most* mistake her *gifts* to *women.*

Rule 17.—*Tranquillity, serenity,* and *repose* are indicated by "moderate force," "middle pitch," and "moderate movement;" softened "medial stress;" "smooth" and "pure quality" of tone; and moderate inflections.

Example.

How sweet the moonlight sleeps upon this *bank!*
Here will we sit, and let the sounds of music
Creep in our *ears!* soft stillness, and the *night,*
Become the touches of sweet harmony.
Look how the floor of heaven
Is thick inlaid with patines of bright gold!
There's not the smallest orb which thou behold'st,
But | in his motion | like an angel | sings,
Still quiring to the *young-eyed cherubim:*
Such harmony is in immortal souls!

The careful study and practice of tones cannot be too strongly urged on the attention of young readers. Reading devoid of tone is cold, monotonous, and mechanical, and false, in point of fact. It defeats the main end of reading, which is to impart thought in its natural union with feeling. Faulty tones not only mar the effect of expression, but offend the ear, by their violation of taste and propriety. Reading can possess no interest, speech no eloquence, without natural and vivid tones.

The foregoing examples should be practised with close attention and persevering diligence, till every property of the voice exemplified in them is perfectly at command.

XI.—APPROPRIATE MODULATION.

The word "modulation" is the term applied, in elocution, to those *changes* of "force," "pitch," and "movement," "stress," "quality," and "inflection," which occur, in continuous and connected reading, in passing from the peculiar tone of one emotion to that of another. "Modulation," therefore, is nothing else than giving to each tone, in the reading or speaking of a whole piece, its appropriate character and expression.

The first practical exercise which it would be most advantageous to perform, in this department of elocution, is to turn back to the exercises on "versatility" of voice, and repeat them till they can be executed with perfect facility and precision. The next exercise should be a review, without the reading of the intervening rules, of all the examples given under the head of "tones." A very extensive and varied practice will thus be secured in "modulation." The student should, while performing this exercise, watch narrowly, and observe exactly, every change of tone, in passing from one example to another. The third course of exercise in "modulation," is to select some of the following pieces, which are marked for that purpose, as the notation will indicate. A fourth course of practice may be taken on pieces marked by the student himself.

* This accent is inserted to mark the necessity of pronouncing the second syllable *ed* in the word *drowned.*

† Pronounce the *ed* in the word *limed.*

Βιωτικος, serviceable to life.	Γραφειον, a writing tool.	Γραμμα, a written letter.
ΓΡΑΦΩ, I engrave, write.	Γραφευς, a writer.	Γραμματεια, the art of writing.
Γραφη, a writing.	Γραφικος, pertaining to writing.	

In the word αληθινολογια, *truth-speaking*, there are two compounds, namely, αληθινος from αληθης, and λογος: λογος means speech, a word. Αληθινολογια is then a compound word, resembling in form as well as import this term which we coin for the purpose of illustration, namely, *truth-speaking*. Take another instance from our own language. *Aristocracy* is made up of αριστος, *best*, and κρατεια, *power* or *government*, and so signifies, not *best government*, but *the government of the best*.

You cannot obtain all the information contained in the Etymological Vocabulary, until you know the second word which enters into combination with each separate root. I shall therefore supply these second terms, together with their significations.

SECONDARY COMPONENTS.

Κρατος, strength.	Τεχνη, art.
Λογος, speech.	Φθορα, destruction.
Μαντις, a diviner, a foreteller.	Φυω, I bring into existence.
Πονος, labour.	

Obs.—Note that the pronoun is implied in the verb, and consequently you do not need a separate pronoun in translating. Thus γραφω is *I* write; involving the pronoun *I*, as well as the verb *write*. So γραφει is *he* writes, and γραφομεν is *we* write.

LESSONS IN CHEMISTRY.—II.

ELEMENTARY SUBSTANCES—METALLOIDS—METALS—SALT—ACID—ALKALI—BASE—CHEMICAL NOMENCLATURE.

ELEMENTARY SUBSTANCES.—Seeing that "atoms" are indivisible, and that cohesion binds them into masses, whilst affinity joins different atoms to form new substances, it naturally follows that all bodies are either *simple* or *compound*. Simple or elementary substances cannot be split up into others which essentially differ from the original body, whilst compound substances can.

In the example of chemical combinations given in the last lesson, the sulphur and copper were simple substances or "*elements*," and the sulphide of copper, which was formed on the application of heat, was a "compound" body. No efforts of the chemist have proved sufficient to split up sulphur or copper. They defy all power to alter or change them; but, by using certain means, the sulphide of copper can be made to resolve itself once more into its components—copper and sulphur. The constitution of a body may be determined by two means: either by *analysis*, which is separating a body into its components or elements, or by *synthesis*, which is the putting together of the components to form the body.

By analysing the substances of which our earth is composed, sixty-three elements have been discovered; and in after years, when we possess more powerful means of analysis, we may find that some of these "elements" are capable of further division. The elements are usually divided into forty-nine *metals* and fourteen non-metallic substances or *metalloids*. The distinction between these two classes is not very satisfactory. The metals are opaque, they possess metallic lustre, and are good conductors of heat and electricity. The metalloids either want these properties or possess them only in a very low degree. This division is not very accurate, for iodine and carbon, though metalloids, both have *metallic lustre;* and the latter, in the form of plumbago or graphite, is a good conductor of electricity.

For the sake of convenience and shortness in writing, *symbols* are used for the elements. These consist of the *first*—or the first and most characteristic—letter of the Latin name of the body. In the following table, the metals printed in italics are of rare occurrence:—

THE METALLOIDS.

NAMES.	SYMBOLS.	COMBINING WEIGHTS.
Oxygen	O.	16.
Hydrogen	H.	1.
Nitrogen	N.	14.
Carbon	C.	12.
Chlorine	Cl.	35·5.
Iodine	I.	127.
Bromine	Br.	80
Fluorine	F.	19.
Sulphur	S.	32.
Selenium	Se.	79·5.
Tellurium	Te.	129.
Phosphorus	P.	31.
Boron	B.	11.
Silicon	Si.	28.

THE METALS.

NAMES.	SYMBOLS.	COMBINING WEIGHTS.
Aluminium	Al.	27·4.
Antimony (*Stibium*)	Sb.	122.
Arsenic	As.	75.
Barium	Ba.	137.
Bismuth	Bi.	210.
Cadmium	Cd.	112.
Cæsium	Cs.	133.
Calcium	Ca.	40.
Cerium	Ce.	92.
Chromium	Cr.	52·5.
Cobalt	Co.	58·7.
Copper (*Cuprum*)	Cu.	63·5.
Didymium	D.	96.
Erbium	E.	—
Glucinum	Gl.	9·3.
Gold (*Aurum*)	Au.	197.
Indium	In.	74.
Iridium	Ir.	198.
Iron (*Ferrum*)	Fe.	56.
Lanthanum	La.	92.
Lead (*Plumbum*)	Pb.	207.
Lithium	Li.	7.
Magnesium	Mg.	24.
Manganese	Mn.	55.
Mercury (*Hydragium*)	Hg.	200.
Molybdenum	Mo.	96.
Nickel	Ni.	58·7.
Niobium	Nb.	94.
Osmium	Os.	199·2.
Palladium	Pd.	106·6.
Platinum	Pt.	197·5.
Potassium (*Kalium*)	K.	39·1.
Rhodium	Rh.	104·4.
Rubidium	Rb.	85·4.
Ruthenium	Ru.	104·4.
Silver (*Argentum*)	Ag.	108.
Sodium (*Natrum*)	Na.	23.
Strontium	Sr.	87·5.
Tantalum	Ta.	172.
Thallium	Tl.	204.
Thorium	Th.	115·7.
Tin (*Stannum*)	Sn.	118.
Titanium	Ti.	50.
Tungsten (*Wolfram*)	W.	184.
Uranium	U.	120.
Vanadium	V.	137.
Yttrium	Y.	—
Zinc	Zn.	65·2.
Zirconium	Zr.	89·6.

The numbers in the third column are the *combining weights*, or, as they are sometimes called, the *equivalent numbers*, or *atomic weights*. A chemical compound is made up of molecules. Each molecule, as we have seen, is composed of atoms, and each atom is indivisible; therefore, whatever proportion the atoms bear to each other in the molecule—whether in number, or weight, or volume—they will have that same proportion in the mass.

For instance, if we analyse 18 grains of water, we shall find that 16 grains are oxygen and 2 grains are hydrogen, but the molecule of water is composed of 2 atoms of hydrogen and 1 of oxygen; therefore we conclude that one atom of oxygen weighs 16 times the atom of hydrogen, and in the 2 grains of hydrogen there will be double the number of atoms that there are in the 16 grains of oxygen, because such is the case in the molecule.

Because hydrogen is the lightest of all known bodies, its atom is taken as the standard, and by careful analyses the comparative weights of all other atoms have been determined. The French take the equivalent of oxygen—100—as their standard.

It is to be remembered, then, that the *atomic weight* of any element signifies the relation in weight which the atom of that element bears to an atom of hydrogen; and since chemical compounds are formed by the union of atoms, the atomic weight will also represent the weight in which the element will enter into combination. Sometimes one, two, or many atoms enter into the compound, so that whatever may be the quantity of the element, it must always be a multiple of the atomic weight; hence the name *combining weight*. And it very frequently happens that one element in a compound is replaced by another, one atom taking the place of another, the weight of one atom being equivalent to the weight of the other; hence the name *equivalent number*. The student will soon become familiar with these laws of combination. In writing compounds, the symbols of the elements are placed side by side, and the number of atoms, if more than one, written beneath.

CuO = copper and oxygen combined, to form the oxide of copper.
H_2O = water; 2 atoms of hydrogen and 1 of O.
$2NH_3$ = 2 atoms of ammonia; that is, 2 atoms of N and 6 of H.

A *salt* is a compound of an *acid* and a *base*.

An *acid* is a body which usually possesses a sour taste, and will redden litmus paper and vegetable blues. Formerly it was supposed to owe its properties to the presence of oxygen, but it has been found that an acid can exist without that gas, but *hydrogen* must always be present. Hence, an acid is now defined to be *a salt of hydrogen*.

An *alkali* neutralises an acid, and returns the blue colour to the reddened litmus. Potash, soda, and ammonia are the chief alkalies.

A *base* is a body which will combine with an acid to form a salt.

The alkalies are the strongest bases. A base is generally the oxide of a metal.

Acids which end in *ic* make salts which end in *ate*. Sulphuric acid (H_2SO_4) makes sulph*ates*. Nitric acid (HNO_3), makes nitr*ates*. Those which end in *ous* make salts ending in *ite*. Sulphur*ous* acid (H_2SO_3) makes sulph*ites*. Nitr*ous* acid (HNO_2) forms nitr*ites*. And it will be observed that the acids in *ous* have an atom less oxygen than those in *ic*.

CHEMICAL NOMENCLATURE.—Salts may be formed by the replacement of the hydrogen in the acids by an atom of metal. Some metals are capable of replacing 1 atom of hydrogen, some 2, some 3, and others 4. They are said to be respectively *monatomic*, *diatomic*, *triatomic*, and *tetratomic*, and the most important may be arranged thus—only those in italics may be learnt—

MONATOMIC.—*Cæsium*, Lithium, *Potassium*, *Sodium*, Rubidium, *Silver*, Thallium.

DIATOMIC.—*Barium*, Cadmium, *Calcium*, Cerium, Chromium, Cobalt, *Copper*, Didymium, Glucinum, *Iron*, Lanthanum, *Lead*, Magnesium, *Manganese*, *Mercury*, Nickel, Palladium, Strontium, Thorium, Uranium, *Zinc*.

TRIATOMIC.—*Aluminium*, *Antimony*, *Arsenic*, Bismuth, *Gold*, Rhodium.

TETRATOMIC.—Niobium, *Platinum*, Tantalum, *Tin*, Titanium, Zirconium.

The atomicity of the chief metalloids is here given:—

MONATOMIC.—Bromine, Chlorine, Fluorine, Hydrogen, Iodine.

DIATOMIC.—Oxygen, Selenium, Sulphur, Tellurium.

TRIATOMIC.—Boron, Nitrogen, Phosphorus.

TETRATOMIC.—Carbon, Silicon.

If we take for the type of the oxides, *water*, H_2O (the oxide of hydrogen), then K_2O is the oxide of potassium or *potash*. To get the oxide of gold, the H must be in a multiple of 3; therefore take 3 atoms of H_2O: $3H_2O = H_6O_3$. Now gold is triatomic, 1 atom being capable of replacing 3 of H, hence the oxide of *gold* = Au_2O_3. Tin is tetratomic; we must therefore have the H in 4 atoms, or a multiple of 4: $2H_2O = H_4O_2$. 1 atom Sn replaces H_4, hence SnO_2 is the oxide of tin.

The mode of constructing this table will be easily understood, and the student should accustom himself to write the formulas of all the salts of the metals, the simple rule being, *take the acid of the required salt, and for its hydrogen substitute the equivalent number of atoms of the metal.* The types which are placed at the head of the columns are the compounds of hydrogen, in some cases acids:—

Oxides H_2O (water).	*Sulphates* H_2SO_4 (sulphuric acid).	*Nitrates* HNO_3 (nitric acid).	*Chlorides* HCl (hydrochloric acid).	*Chlorates* $HClO_3$ (chloric acid).	*Sulphides* H_2S (sulphuretted hydrogen).
K_2O potash.	Na_2SO_4.	KNO_3.	Ag Cl.	K Cl O_3.	Ag_2S.
Cu O.	Cu SO_4.	Zn $2NO_3$.	Fe Cl_2.	Fe $2Cl O_3$.	Sb_2S_3.
As_2O_3.	Bi_23SO_4.	Au $3NO_3$.	Au Cl_3.	etc.	etc.
$Sn O_2$.	Sn $2SO_4$.		Pt Cl_4.		

Occasionally other terms are used, but their meaning is at once obvious. *Binoxide* means an oxide in which are 2 atoms of oxygen: SnO_2. In a *sesquioxide*, the oxygen is in the proportion of $1\frac{1}{2}$ (sesqui), Fe_2O_3 (sesquioxide of iron).

The mode of naming any of the above given examples is to name the metal and then the salt.

Cu SO_4 = copper sulphate.	Ag_2S = silver sulphide.
Au $3NO_3$ = gold nitrate.	$KClO_3$ = potassium chlorate.

LESSONS IN ARITHMETIC.—XXV.

COMPOUND ADDITION.

3. THE process of adding together two or more compound quantities of the same kind is called *Compound Addition*. The method scarcely requires any explanation, and will be understood at once from an example.

£	s.	d.	far.
6	11	5	1
4	9	6	2
3	12	8	3
8	6	9	1
23	0	5	3

EXAMPLE.—Add together £6 11s. 5¼d., £4 9s. 6½d., £3 12s. 8¾d., and £8 6s. 9¼d.

Placing the farthings under the farthings, the pence under the pence, etc., we add the farthings, which amount to 7—*i.e.*, to 1 penny and three farthings. Writing down the 3 farthings under the farthings' column, and adding in the 1 penny to the row of pence, we get 29 pence—*i.e.*, 2 shillings and 5 pence. Writing the 5 pence under the pence column, and adding the 2 shillings to the row of shillings, we get 40 shillings—*i.e.*, 2 pounds exactly. Writing down a cipher under the shillings' column, to show that there are no shillings over, and adding the 2 pounds to the pounds' column, we get 23 pounds, which we write down under the pounds' column.

4. *Rule for Compound Addition.*

Write the quantities so that those of the same denomination stand under each other. Beginning with the lowest denomination, find the sum of each column separately, and divide it by that number which is required to make one of the next highest denomination. Set the remainder under the column added, and carry the quotient to the next column.

Obs.—In the example given above we expressed the farthings in a separate column for clearness, and not as fractions of a penny, but it is not usual to do so.

EXERCISE 43.

1. Add together the following examples in Compound Addition:—

2. £3 17s. 0¾d., £12 5s. 10½d., £2 0s. 5½d.
3. £4 19s. 11½d., £15 14s. 3¼d., £21 17s. 2d., £57 13s. 9d., 16s. 0½d., £1 2s. 3½d.
4. £22 3s. 5½d., £13 2s. 0¾d., £33 14s. 9¾d., £23 19s. 10¾d.
5. £987 17s. 10½d., £896 16s. 11½d., £774 12s. 10¾d., £916 18s. 9½d., £768 15s. 6¼d.
6. £4736 16s. 11¾d., £9804 11s. 10½d., £3896 12s. 6¼d., £7925 17s. 11½d., £8730 12s. 10¾d., £4913 15s. 7¼d., £7835 16s. 9½d., £9768 17s. 10¾d.

6.

tons.	cwt.	lbs.	oz.
3	5	17	13
4	7	35	12
1	15	63	7

7.

tons.	cwt.	lbs.	oz.
15	6	45	5
3	17	80	6
26	0	31	7

8.

lbs.	oz.	dwts.	grs.
21	7	12	10
28	5	8	7
7	0	6	15
41	6	0	20
9	0	0	7

9.

leagues.	m.	fur.	rods.	yds.	ft.
5	2	4	7	4	0
18	2	3	21	3	0
85	0	6	10	4	1

10.

acres.	r.	p.
100	3	3
115	2	2
160	1	15
91	2	26

11.

sq. yds.	ft.	in.
15	5	7
10	7	30
9	6	25
7	5	63

12.

gals.	qts.
73	3
60	2
40	1
65	2

13.

wks.	d.	hrs.	min.
10	5	12	40
21	3	9	15
40	4	17	30
42	1	0	0

14.

yrs.	mon.	wks.	d.	hrs.	min.
22	3	2	4	13	29
14	9	3	6	15	2
21	1	0	5	3	59
13	2	2	2	2	37

15.

drams.	scruples.	grains.
2	3	17
5	2	12
3	2	9
5	3	14

16.

cubic yds.	ft.	in.
14	17	1623
728	26	1727
432	13	54
27	2	1111

17.

sq. m.	acres.	r.	p.
2	36	3	19
3	27	3	35
4	21	2	21

18.

Fr. e.	qr.	nl.
7	4	3
2	3	2
7	1	2
5	0	3

19.

cong.	o	fʒ	fʒ	ɱ
2	5	15	7	42
5	2	11	3	13
3	7	9	2	11

20.

loads.	qrs.	bush.	pks.	gals.
2	4	7	2	1
3	3	6	3	0
15	2	5	0	1

PROMISCUOUS EXERCISES.—I. ANTIQUITY OF FREEDOM.

[*Marked for Rhetorical Pauses, in poetry.*]

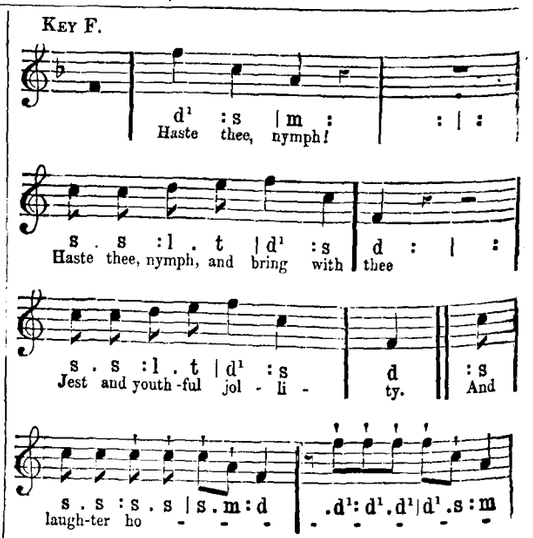
Here ' are old trees, tall oaks | and gnarléd pines,
That stream ' with gray-green mosses; here | the ground
Was never trenched by spade; and flowers | spring up '
Unsown, and die ungathered. It is sweet |
To linger here, among the flitting birds,
And leaping squirrels, wandering brooks, and winds '
That shake the leaves, and scatter, as they pass,
A fragrance ' from the cedars, thickly set '
With pale blue berries. In these peaceful shades,—
Peaceful, unpruned, immeasurably old,—
My thoughts ' go up the long ' dim ' path of years,
Back ' to the earliest days of Liberty.
O FREEDOM! thou art not, as poets ' dream,
A fair young girl, with light ' and delicate limbs,
And wavy tresses | gushing from the cap '
With which the Roman master ' crowned his slave ‖
When he took off the gyves. A bearded man,
Armed to the teeth, art thou; one mailéd hand ‖
Grasps the broad shield, and one | the sword; thy brow,
Glorious in beauty | though it be, is scarred ‖
With tokens of old wars; thy massive limbs ‖
Are strong with struggling. Power | at thee has launched
His bolts, and ' with his lightnings ' smitten thee;
They could not quench the life thou hast from heaven.
Merciless power | has dug thy dungeon deep,
And his swart armourers, by a thousand fires,
Have forged thy chain; yet, while he deems thee bound,
The links are shivered, and the prison walls |
Fall outward; terribly thou springest forth,
As springs the flame ' above a burning pile,
And shoutest to the nations, who return
Thy shoutings, while the pale oppressor | flies.
Thy birthright | was not given ' by human hands:
Thou wert twin-born ' with man. In pleasant fields,
While yet our race was few, thou sat'st with him,
To tend the quiet flock | and watch the stars,
And teach the reed to utter simple airs.
Thou ! by his side, amid the tangled wood,
Didst war upon the panther ' and the wolf,
His only foes; and thou ' with him ' didst draw
The earliest furrows ' on the mountain side,
Soft ' with the deluge. Tyranny himself,
Thy enemy, although of reverend look,
Hoary ' with many years, and far obeyed,
Is later born ' than thou; and | as he meets
The grave defiance of thine elder eye,
The usurper | trembles | in his fastnesses.
Oh! not yet |
May'st thou unbrace thy corslet, nor lay by '
Thy sword; nor yet, O Freedom! close thy lids '
In slumber; for thine enemy | never sleeps,
And thou ' must watch ' and combat ‖ till the day
Of the new earth ' and heaven. But wouldst thou rest
Awhile | from tumult ' and the frauds of men,
These old ' and friendly solitudes | invite
Thy visit. They, while yet the forest trees |
Were young ' upon the unviolated earth,
And yet the moss-stains ' on the rock | were new,
Beheld thy glorious childhood, and rejoiced.—*Bryant.*

LESSONS IN MUSIC.—X.

MENTAL EFFECT—CONSONANCE OF NOTES—THE MODULATOR, ETC.

WE remarked in a previous lesson the striking change in the mental effect of a note produced by a rapidity of movement, and observed that, though seemingly opposed, these double mental effects do hold a real relation to each other. We spoke of LAH passing (by change of movement) from the "abandonment" of *sorrow* to the "abandonment" of *joy*. In the same way the mental effect of DOH, ME, and SOH may pass from the "dignified and solemn" to the "bold and decisive," as shown in the examples given in our last lesson; and, more than this, by using a yet quicker movement, we may find these same notes—never, mark you, passing into that emotional character which belongs to TE, RAY, FAH, and LAH, but—expressing that *bold hearty* laughter "holding both its sides," of which Milton wrote and Handel sung. This is shown in the following passage.

KEY F.



The laughter having thus commenced with the last phrase, which is repeated in the other "parts" also, next changes to another key (that of the sub-dominant), but still keeping DOH, SOH, ME, as its accented notes. It afterwards falls into laughter of a different style, which is more musical, perhaps, but not so open and hearty. Enough of the example is given to show the character of DOH, ME, and SOH in rapid movements.

We trust that our pupils will study all these examples with great care, and practise them well. They could not have better exercises for voice or ear. An earnest endeavour to study the mental effect of notes will very greatly increase the power of singing those notes with accuracy.

1. The most *perfect* consonance (or sounding together) of any two notes, is that of two which are octaves to one another—as DOH and DOH¹, SOH and SOH¹, etc. The notes agree so "perfectly" as to be constantly regarded as the same. The consonance which stands next in the order of agreement is that of the *fifth*—DOH with SOH, RAY with LAH, ME with TE, SOH with RAY¹, and LAH with ME¹. TE with FAH¹ is an *imperfect* fifth. Approaching to this in "perfectness" of concord, is the fourth—DOH with FAH, RAY with SOH, ME with LAH, SOH with DOH¹, LAH with RAY¹, and TE with ME¹. FAH, TE, is an augmented fourth. But it is not the most "perfect" consonance that is the most *pleasing*. For the production of pleasure and beauty in music, as in all other fine arts, there is needed a certain *variety in unity*—a certain difference blending with agreement. Hence it is that the most pleasing consonance of the scale is that of the third—DOH with ME, RAY with FAH, ME with SOH, etc. The first, third, and fifth of the scale—DOH, ME, SOH—form, when sounded together, the most delightful union of sounds that is known. A consonance of three or more notes is called a "chord."

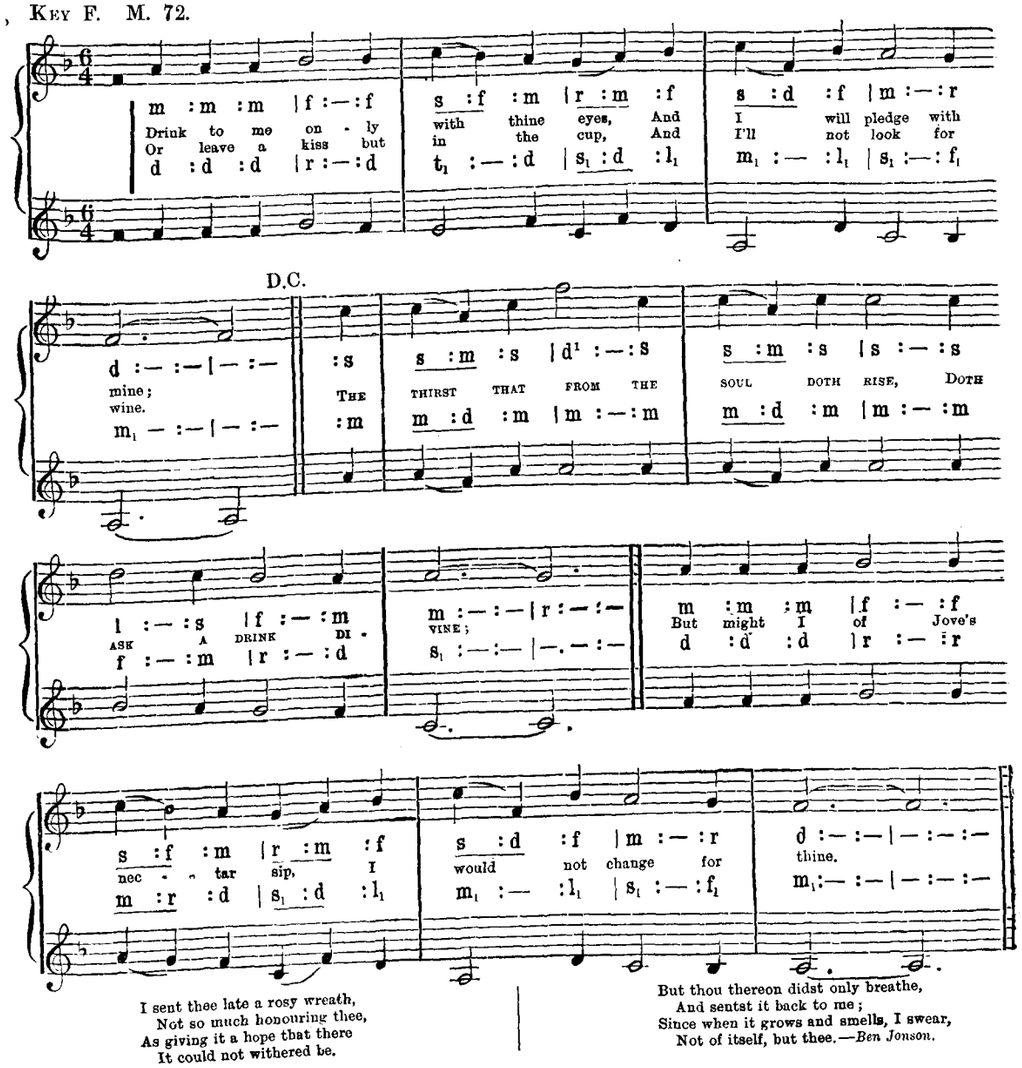
2. Try each of the above consonances in order, either by the help of a friend or with some musical instrument. You will thus be aided in forming a kind of personal acquaintance with the notes. You will be enabled to individualise them, and to recognise by the ear their mental effect.

3. The following ancient and well-known tune is introduced to illustrate still further the qualities of DOH, ME, and SOH. The pupil will notice that it has a *soft* and *gentle* opening, which exhibits the properties of ME, relieved by those of FAH, and enlivened by SOH. In the fifth line there is a most beautiful *awakening* to bolder and brighter sounds, in which SOH and upper DOH play their part, and then the music returns to the softer expression again. As the pupil learns to appreciate these points, and to notice them for himself, his taste will insensibly improve, and with his taste his "execution." Study in every possible way the various points of beauty and expression of which your music is capable.

*

EXERCISE 18.—**DRINK TO ME ONLY WITH THINE EYES.** (AN OLD ENGLISH MELODY.)

KEY F. M. 72.



I sent thee late a rosy wreath,
Not so much honouring thee,
As giving it a hope that there
It could not withered be.

But thou thereon didst only breathe,
And sentst it back to me;
Since when it grows and smells, I swear,
Not of itself, but thee.—*Ben Jonson.*

This tune must be thoroughly sol-faed "by heart," like the rest, and the pupil must point to the notes on the modulator as he thus sol-faes.

Our pupils must expect no explanation at this stage of the course, of the sharps, or flats, or clefs introduced at the beginning of the old notation staff. They are introduced thus early for the sake of those who play on instruments. It is enough for the singer that the square mark shows him the place of the key-note.

While our pupils are advancing in their own practical study of the three principal notes of the scale, we may usefully occupy our time in reviewing some of the steps already taken. We are assured that most of the mistakes of our pupils have arisen from careless reading or from a forgetfulness of the pledge to which at first we sought to bind them. This was the pledge:—"We have only two things to ask of you: the first, that you will *be content to learn one thing at a time*, instead of being impatient for knowledge not at the moment helpful—perhaps, just then, only confusing to you; the second, that when something is set before you to be done, *you will really do it*, instead of *supposing* it to be done, and going on; for only by doing we truly understand." But, without judging our friends too nicely, we will try to meet their difficulties. Those difficulties relate to the "modulator," the "pattern," and "the movable DOH."

"*What I want*," has been remarked by a pupil, "*is to be able to measure to the eye the exact interval the voice is taking.*" It is just for this purpose that the modulator is provided. The ordinary staff of five lines and four spaces does not measure *to the eye* the exact interval the voice is taking, because it fails to show pictorially the places of the "semitones" (small steps) of the scale. This is, however, a point of vital importance to the learner, and *one which should be kept constantly before his eyes*. Hence the necessity of some such scale as the modulator offers. The modulator also possesses the advantage of showing not only lines or marks *for* the notes, but the names of the notes themselves. Our pupils have to use only the middle column at

*

KEY TO EXERCISE 42, LESSON XXIV. (Vol. II., page 7).

1. 1806.
2. 68810.
3. 86768.
4. 284079.
5. 96615.
6. £25 13s. 6¾d.
7. £433 1s. 2¼d.
8. 66 gns. 15s. 2d.
9. 1448 sixpences, 2172 grts.
10. 6650.
11. 170472.
12. 9000.
13. 1010047.
14. 2 lbs. 1 oz. 10 dwts. 16 grs.
15. 177 lb. 9 oz. 12 dwts.
16. 1785.
17. 631680.
18. 116869.
19. 80797440.
20. 9 cwt. 0 qrs. 8 lbs.
21. 119 tons 6 cwt. 3 lbs.
22. 19 cwt. 2 qrs 18 lbs. 1 oz.
23. 9120.
24. 37608 scrupies, 752160 grains.
25. 64 lbs. 11 oz 5 dwts.
26. 88 lbs. 4 oz 7 drms. 2 scps.
27. 47520 yds. 142560 ft. 1710720 in.
28. 712800 ft. 8553600 inches.
29. 960000 perches, 5280000 yards.
30. 54 m. 7 fur. 211 yds. 2 ft.
31. 29 m. 4 fur. 172 yds. 2 ft. 7 in.
32. 5031 rods 276705 yards.
33. 17 m. 0 fur. 20 rods, or 17 m. 0 fur. 110 yds. or 30030 yards.
34. 132000000 feet.
35. 2560 ns. or 640 qs.
36. 5000 qrs. or 1250 yards.
37. 6396 yds. 2 qrs. 1 nail.
38. 9302 French ells, 4 qrs. 3 nls.
39. 10156 nails, or 22851 in.
40. 51 brls. 2 gals.
41. 14851 gals. 3 qts. 1 pt. 2 qtns.
42. 100000 pints.
43. 43200 pints.
44. 105 brls. 8 gals.
45. 540 hghds. 44 gals.
46. 22760 pints.
47. 488 quarts.
48. 24440 quarts.
49. 28992 pints.
50. 1427 bush. 1 pk.
51. 508 qrs. 1 bush. 2 pks. 1 gal.
52. 36360 m. 2181600 s.
53. 31557600 sec.
54. 84 wks. 6 hrs. 45 min., or 588 days 6 hrs. 45 min.
55. 65 days 2 hrs. 4 min. 40 sec.
56. 31556928 sec.
57. 946128000 sec.
58. 5148000 sec.
59. 9505200 sec.
60. 99000″.
61. 2126° 11′ 54″.
62. 185185 right angles 16° 40′.
63. 470660 sq. ft.
64. 628714548 sq. in., or 4366073¼ sq. ft.
65. 32640858360 sq. inches.
66. 582 acr. 1 rood 3 p. 29 yds. 8 ft.
67. 259200 cub. in.
68. 4551552 cub. in.
69. 2325888 cub. in.
70. 49 cubic ft. 1 in.
71. 1452 cub. yds. 12 ft.
72. 4492800 cub. in.
73. 52 tons 40 cub. ft. 180 cubic inches.
74. 576 lbs. avoirds.
75. 691 lbs. 10$\frac{5}{11}$ oz. avoirdupois.
76. 822 lbs. 13½ oz. av.
77. 1234 lbs. 4½ oz. av.
78. 58 lbs. 4 oz. troy.
79. 122 lbs. 3$\frac{43}{50}$ oz. troy.
80. 2 lbs. 8$\frac{353}{372}$ oz. av.
81. 12 square yards.
82. 360 square feet.
83. 16 acres 0 roods 10 rods.
84. 108 sq. yds. 8 sq. feet.
85. 446 acres 1 rood.
86. 40 acres.
87. 36 square yards.
88. 66 square yards.
89. 111⅓ square yds.
90. 60 cubic feet.
91. 56$\frac{7}{8}$ cubic feet.
92. 8375$\frac{11}{16}\frac{13}{32}\frac{13}{64}$ imp. bushels.
93. 7198$\frac{37}{125}\frac{37}{125}\frac{37}{125}$ imp. gallons.
94. 77$\frac{1}{4}\frac{1}{4}\frac{1}{4}\frac{1}{4}$ imp. bus.
95. 128$\frac{37}{1000}$ cub. feet.
96. 66⅔ yards.
97. 27993600 cub. in.
98. 4374279936 cubic inches.
99. 10½ pieces.
100. 800 days.

LESSONS IN ENGLISH.—XV.

SUFFIXES.

WORDS are affected in their import not only by particles set before them, but also by particles set after them. In *presumable*, you have a word, the meaning of which is affected by both a foregoing and an after-coming particle. It may be divided thus:—

PREFIX.	ROOT.	SUFFIX.
pre	sum	able
before	*take*	*capacity.*

The root of the word is the Latin sumo, *I take*. By the addition of *pre*, sume becomes presume, *I take before*; that is, before positive proof. If you add *able*, then you form *presumable*, which signifies *what may be presumed*.

Having treated of prefixes, I pass on to suffixes, and shall give a list of the principal.

LIST OF ENGLISH SUFFIXES.

Able, from the Gothic abal, *strength*, found in the Latin habilis, *fit for*, and in the Latin termination bilis; as, amabilis, *lovable*. It is found also in our word *ability*. In the sense of power or capacity, it occurs in many English words; as, reason*able*, dur*able*, etc. Sometimes it passes into the form *ible*; as comprehens*ible*, visi*ble*, etc. When preceded by *v*, the *a* or *i* blends with the *v* into *u*, as in sol*uble*.

"Where all life dies, death lives, and nature breeds,
Perverse, all monstrous, all prodigious things,
Abominable, inutterable."
Milton, "Paradise Lost."

Ade (*ado*), coming into the English through the French, the Italian, and the Spanish, gives us such words as broc*ade*, *embroidered silk*; comr*ade*, from the French camarade, or the Italian camerata, through the Latin camera, *a chamber*; scal*ade*, from the Latin scala, *a ladder*, or from the Spanish escalar, *to climb*; brav*ado*, *a boast*, from the Spanish bravata, or the French bravade, a boastful threat.

"What can be more strange than that we should, within two months, have won one town of importance by *scalade*, battered another, and overthrown great forces in the field?"—*Bacon.*

Age, from the Latin termination ago, as in im*ago* (*an image*), through the Spanish *azgo*, and the French *age* (as in avantage, *an advantage*): it denotes a state of being.

"That to the utmost of our ability, we ought to repair any *damage* we have done to others is self-evident."—*Beattie, "Moral Science."*

The term *average* is from the low Latin averagium (from the Latin verb habeo, *I have*), which denoted a duty or service paid primarily in labour by the tenant to the lord, by means of his beasts, and carriages, and implements of husbandry, and thus becoming in a secondary sense a sort of tax on movable property. From similar roots, and the customs they denote, come *avercorne* and *averpenny* in old legal documents.

"Whether the small town of Birmingham alone doth not upon an *average* circulate every week, one way or other, to the value of £50,000."—*Berkeley, "Querist."*

Al, from the Latin *al*, as in animal, *an animal*, and animalis, *belonging to an animal*. *Al* in Latin indicates personality; thus, anima is life, and animal one who possesses life. *Al*, from *alis*, signifies *belonging to*.

"Mr. Monkhouse happening one day to pull a flower from a tree which grew in one of their *sepulchral* inclosures, an Indian, whose jealousy had probably been upon the watch, came suddenly behind him and struck him."—*Cook, "First Voyage."*

An, a suffix from the Latin adjective form *anus*: as humanus, *human, pertaining to a man*; from humanus also comes human*e*, *kind, like a man*, in which you see *an* in another form. From the termination of these Latin adjectives in the neuter plural *ana* is derived, the once favourite *ana*; as in Johnsoni*ana*, the things of Johnson, that is, his lighter sayings and doings, what is sometimes called *table-talk*, from the German *tisch-reden*.

Ance or *ancy*, a substantive suffix from the Latin *antia*, as in const*antia*, *constancy*; it denotes a condition; in constancy, the condition of being constant or firm. *Ance* sometimes passes into *ence*, as in condolence, the state of grieving (Latin, doleo, *I grieve*) with (con) another.

"She had so steadfast *countenance*,
So noble porte and *maintenance*."—*Chaucer.*

Ant and *ent* are connected with the Latin participles in *ans* and *ens*, as amans, *loving*; docens, *teaching*, etc. Adjectives ending in *ant* sometimes come to us through the French, as in dorm*ant*, *sleeping*; the present participle of the Latin verb dormio, *I sleep*, being dormiens, and of the French verb dormir, dorm*ant*.

"Logicians distinguish two kinds of operations of the mind; the first kind produces no effect without the mind; the last does. The first they call *immanent* acts, the second transitive."

Ar from the Latin substantive ending in *ar*, as calcar, *a spur*; and the Latin adjective ending in *aris*, as regul*āris* (Latin, regula, *a rule*), according to rule, *regular*. The *ar* having once become a recognised termination in English, is to be found in words of Latin origin as similar (similis, *like*). This termination passed through the substantival form, as in "similaritas," and our borrowed language has retained it in that shape.

"You have heard how first they began of laymen onely, leading a straiter life from the society of other persons, who, then following the rule of S. Bennet (Benedict), were called *regulars* and votaries."—*Fox.*

Archy, a Greek termination, signifying *chief, government*, has been spoken of under the prefixes.

Ard (connected with the German *art*, kind, manner), a substantive termination, signifies a permanent state; as, slug*gard*, one who is in the habit of being sluggish; drunk*ard*, one whose habitual state is intoxication: a good man may be once drunk, but a good man cannot be a drunkard. The dull, in dull*ard*, is allied to the Dutch dol, *mad*, or dolen, to wander or rave, or to the German toll, *mad*.

"But would I bee a poet if I might,
To rub my browes three days and wake three nights,
And bite my nails and scratch my *dullard* head,
And curse the backward muses on my bed
About one peevish syllable."
Bishop Hall.

Ary, from Latin adjective termination *arius*, as found in auxili*arius*, (Latin, auxilium, *aid*), *auxiliary, tributary*. This same *arius gave rise to our* termination in arious, as in *gregarious* (Latin, grex, *a flock*), *flocking together*.

From Latin words ending in *arius*, we have statu*ary* (ars statuaria); lapid*ary* (Latin, lapis, *a stone*), a (precious) stone-cutter; avi*ary*, a place for keeping birds (Latin, avis, *a bird*).

Aster, as in poet*aster*, which comes immediately from the French poétastre, *a bad poet*, is found in the Italian *astro*, a termination denoting contempt. The *aster* in disaster, a calamity, has nothing to do with the suffix. Disaster seems to be from *dis* and the Latin astrum, a star, and so signifies an *ill-starred* condition.

Ate is a verbal (derived from a verb) termination, the origin of which is found in the Latin passive participle, as congreg*atus*; hence the *verb to congregate*.

"The *infuriate* hill shoots forth the pillared flame."
Thomson, "Summer."

Ated, ted, or *ed*, are the terminations of the passive participle in English, equivalent to the same Latin participle ending in *tus*; thus the Latin communi*catus* is in English communi*cated*. In the same way we have adapt*ed*, devolv*ed*, affix*ed*, imput*ed*, etc. Participles in *ed* become adjectives by suppressing the *d*, as desol*ated* becomes desol*ate*.

Ce is an English representative of the Latin termination in *tia*, as grat*ia*, *favour, grace*. *Cy* is sometimes used instead of *ce*: for example, clemen*tia*, clemen*cy*; that is, mer*cy*.

In the older forms of the language words ending in *cy* were spelt *cie*. These nouns denote the abstract quality; thus prudens means *prudent*, as a *prudent* man; but prud*entia* means prudence, in the abstract; that is, the quality is considered apart from any subject.

"But even that mightye loue (love) of his great clemen*cie*,
Hath given me grace at last to judge the truth from heresie."
Gascoigne.

Ch, a Saxon termination found in church, ditch, which, etc., and of old pronounced as a guttural, or at least like *k*, as in the Scotch *whilk*, or *quhilk*, and the German *ch* or *ich*, as ich (*ick*), *I*; doch, *yet*; thus we have the Latin *sic*, and the English *such*; the Scotch *mickle*, and the English *much*; the Scotch *kirk*, German *kirche*, and the English *church*. *Ditch* or *dike* is a thing that men produce by digging. The words run thus, *dig, dike, ditch*. Another form of *dike* and *ditch* is *digue*.

"The people ran into so great despair that in Zeland they gave over working at their *digues*, suffering the sea to gain every tide upon the country."—*Sir W. Temple.*

Cle or *le*, a diminutive, formed after the manner of the Latin diminutive termination *culus*, masculine, and *cula*, feminine: for example, homun*culus*, *a little man*; a *manikin*; regu*lus* (Latin, rex, *a king*), *a little king*; mater*cula*, *a little mother*. The ending *cle* appears in partic*le*, *a little part*; pellic*le* (Latin, pellis, *skin*), *a little skin*; in muscle (*musculus a little mouse*), so called in reference to its appearance under the skin.

Dom, a suffix, found as a noun in the Latin and the Saxon, as well as the English; as in *domus*, a house; *dominus*, master; hali*dom*, holiness; king*dom*, the jurisdiction of a king. *Dom* is found also in the German *thum*; as reichthum, *riches*. *Dom* denotes *power, authority, office*. It is the same word that we have in *doom*; as doom's-day, *the day of judgment*. It occurs in the Saxon dom-boc, *doom-book*.

"For neither the Fadir jugith ony man, but hath *gouun* (given) eche *dome* to the sone."—*Wicliff's "Testament," John* v. 22.

"And looke, when I am king, clayme thou of me the earl*dome* of Hereford."—*Shakespeare, "Richard III."*

Ee, a termination of Gallic origin, found in refug*ee*, debauch*ee*, originated in an effort to represent in English the vocal force of the French accented *e*; as, *débauché, refugié*. The French word is the passive participle. Hence, frequently the words ending in *ee* have a passive sense: a trust*ee* is *one who is trusted* by a trustor or truster; that is, *one who trusts*. It is the same with feoffer and feoffee.

"And though his majesty came to them by descent, yet it was but in nature of the heire of *a feoffe* in trust, for the use and service of the kingdom."—*Prynne.*

El, le, a suffix, denoting an *instrument*; as, shov*el*, from *to shove*; stopple, from *to stop*; need*le*, from the Dutch naad, *a seam*; in Anglo-Saxon, *nædel*; German, *nadel*, doubtless allied to the Anglo-Saxon *nægel*, the German *nagel*, and the English *nail*. *Damsel*, a young woman, is an abridged form of the French *demoiselle*, which of old denoted *a daughter of noble parents*: the transition of demoiselle into damsel may be seen in the rendering of the word by English versions of different ages; as Wicliff (1380), *a damysel*; Tyndale (1534), *a damsell*; Cranmer (1539), *a damsell*; the Authorised (1611), *a damosell*. The Greek word, which properly denotes a female servant, is translated by the Geneva version (1557), *a mayde* (maid); and by the Rheims version (1582), *one vvenche* (wench). (Matt. xxvi. 69.)

En, a suffix, by which nouns are converted into adjectives, and adjectives into verbs; as brass, brazen; white, to whiten. In the same way, we have long, length, lengthen; dark, darken; soft, soften; leather, leathern; south, southern, and southron. *En* forms also one ending of passive participles; as weave, wove, woven; shear, shorn. It is found in some nouns as their plural termination; as ox, oxen. Of old, *en* and *n* formed the plural of the present tense of verbs, representing the Anglo-Saxon *don*. I quote the words of Ben Jonson:—

"The persons plurall keepe the termination of the first pers. singular. In former times, till about the reigne of King Henry the Eighth, they were wont to be formed by adding *en*, thus: Loven, sagen, complainen."—"*Grammar.*"

Ence, a suffix, formed from the active participle in Latin ending in *ens*; as pœnit*ens*, pœnit*entia*, penit*ence*; exist*ens*, exist*entia*, exist*ence*.

End, a Saxon termination which denotes an agent; as weg-ferend, *a wayfarer*; *friend*, in Saxon *freond*; German, *freund*; probably connected with the verb *to free*; that is, *to make free*; and *to free* may have its source in the more general import of the term—namely, *to love, to woo*; so that a friend is one who loves, and therefore frees another. Friend and friendly, in the older forms of the language, signified *lover* and *loving*.

"The true faith, whereever it is, worketh and frameth the heart to *friendlike* dispositions unto God, and brings forth *friendlike** carriage in the life towards God."—*Goodwin.*

Ent (sometimes *ant*, as in "church milit*ant*"), an adjective termination, the origin of which is found in both the Saxon and the Latin; as, writ*end*, *writing*; absens (absentis), *absent*. Adjectives ending in *ent* denote a present condition—*e.g.*, different; or a quality considered concretely; that is, in relation to some subject.

"Lord God, how frequ*ente* and famyliar a thynge with euery (every) estate and degree throughout Christendom, is this rever*ent* othe (oath) on the Gospills of Christ."—*Sir T. Elyot.*

Er (in the forms *er, r, re*). By comparing the Anglo-Saxon writ*ere*, the Latin scriptor (scribo, *I write*), and the English writer, we find that the termination *er, or*, denotes *an agent*. So in Saxon sædere, *a sower*; plegere, *a player*; and in Latin, amator, *a lover*; doctor, *a teacher*. The endings *ere* in Saxon, *or* in Latin, and *er* in English, are very common. You must, however, in following analogy, use words so formed with judgment and taste. Having an active signification, they are generally formed from verbs, thus: to mend, *a mender*; to think, *a thinker*; to build, *a builder*. But it is not from every verb that such nouns can be properly formed. We can say, *to better*, but not a betterer; yet *a bettering* has some authority. Proper names arise from these nouns—*e.g.*, Mr. Barker, Mr. Tyler, Mr. Hellier, Mr. Fisher.

The suffix *er* also forms the comparative in adjectives; as, green, greener. It is, too, found in some verbs of Gallic origin; as in encounter (encontre, *a meeting*); cover (couvrir, *to cover*).

* Friend*like*, abbreviated into friendly; in German it is freund*lich*. Compare what is said before on the termination *ch*.

LESSONS IN DRAWING.—XV.

WE now propose to direct the attention of our pupils to the principles of light and shade in trees, or what is artistically termed "massing in the foliage," and introduce some illustrations. Figs. 104 and 105 represent the same subject. The arrangement and outline of the trunk, branches, and foliage must be first made, as in Fig. 104, and we beg the pupil especially to remember that this must be his mode of pro-

present. In order thus to measure to the eye the interval the voice is taking, our pupil must not be constantly looking from the book to the modulator, and from the modulator to the book. He must first learn a few notes of his tune "by heart," and then sing them from the modulator alone; and so on till he can point the whole tune from memory, and without the book. Thus, if he is learning Exercise 5, let him just read and repeat to himself "DOH, SOH, ME, DOH," several times over. Then let him, laying aside his book, turn to the modulator, and sing these notes while he points to them. Next, let him learn to "point and sing," without book, the phrase "ME, ME, DOH," in the same manner, and after that the whole exercise. Very extensive experience in teaching has made us feel increasingly the importance of requiring the pupils thus to "see," and themselves point out the intervals they sing on a perfect scale like the modulator.

Of the two other difficulties of students we must speak in another lesson.

LESSONS IN LATIN.—XIX.

THE LATIN VERB.

IN form, the Latin verb has two chief divisions—1, *active*; 2, *passive*. Thus, laudo is *I praise*, in the active voice, and laudor, *I am praised*, in the passive voice. There are some verbs which, though *passive* in form, are *active* in signification; as hortor, *I encourage*. The ending in *r* shows that hortor is of the passive form. This form the verb, so to say, lays down, or lays aside, and hence it is called *deponent* (from de, *down*, and pono, *I put*). Deponent verbs, then, are verbs which, disregarding the claims of their form, have an active import, just as if they were active in form. As these verbs have an active meaning, their past participle has an active meaning: thus, hortatus, the past participle of hortor, is not *being encouraged*, but *having encouraged*. This past participle joins with parts of the verb sum, *I am*, to form the *perfect* tense: thus, hortatus sum means *I have encouraged*. There are deponent verbs in all four conjugations.

The tenses of the verb in Latin are pretty much the same as in other languages. Thus we have PRESENT, amo, *I love*, or *I am loving*; IMPERFECT, amabam, *I was loving*, or *I did love*; PERFECT, amavi, *I loved*, or *I have loved*; PLUPERFECT, amaveram, *I had loved*; FIRST FUTURE, amabo, *I shall* or *will love*; SECOND FUTURE, amavero, *I shall have loved*.

The *present tense* denotes either an action continued in the present time, or an habitual action. The *imperfect tense* denotes an action continued in past time. The *perfect tense* has two meanings: first, it signifies an action done and completed in past time indefinitely, and from the period in past time being indefinite or undefined, it is called an *aorist*, or is said to have an *aorist* import (*aorist* is a Greek word, denotes a tense of the Greek verb, and signifies *undefined* or *indeterminate*); in the second place, the *perfect tense* indicates an action which in itself, or in its consequences, continues from the past to the present, being somewhat the same as our phrase, *I have dined*—that is, I have *just* dined; in contradistinction to the aorist *I dined*—that is, *yesterday*, or some time in the past.

The Latin has three moods, the *indicative*, or the mood of reality, the mood of simple statement; the *subjunctive*, or mood of dependence; and the *imperative*, or mood of command. Mood is a Latin word (modus), signifying *measure* or *manner*. It is found in the French term *mode*, sometimes used in English. The term *mood*, therefore, denotes the modes or manners in which a statement is made. All propositions may be reduced to two general classes; they are either *independent* or *dependent*. The independent are in the *indicative* mood; that is, the mood which simply indicates or points out. The dependent are in the *subjunctive*. The word subjunctive (Latin, sub, *under* or *to*, and jungo, *I join*) signifies *that which is subjoined*; that which is connected in the way of dependence. The subjunctive mood, consequently, is the mood which is dependent on the indicative. The *imperative* mood, though differing in form from the other two, may logically be considered as a subdivision under the *subjunctive*. How closely the subjunctive and the imperative are allied, may be seen in the fact that the subjunctive is often used for the imperative; it is so used when a kind of softened command is desired. In the older Latin grammars, you will find the *potential* mood, and even the *optative* mood; but these are mere figments; they have no corresponding reality in the language. Another form of the verb has a better claim to be termed a mood; I allude to what is called the *infinitive*, as legĕre, *to read*. This, however, might probably be more rightly described as the verb in its abstract form. If, however, it is acknowledged to be a mood, then we must say that the Latins have four moods, the *indicative*, the *subjunctive*, the *imperative*, and the *infinitive*. The *infinitive*, however, must stand in the class of dependent modes of utterance, since it makes no sense unless when joined to a verb in another mood. Thus, vult legere, *he wishes to read*. Here legere has meaning by being united with vult. Vult is said to be a *finite* word, as legere is said to be an *infinitive*; *finite* and *infinitive* are the opposites of each other. The two words come from the same Latin word finis, *end* or *limit*; the former, therefore, means the *limited*; the latter, having the prefix, in, *not*, means the *unlimited*; that is, the *definite* and the *indefinite* mood.

Another form in which the verb appears is the *participle*. In Latin there are *four* participles; 1, the *active*, ending in *ns*, as amans, *loving*; 2, the *passive*, ending in *tus*, as amatus, *loved*; 3, the *future*, ending in *rus*, as amaturus, *about to love*; and 4, the corresponding *passive* participle, which ends in *dus*, as amandus, *to be loved*—that is, *he who ought to be loved*. The usages connected with these participles will be set forth hereafter. The Latins have no active participle of past time; they cannot by means of a participle say *having loved*. But the past participles of their deponent verbs have an active signification, since the verbs themselves have an active signification; thus, hortatus means *having exhorted*.

Connected in form with the passive participle in *dus*, is what in Latin is called the *gerund*; as, amandum, which wears the appearance of being the neuter singular of the participle amandus. The gerund exists in the nominative as amandum, in the genitive as amandi, and in the dative and ablative as amando. It is not easy to set forth the distinctive meaning of the gerund in one English term. Its proper and full force must be learnt in reading Latin prose. I place before you a few instances of its use.

GERUND.

Scribendum est, *one must write.*
Scribendi ars, *the art of writing.*
Scribendo aptus est, *he is ready at writing.*
Inter scribendum, *during writing.*
Scribendo exerceor, *I am exercised in writing.*

Hence, you see that the *gerund* denotes under certain circumstances the whole act implied in the verb, as here the act of writing. Yet is it nearly connected in meaning as in form with participles. Similar, indeed, is the case with our word *writing*; and generally our active participles in *ing*, besides having a participial force, assume now a *verbal*, and now a *substantive* force; a *verbal*, as *in writing the letter, say, etc.*—that is, *while you write*, or *when you write*; a substantive force, as, *the writing is bad*.

As in form the *gerund*, so also the *supine* is peculiar to the Latin tongue. There are *two supines*, one ending in *um*, as amatum, *in order to love*; the other ending in *u*, as amatu, *to love* or *to be loved*; the former is called the *first* or *active supine*; the latter, the *second* or *passive supine*. The former is used after verbs of motion; the latter is used after certain adjectives; thus:—

SUPINES.

1st. Venio rogātum, *I come in order to ask.*
2nd. Jucunda auditu, *pleasant to hear* or *to be heard.*

You may see here an illustration of the propriety of my questioning whether the *infinitive* should be designated a *mood*. If it is a mood, is not the *supine* equally a mood? And if you admit the claims of the *supine*, can you deny the claims of the *gerund*? But if the *gerund* is a mood, equally is the *participle* a mood. Properly there can be no mode or manner of utterance where there is not a complete utterance; that is to say, moods imply propositions, for without a proposition there is no mood. If so, the *infinitive* can be called a mood only by some latitude of expression.

These, then, are the forms of the verb which you have to understand, to recognise, to construe, to form, and to employ in Latin. I will here recapitulate them:—

TWO VOICES.

1. *Active.* 2. *Passive.*

Deponent belonging to the passive in form and to the active in meaning.

SIX TENSES.

1. *Present*; 2. *Perfect*; 3. *Imperfect*; 4. *Pluperfect*; 5. *First Future*; 6. *Second Future*, or *Future Perfect*.

THREE MOODS.

1. The *Indicative*. 2. The *Subjunctive*. 3. The *Imperative*.

FOUR OTHER FORMS.

1. The *Infinitive*. 2. The *Participle*. 3. The *Gerund*. 4. The *Supine*.

In all, fifteen varieties of expression enter into the Latin verb. You are not to suppose from this that every verb has all these forms. Even when the Latin was a living language, many verbs were defective, that is, lacked some of the ordinary forms. We, however, are bound to write the language as we find it written in the remains of Roman literature, and so are restricted to forms which actually occur in extant Latin writings; and as poetry has its licences, so are we obliged, in order to be correct, to confine ourselves to the usages of the best prose writers. In general, the Latin of Cicero is the model to be followed.

Verbs which have been above described as active, may also be called *transitive*; that is, *active* in voice, and *transitive* in import; thus, laudo puerum, *I praise the boy*, is a transitive verb, because the action of the verb passes over (trans, *across, over*, and eo, *I go*) to the object, puerum. As some verbs are *transitive*, others are *intransitive* or *not transitive*. Such is dormio, *I sleep*, in which no action passes over to an object. *Intransitives* are sometimes called *neuters*; that is, neither active nor passive. When they have a passive form, they bear the name of *neuter passives*; as, ausus sum, *I have ventured*; gavisus sum, *I have rejoiced*. Sometimes a verb, in the passive form, has a *reflective* force, and may be Englished by a neuter or intransitive verb; as, moveor, *I move myself*, or simply, *I move*. A few active forms have a passive signification; as, vapulo, *I am beaten*; veneo, I am sold. Somewhat similar is fio (factus sum, fieri), *I become, I pass from one state into another*; *I am made*.

The tenses may be divided into three classes; thus:—

I.	PRESENT TIME	the action incomplete	*Present.*
		the action complete	*Perfect.*
II.	PAST TIME.	the action incomplete	*Imperfect.*
		the action complete	*Pluperfect.*
III.	FUTURE TIME	the action incomplete	*First Future.*
		the action complete	*Second Future.*

You thus see that there are three forms of complete action, and three of incomplete:—

INCOMPLETE	1 scribo, *I write* or *am writing*	PRESENT.
	2 scribebam, *I did write* or *was writing*	IMPERFECT.
	3 scribam, *I shall write* or *shall be writing*	FUTURE.
COMPLETE	1 scripsi, *I have written*	PERFECT.
	2 scripseram, *I had written*	PLUPERFECT.
	3 scripsero, *I shall have written*	SECOND (or PERFECT) FUTURE.

The natural sequence of our ideas requires a corresponding sequence of tenses. We do not in thought suddenly pass from the present to the past in the same sentence, or in the same member of a sentence. Consequently, we must avoid doing so in the employment of the tenses. The tenses may be divided into pairs—namely, *similar* and *dissimilar*; for example:—

SIMILAR TENSES.		DISSIMILAR TENSES.	
Present	Present.	Present	Imperfect.
Present	Perfect present.	Perfect present	Imperfect.
Imperfect	Imperfect.	Pluperfect	Perfect present.
Imperfect	Pluperfect.		

Now *similar* tenses should *follow* each other, and not *dissimilar* ones. That is, if you use one present, use another; if you use a present, do not let an imperfect immediately follow.

Observe, however, that the present infinitive may come after a finite verb in the imperfect tense, as solebat scribere, *he was wont to write*. The rule I have now given relates to what is called the consecutio temporum, or *sequence of tenses*. Compare Exercise 75 (Latin-English), in the next lesson.

KEY TO EXERCISES IN LESSONS IN LATIN.—XVIII.

EXERCISE 69.—LATIN-ENGLISH.

1. There is no firm friendship among the bad. 2. I hasten to death. 3. The Gauls dwell beyond the Rhine. 4. We have no weapons against death. 5. A generous man is mild toward the conquered. 6. Comets are admirable on account of their rarity and beauty. 7. Slaves obey on account of fear, the good from a regard to duty. 8. Sailing along the shore is often dangerous. 9. No one is happy before death. 10. On what account dost thou laugh? 11. Below the moon all things are perishable. 12. Thou dwellest many years among barbarians. 13. The kingdom of Pluto is placed under the earth. 14. The government of nations is in the power of kings. 15. Fish die out of water. 16. The thing happened contrary to expectation. 17. The camel bears hatred to horses. 18. Painted garments are mentioned with (in) Homer. 19. Many animals congregate and fight against other animals. 20. The hippopotamus feeds on the corn-fields around the Nile.

EXERCISE 70.—ENGLISH-LATIN.

1. Inter malos nulla est firma societas. 2. Contra mortem nulla habet homo arma. 3. Ultra mortem est vita. 4. Ad Rhenum properamus. 5. Ante domum sunt amici. 6. Apud me sunt filii mei. 7. Apud te suntne filii vestri? 8. Mitis erga victos est rex. 9. Post mortem boni sunt felices. 10. Quid est infra terram? 11. Deus est super omnia et per omnia. 12. Infra nubes habitant homines. 13. Penes me mei sunt liberi. 14. Apud Ciceronem sunt multa pulchra dicta. 15. Rus propter te amo. 16. Intra muros sunt milites.

EXERCISE 71.—LATIN-ENGLISH.

1. Poison is for (acts as) a remedy sometimes. 2. An infant has no power without another's aid. 3. Eagles do not build in trees. 4. The cuckoo lays in the nests of other birds. 5. By old age our senses grow dull. 6. Some men are born with teeth. 7. Xerxes fled from Greece with very few soldiers. 8. Metellus leads elephants in triumph. 9. The traveller sings in presence of the robber. 10. The stars move from the east (rising of the sun) to the west (setting of the sun). 11. Britain was discovered by the Phœnicians. 12. Bees cannot exist without a queen. 13. It is sweet to die for one's country.

EXERCISE 72.—ENGLISH-LATIN.

1. Estne aliquando venenum pro remedio? 2. In Græciâ pugnat Xerxes. 3. In senectute visus et auditus hebescunt. 4. Paritne in alieno nido coccyx? 5. Soror tua coram multis cantat. 6. Ab ortu solis ad occasum properant. 7. Græciâ proficiscens exercitus in Italiam properat. 8. Metellus cum multis militibus est in Britanniâ. 9. Filius meus sine dentibus est natus. 10. Estne exercitus sine elephantis? 11. Elephanti in triumpho a duce ducuntur. 12. Dulcene est pro patriâ mori? 13. Quid sine Dei ope sunt mortales? 14. Omnesne aves in arboribus nidificant? 15. Clam patre est puer in domo. 16. Infantes in gremio matris felices est dulce videre. 17. Tecumne est soror tua? 18. Sine patre nihil potest puer. 19. Mecum est filia mea. 20. Quot liberi tecum sunt? 21. Quot homines sunt in Britanniâ?

LESSONS IN GEOMETRY.—XIX.

THE following method of constructing a regular pentagon involves the use of the circumscribing circle, on the circumference of which the angular points of the pentagon may be marked. We have added this to the modes of construction given in the last lesson to show the student that there are many ways of constructing each of the regular polygons, and to urge him to exercise his ingenuity in finding out other methods for the construction of the hexagon, heptagon, etc., than those we are about to give him in this and the following lessons.

PROBLEM L.—*To construct a pentagon on a given straight line (another way).* Let A B (Fig. 68) be the given straight line on which the required regular pentagon is to be described. At the point A, in the straight line A B, draw A C, of indefinite length, perpendicular to A B, and produce A B indefinitely both towards X and Y. Bisect A B in D, and along A C set off A E, equal to A D. Join B E, and produce it indefinitely to F, and set off E G along E F, equal to E A or A D. Then from A as centre with the distance A G, describe the semicircle X G H, and from B as centre, with a distance equal to A G, describe the semicircle K L Y, and let the semicircles X G H,

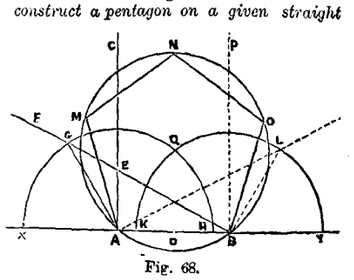


Fig. 68.

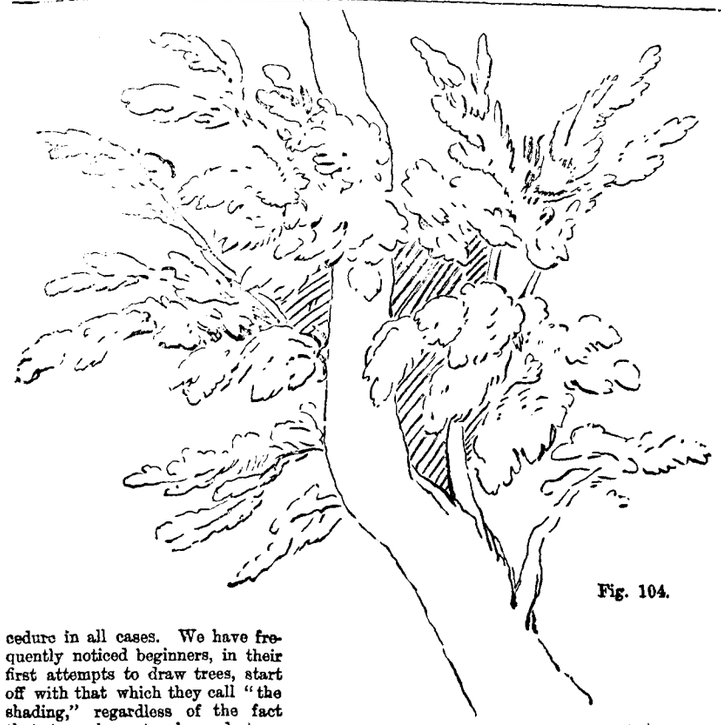


Fig. 104.

cedure in all cases. We have frequently noticed beginners, in their first attempts to draw trees, start off with that which they call "the shading," regardless of the fact that trees have trunks and stems upon which the foliage depends, and equally so as to the importance of the lights, which vary as much as the trees themselves; these lights must be so managed that *all the half tints and darker parts must be made subservient to them.* A proper acquaintance with the growth of the stems will assist us in understanding the disposition of the lights, as by them we must give the individual character of the tree: in other words—the lights, as they fall upon the foliage, are in their extent governed by that upon which the foliage depends, that is, the stems. We shall return to this again; in the meantime we will place before the pupil an example which practically has more to do with detail, than with the broader manner we shall enter upon in the next lesson. Our object in this arrangement is with a view of showing him the necessity of making himself capable, by this additional example, of entering into details, previous to the practice of the general distribution of light and shade, which, it will be our endeavour to show, must afterwards receive those characteristic details which belong to trees in particular. Fig. 107 is the finished drawing of a fir-tree, whilst Fig. 106 represents the method we recommend in copying it. The sharp angular manner of execution will be noticed in contradistinction to the horizontal and broader method of the oak, or the drooping and almost perpendicular style of the willow. These should be copied on a larger scale, as a broader and more effective drawing will be obtained thereby than if it be done on too diminutive a scale; and, besides, the details will be better understood, and there will be also greater opportunity for entering fully into all minor particulars, which, if carefully observed, without descending to littleness of manner, will have so much influence upon the whole.

As there is in many respects a close affinity between foregrounds and trees, it might be advisable at this stage to enter somewhat upon the treatment of foregrounds, preparatory to the remaining instructions we propose to give upon trees. Shrubberies, scattered bushes overgrown with brambles and honeysuckle, very properly belong to foregrounds; their mixed character, being neither trees nor plants, claim most of the remarks we shall have to make upon both. For studies for foregrounds, nature will be our greatest help and resource, affording at all times an endless variety of subjects, which can be more conveniently obtained than the larger specimens of vegetation. It is an excellent practice, and one that is very common amongst artists, to collect



Fig. 105.

specimens of wild plants and preserve them in water; or, what is better when practicable, take them up bodily with the roots and plant them in pots. From these, separate and careful studies may be made, which will prove to be an excellent preparation for more extensive practice when drawing them collectively in their natural state, as seen on the common, under the hedges, or in shady lanes. We cannot here refrain from expressing regret that we are limited in these lessons to form only, since so much is gained by colour in the general effect of ground plants. If we reflect for a moment upon the infinite variety of growth they exhibit upon the flowers whose brilliant colours, blue, red—and yellow, and sparkling white—crop up from amongst greens of every hue, we must confess that we should be very glad, were it possible, if we could take up the palette as well as the pencil, and by introducing our pupils to these additional charms, give them another sensation besides that which is produced by form only; but, even if this were practicable, we must withstand the temptation to turn aside from the path we are pursuing, which leads to a point where form and colour meet and help to perfect each other by their union; for if we must maintain that form without colour is less satisfactory, it is, nevertheless, expressive; but colour without form, however beautiful the arrangement may be, conveys no meaning, and presents nothing whereby to characterise it. In the practice of drawing foreground herbage, a *writer on art* observes "that the edges of the several more advancing leaves must be made sharp and decisive against the ground, whilst those that retire may have less opposition; this will assist their perspective," and they will acquire a more receding character by slightly toning down or blending the remoter parts with the ground or objects behind them: this rule may be applied to all objects, regardless of their size or form. The strength of the shadows must be allowed to be an important consideration. Our pupils will remember the observation, that near the highest lights are the darkest shadows; so, for example, should the light fall strongly upon the leaves of a plant, the shadows beneath them will bear the same proportion of depth, and those leaves which receive less light will have less strength in their shadows. Whilst we recommend our pupils to make close copies of plants separately, in order to obtain a knowledge of their construction and character, we are not advising them to make botanical studies, but *art* studies; this procedure will be all that is necessary to obtain a practical acquaintance with their forms, and will enable our students to represent them with greater skill and freedom, which is of such great importance when grouping plants in a landscape. The work then will be in the end pleasing and satisfactory, because it is truthful; otherwise, when less attention is paid to particular details, and a slovenly manner is employed, it is sure to terminate in confusion and failure. Mr. Burnet, in his work on Landscape Painting, says, "To begin with the foreground, as being that part of the landscape nearest the eye, it is necessary, therefore, that it should receive all those qualities conducive to its situation—such as detail, breadth, and largeness of parts." In contrast to this, the same writer says, "In the early stages of the art, the minutiæ of individual plants and flowers were carried to the highest pitch of absurdity; not only is the whole ground of these pictures inlaid with endless specimens of botanic scrupulosity, but the intervening spaces are filled with reptiles and insects, as if the lives of the artists had been of an antediluvian length."

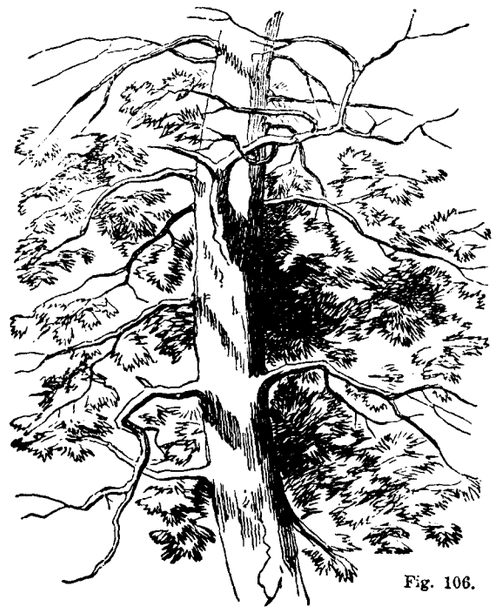


Fig. 106.

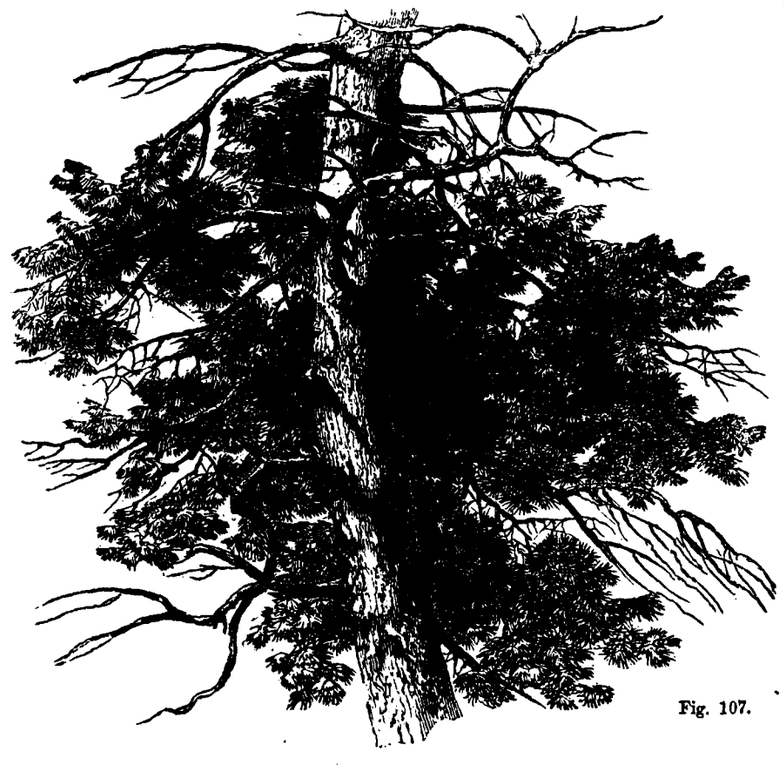


Fig. 107.

K L Y intersect in the point Q. From the centre Q, with the distance Q A, or Q B, describe the circle A N B, and along its circumference set off the arcs A M, M N, N O, each equal to A B, to determine the angular points M, N, O of the pentagon A M N O E, which is completed by joining the straight lines A M, M N, N O, O E.

The student who is acquainted with the method of drawing the equilateral triangle, square, and regular pentagon, will readily see that the construction of figures, the number of whose sides are multiples of 3, 4, and 5, depends merely on the repeated bisection of arcs of circles or angles, as may be seen by an inspection of Figs. 69, 70, and 66.

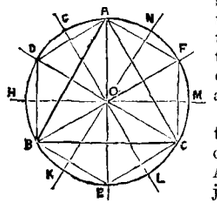


Fig. 69.

In Fig. 69, A B C is an equilateral triangle, or trigon, inscribed in the circle A B C. By bisecting the arcs A B, B C, C A, in the points D, E, F, and joining A D, D B, B E, E C, C F, and F A, we get the hexagon A D B E C F, the number of whose sides is 3×2, or 6. If the arcs A D, D B, B E, E C, C F, and F A, were again bisected in the points G, H, K, L, M, N, we should get a dodecagon, or twelve-sided figure, the number of whose sides is $3 \times 2 \times 2 = 12$; by joining the extremities of the arcs A G, G D, etc., or drawing chords subtending these arcs, and by another bisection of the twelve arcs, into which the circle is divided by the angular points of the dodecagon, we should get a twenty-four-sided figure. The same results would be obtained by bisecting in succession the angles at the point O, the centre of the circle, and drawing chords, as before, to the arcs obtained by the successive bisections of the angles at the centre, and the consequent bisections of the arcs on which they stand.

If the arcs A B, B C, C A, or the angles A O B, B O C, C O A, were trisected, instead of being divided into two equal parts, and chords were drawn subtending the arcs thus subdivided, we should have a *nonagon* or *enneagon*, a polygon the number of whose sides is equal to 3×3, or 9, and by bisecting the nonagon we should obtain an eighteen-sided figure, the number of whose sides is equal to $3 \times 3 \times 2$, or 18.

Similarly in Fig. 70, in which the square A B C D is inscribed in the circle A B C D, an octagon, A E B F C G D H, is obtained by bisecting the arcs A B, B C, C D, D A, in the points E, F, G, H, and joining the straight lines A E, E B, etc., the octagon being a figure the number of whose sides is 4×2, or 8. A further bisection of the arcs A E, E B, etc., would give us a figure the number of whose sides is $4 \times 2 \times 2$, or 16; and so on.

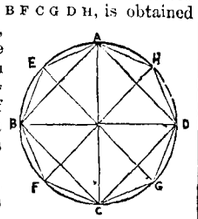
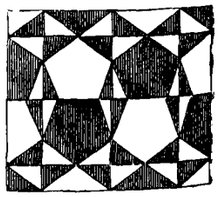
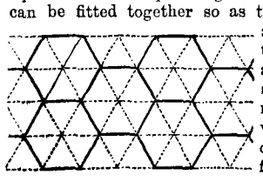


Fig. 70.

In the same way, an inspection of Fig. 66, in Problem XLVII., page 149, shows that if we bisect the arcs A B, B C, C D, D E, E F, in the points R, S, T, P, Q, and join their extremities, we get a decagon, or regular polygon, the number of whose sides is 5×2, or 10; while if the arcs A B, B C, etc., were trisected, we should obtain a quindecagon, or regular polygon, the number of whose sides is 5×3, or 15. The learner can readily calculate for himself the results of further subdivisions of the arcs of the circle in the cases of the pentagon, decagon, and quindecagon.

The reader may have noticed already, that of all figures having equal sides and equal angles there are only three kinds that can be fitted together so as to cover a flat surface without any interstices or openings between the pieces used. These are the equilateral triangle, the square, and the hexagon. This number of regular figures that will cover a flat surface without the addition of any other figures, regular or irregular, may be further reduced to two when we remember that the hexagon itself is composed of six equilateral triangles, as may be seen from Fig. 71, in which the thick lines show how any number of equilateral triangles regularly disposed in rows may be grouped into hexagons. The learner will find it a useful practice to make drawings of the various regular polygons arranged in order, in such patterns as his taste and fancy may dictate, for models of tesselated pavement, marquetry, and parquetry. An illustration of our meaning will be found in Fig. 72, a design which consists of perpendicular lines of pentagons, black and white in alternation, the lozenges or rhombuses (see Definition 30, Vol. I., page 53) being divided by transverse perpendicular and horizontal lines into right-angled triangles, which are also black and white in alternation as they are contiguous to a white or black pentagon respectively. The designs made by the learner, for pavement, may be done in pieces of red, black, and white paper, or in paper coloured to imitate various kinds of marble, pasted together on cardboard. The patterns for marquetry, which consists of various kinds of ornamental wood cut in small pieces and veneered on a flat surface of deal or some common timber, to form the top of a table or the panel of a cabinet; and those for parquetry, or blocks of wood about an inch in thickness, put together in symmetrical patterns to form floors, may be cut out in paper stained in imitation of various kinds of wood. It may be said that coloured paper in imitation of wood may be purchased of any one who sells materials for bookbinding, while paper in imitation of marble may be procured at the same place for fine work, and from the paper-hanger for making designs on a large scale. We have called the attention of the reader to the method named above of making geometrical designs in coloured paper, to show him how readily a knowledge of geometry may be applied to art purposes.


Fig. 72.


Fig. 71.

For filling up any space with small compartments all of the same size and form, the hexagon is the most convenient, because its shape assimilates more closely than either the equilateral triangle or the square to that of the circle, the strongest form for the arrangement of material to bear pressure, as in the case of the barrel drain or circular sewer. Less material, too, would be used in forming a number of hexagonal compartments than in filling the same space with compartments in the form of equilateral triangles or squares having the same depth and area of base as the hexagon. A remarkable instance in nature of the use of the hexagon for making the most of space for stowage, with the least possible quantity of material, is found in the honeycomb, of which the cells are hexagonal in form, terminating at the bottom in a roof or floor, consisting of three parallelograms, the opposite angles of which are about 110° and 70° respectively.

The construction of a hexagon is easy enough, whether it be required to inscribe it in a given circle, or to construct it on a given straight line, because the radius of the circumscribing circle is always equal to the side of the hexagon that it surrounds. Thus, if we have to inscribe a hexagon in the circle A C E (Fig. 73), it is manifest that all we have to do is to open the compasses to the extent of A G, the radius of the circle A C E, and divide the circumference into six equal parts by applying the opening of the compasses round the circumference, and marking the points A, B, C, D, E, F, in succession. The hexagon is then completed by joining A B, B C, C D, D E, E F, F A, the chords of the six equal parts into which the circumference has been divided.

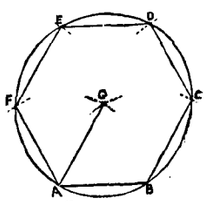


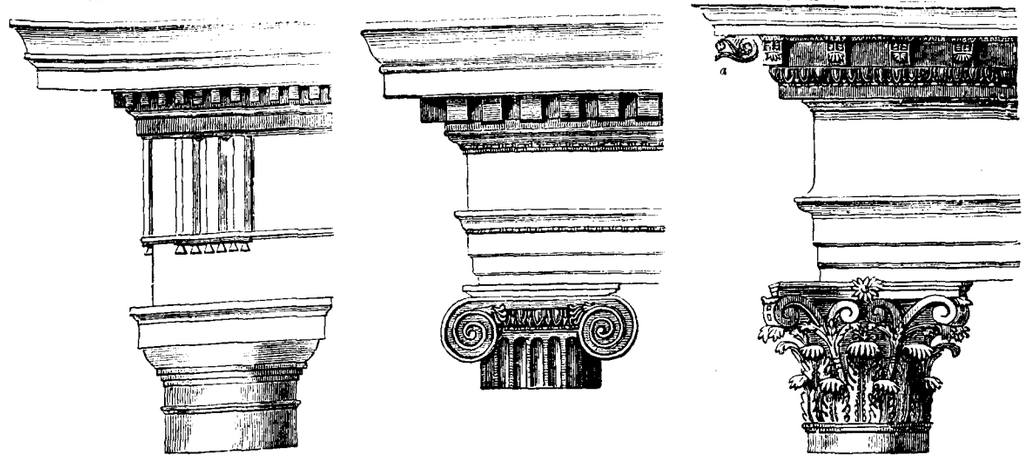
Fig. 73.

Problem LI.—*To construct a hexagon on a given straight line.* Let A B (Fig. 73) be the given straight line on which it is required to construct a hexagon. From A and B as centres, with the distances A B and B A respectively, draw two arcs intersecting each other in G. The point G is the centre of a circle circumscribing the required hexagon. From the centre G with the distance G A describe the circle A C E; then from A and B as centres, with the radius A B and B A respectively, draw arcs cutting the circumference of the circle A C E in the points F and C; and from these points as centres, with the same radius, draw arcs cutting the circumference in the points E and D. Join A B, B C, C D, D E, E F, F A; A B C D E F is the hexagon required, for it is constructed on the given straight line A B.

LESSONS IN ARCHITECTURE.—VI.

THE GREEK ORDERS OF ARCHITECTURE.

The temple of Apollo Panionius, in Ionia, was built according to the Doric style (Fig. I.); but the Ionians, dissatisfied with the simplicity of this order, invented another of a more delicate character, and called it the Ionic order, after the name of their country. They made the height of the column in this order greater in proportion to its diameter than in the Doric order. The form of the capital was totally different, having large volutes at its corners, of which the spiral is often very finely sculptured; the entablature was changed in its parts and proportions; and a base was added to the bottom of the column, in harmony with its capital (see Fig. II.). Of the origin of this order of architecture we have no distinct account. Vitruvius states, that as the Doric order was considered strong and masculine, like the form of Hercules, the Ionians modelled their new order according to the elegance and delicacy of the female figure, and that the volutes were taken from the curls of the hair on each side of the face. It is not easy to conceive how the proportions of a Greek order of architecture could be borrowed from that of the human figure, to which it has so little natural resemblance; and it has been ingeniously remarked that it is more natural to trace the form of the volute in the Ionic order to the curling of the bark of a rude upright post, crushed by a superincumbent weight greater than it could bear. In this order, continued subjects began to appear on the frieze, which in the Doric were considered the exception to the rule. The cornice of the entablature was also enriched with exquisite mouldings, and decorated with sculptured ornaments.



THE GREEK ORDERS OF ARCHITECTURE.

The edifices constructed after the Ionic order were numerous and magnificent, such as the temples of Bacchus, at Teos; Apollo, at Miletus; Minerva, at Priene and Tegea; and of Diana, at Magnesia and Ephesus. This order was also employed in the construction of the Erectheum, or the temples of Minerva Polias and Pandrosus, in the Acropolis at Athens; of the Delphic Apollo and of Æsculapius, in the same city; and in that of Juno, in Attica. The temple of Diana, at Ephesus, was justly deemed one of the seven wonders of the world. The architect who traced the plan of this temple was Ctesiphon, who flourished about 552 B.C., and it was partly executed under his direction and that of his son Metagenes: but it was completed by other architects, who worked upon it after these for the space of more than two centuries. Vitruvius says that the form of this temple was *dipterick* (two-winged), that is, surrounded with two rows of columns in the form of a double portico. It was 426 feet long, and 216 broad. In this temple there were 127 columns of marble each sixty feet high, given by as many kings! Thirty-six of these columns were carved by the most excellent artists of their times. Scopas, one of the most celebrated sculptors of Greece, executed one which was the finest ornament of this magnificent structure. All Asia had contributed with incredible ardour to the erection and decoration of this temple.

Vitruvius informs us that Demetrius, whom he calls the servant of Diana, and Paconius, the Ephesian, finished this temple, which was of the Ionic order. History records the remarkable fact that this temple was burned to the ground on the day that Alexander the Great was born. This same Alexander, it is said, offered to rebuild it at his own expense, provided that the Ephesians would consent that he should have the sole honour of it, and that no name should be added to his in the inscription to be put upon it. The Ephesians, not approving this condition, concealed their refusal of his offer by saying, "that it was not consistent for one god to erect a monument to another." This temple was rebuilt with still greater magnificence than at first. The truth of this may be gathered from the words of the sacred historian, in reporting the speech of Demetrius the silversmith, who made silver shrines of Diana, to the workmen of like occupation: "Sirs, ye know that by this craft we have our wealth. Moreover, ye see and hear, that not alone at Ephesus, but almost throughout all Asia, this Paul hath persuaded and turned away much people, saying that they be no gods which are made with hands: so that not only this our craft is in danger to be set at nought; but also that the temple of the great goddess Diana should be despised, and her magnificence should be destroyed, whom all Asia and the world worshippeth." Such was the glory

LESSONS IN FRENCH.—XXVIII.

SECTION LX.—THE TWO FUTURES, SIMPLE AND ANTERIOR (*continued*).

Miscellaneous Examples.

Quand parlerez-vous à ce monsieur ?	*When will you speak to that gentleman ?*
Vous fournira-t-il des provisions ?	*Will he furnish you provisions ?*
Ils ne recevront pas leurs revenus.	*They will not receive their income.*
Ne vendrez-vous pas vos propriétés ?	*Will you not sell your property ?*
Que voulez-vous ?	*What do you wish to have ?*
Que veut lire votre frère ?	*What will your brother read ?*
Apporterez-vous des pommes ?	*Will you bring apples ?*
Nous amènerons nos enfants.	*We will bring our children.*
Vous apporterez des légumes.	*You will bring vegetables.*

Exercise 115.

Abreuvoir, m. *watering-place.*	Château, m. *villa.*	Men-er, 1. [§ 50 (6)] *to take to, to lead.*
Appel-er, 1. [§ 50 (4)] *to call.*	Colporteur, m. *pedlar, hawker.*	Récolt-er, 1. *to gather in a crop, to harvest.*
Après-midi, f. *afternoon.*	Donner à manger, *to feed.*	Sem-er, 1. [§ 50 (6)] *to sow.*
Avoine, f. *oats.*	Écurie, f. *stable.*	Se promen-er, 1. ref. [§ 50 (6)] *to walk or ride for pleasure.*
Blé, m. *wheat.*	Foin, m. *hay.*	
Cachet-er, 1. [§ 50 (4)] *to seal.*	Gel-er, 1. [§ 50 (5)] *to freeze.*	

1. Mènerez-vous vos enfants à l'école ? 2. Je les mènerai à l'école et à l'église. 3. Le jardinier apportera-t-il des légumes au marché ? 4. Il y en apportera. 5. Où mènerez-vous ce cheval ? 6. Je le mènerai à l'écurie. 7. Lui donnerez-vous à manger ? 8. Je lui donnerai du foin et de l'avoine. 9. Lui donnerez-vous de l'eau ? 10. Je le mènerai à l'abreuvoir. 11. Paierez- [§ 50 (2) *note*] vous ce que vous devez ? 12. Ne voulez-vous pas vous promener ? 13. Je me promènerai cette après-midi. 14. Vous promènerez-vous à pied ou à cheval ? 15. Je me promènerai à cheval, et ma sœur se promènera en voiture. 16. Marcherez-vous beaucoup dans votre voyage à Paris ? 17. Nous ne marcherons pas du tout. 18. N'appellerez- [§ 50 (4)] vous pas le colporteur ? 19. Je ne l'appellerai pas. 20. N'achèterez- [§ 50 (5)] vous pas ce château ? 21. Nous l'achèterons si nous pouvons. 22. Ne gèlera-t-il pas [§ 50 (5)] cette nuit ? 23. Je ne le crois pas, il fait trop chaud. 24. Ne sèmerez- [§ 50 (6)] vous pas tout le blé que vous récolterez ? 25. Je n'en sèmerai qu'une partie, je vendrai le reste. 26. Je cachetterai mes lettres et je les porterai à la poste.

Exercise 116.

1. Will not the gentleman call his children ? 2. He will call his children and his sisters. 3. Will you not bring your children ? 4. I cannot bring them. 5. Will you not take a ride this afternoon ? 6. We will ride in a carriage to-morrow. 7. Will you not buy my father's horses ? 8. I shall not buy them ; I have no money. 9. Will you not call the podlar ? 10. I do not wish to call him ; I do not wish to buy anything. 11. Will you pay the tailor ? 12. I will pay him for my coat. 13. Will it not freeze to-morrow ? 14. It will freeze to-morrow ; it is very cold. 15. Will you not sow oats in this field (*champ*) ? 16. I will not sow oats ; I will sow wheat there. 17. Will you take your sister to school ? 18. I will take her there this afternoon. 19. Will you not take your son to market ? 20. I will not take him there. 21. Will not the gardener take his horse to the watering-place ? 22. He will take him there. 23. Will you give oats to your horse ? 24. I will give him hay. 25. Will you bring your son with you ? 26. I will bring him to-morrow. 27. Will he bring his horse ? 28. He will bring his horse and carriage. 29. Why do you carry that little child ? 30. He is too ill to (*pour*) walk. 31. Will your brother sell his property ? 32. He will only sell part of it. 33. Will not your servant carry the letter to the post-office ? 34. I will seal it and give it to him. 35. Will you feed my horse ? 36. I will feed him and give him some water.

SECTION LXI.—IRREGULARITIES OF THE FUTURE.

1. The two irregular verbs of the first conjugation, **aller**, *to go*, and **envoyer**, *to send*, make in the future **j'irai, j'enverrai** [*see* § 64].

2. All the verbs of the second conjugation, which end in **enir**, change that termination into **iendrai**, &c., for the future : as, **tenir**, *to hold*, **venir**, *to come* ; **je tiendrai, je viendrai. Acquérir**, *to acquire* ; **conquérir**, *to conquer* ; **requérir**, *to require* ; **mourir**, *to die* ; and **courir**, *to run*, and its compounds, suppress the *i* of the infinitive in the future : **j'acquerrai, je mourrai, je courrai. Cueillir**, *to gather*, and its compounds, change the i preceding the r into e : **je cueillerai.**

3. In the third conjugation, **s'asseoir**, *to sit down*, and **seoir**, *to sit*, make **je m'assiérai*** and **je siérai. Falloir**, *to be necessary*, **vouloir**, *to be willing*, and **valoir**, *to be worth*, make **il faudra, je voudrai,** and **je vaudrai. Voir**, *to see*, and **revoir**, *to see again*, make **je verrai, je reverrai. Pouvoir**, *to be able*, makes **je pourrai,** and **pourvoir**, *to provide*, **je pourvoirai. Savoir**, *to know*, and **avoir**, *to have*, make **je saurai,** and **j'aurai.**

4. **Être**, *to be*, **faire**, *to make*, and its compounds, are the only verbs of the fourth conjugation which are irregular in the future : **je serai, je ferai,** &c.

5. The futures, simple and anterior, are used in French after an adverb of time, in cases similar to those in which the English use the present and perfect of the indicative, when futurity is implied :—

Quand vous verrez ces messieurs.....	*When you see those gentlemen.....*
Dès que vous aurez reçu cette lettre.....	*As soon as you have received this letter.....*

Miscellaneous Examples.

Irez-vous en France cette année ?	*Shall you go to France this year ?*
Nous irons en France et en Italie.	*We shall go to France and Italy.*
Nous vous enverrons chercher.	*We shall send for you.*
Ne viendrez-vous pas nous trouver ?	*Will you not come to us ?*
Ne nous assiérons-nous pas ?	*Shall we not sit down ?*
Quand ils viendront, j'aurai ma lettre.	*When they come, I shall have my letter.*
Cela vaudra-t-il la peine d'y aller ?	*Will that be worth the while to go there ?*
Cet habit ira-t-il bien ?	*Will that coat fit well ?*
Il faudra leur envoyer de l'argent.	*It will be necessary to send them money.*

Exercise 117.

Avec, *with.*	Lentement, *slowly.*	Permett-re, 4. ir. *to permit.*
Bientôt, *soon.*	March-er, 1. *to walk, to go on foot.*	Plaisir, m. *pleasure.*
Connaît-re, 4. ir. *to know.*	Moi-même, *myself.*	Prêt-er, 1. *to lend.*
Demeure, f. *dwelling.*	Où, *where.*	Sort-ir, 2. ir. *to go out, to leave.*
Fraise, f. *strawberry.*	Part-ir, 2. ir. *to set out,*	
Guitare, f. *guitar.*		

1. Ne viendrez-vous pas nous voir demain ? 2. J'irai vous voir, si le temps le permet. 3. N'enverrez-vous pas chercher le médecin, si votre fils est malade ? 4. Je l'irai chercher moi-même. 5. Quand je serai fatigué, je marcherai plus lentement. 6. Quand vous connaîtrez sa demeure irez-vous le voir ? 7. J'irai le voir aussitôt que je saurai où il demeure. 8. Ne le verrez-vous pas aujourd'hui ? 9. Je le verrai cette après-midi. 10. Ne pourrez-vous point nous accompagner ? 11. Je le ferai avec beaucoup de plaisir. 12. Ne leur enverrez-vous point des fraises ? 13. Je leur en enverrai quand les miennes seront mûres. 14. Ne faudra-t-il pas leur écrire bientôt ? 15. Quand nous aurons reçu des nouvelles de leur parent, il faudra leur écrire. 16. Que ferons-nous demain ? 17. Nous irons à la chasse. 18. N'irez-vous pas chez votre père ? 19. Nous irons certainement. 20. Quand votre guitare sera arrivée, la prêterez-vous ? 21. Je ne pourrai la prêter. 22. À quelle heure partirez-vous demain ? 23. Je partirai à cinq heures du matin. 24. Ne sortirez-vous pas ce soir ? 25. Je ne sortirai pas, et je me coucherai de bonne heure.

Exercise 118.

1. Will you send for the physician ? 2. I will send for him this afternoon. 3. Will not the little girl go and fetch apples ? 4. She will send for some. 5. Will you not sit down when you are tired ? 6. We will not sit down, we have no time. 7. What will your brother do when he is tired ? [R. 5.] 8. He will do what (*ce qu'*) he can. [R. 5.] 9. Will it be worth the while to (*de*) write to him ? 10. It will not be worth the while, for (*car*) he will not come. 11. Will it not be necessary to speak to the merchant ? 12. It will not be necessary to speak to him. 13. Will it be necessary for us to take passports ? 14. It will be necessary (*il le faudra*). 15. Will not your little boy walk more slowly when he is tired ? 16. When he is tired, he will sit down. 17. What will your sister do to-morrow ? 18. She will go to church and to school. 19. Will she not come here ? 20. She will not be able to come. 21. Will you walk or go on horseback ? (*Irez-vous à pied ou à cheval ?*) 22. I shall go on horseback. 23. Why do you not go in a carriage ? 24. Because my carriage is in London. 25. When will you see them ? 26. I shall see them as soon as I can. 27. Will they come to our house to-morrow ? 28. They will do so with much pleasure. 29. When you see that gentleman, will you speak to him ? 30. I will not speak to him. 31. When you have written your letters what will you do ? 32. I shall come to your house. 33. When you have read that book, will you send it to me ? 34. I will send it to you. 35. Will you send it to-day ? 36. I will send it to-morrow. 37. They will come to you to-morrow. 38. Will you gather those beautiful flowers ? 39. Yes, madam, I shall gather them to-morrow. 40. I shall be at your father's to-night, at half-past seven. 41. The tailor will make your coat, and will send it to you in a week.

* This verb has two other forms for the future, viz., **j'asseyerai,** &c., and **j'asseoirai,** &c., which, however, are rarely met with.

SECTION LXII.—THE TWO CONDITIONALS (§ 121).

1. The conditional present is formed from the infinitive by adding to the latter the terminations of the imperfect indicative of the verb **avoir, viz., ais, ais, ait, ions, iez, aient.**

2. Every verb in the French language, regular and irregular, has in this tense the above terminations.

3. Conjugation of the Conditional Present of the Regular Verbs.

Je chanter **-ais**	finir **-ais**	recevr **-ais**	rendr **-ais**	
should or would sing	*finish*	*receive*	*render*	
Tu parler **-ais**	chérir **-ais**	apercevr **-ais**	vendr **-ais**	
shouldst or wouldst speak	*cherish*	*perceive*	*sell*	
Il donner **-ait**	fournir **-ait**	percevr **-ait**	tendr **-ait**	
would or should give	*furnish*	*collect*	*tend*	
Nous chercher **-ions**	punir **-ions**	concevr **-ions**	entendr **-ions**	
should or would seek	*punish*	*conceive*	*hear*	
Vous porter **-iez**	saisir **-iez**	devr **-iez**	perdr **-iez**	
would or should carry	*seize*	*owe*	*lose*	
Ils aimer **-aient**	unir **-aient**	décevr **-aient**	mordr **-aient**	
should or would love	*unite*	*deceive*	*bite*	

4. The irregularities of the conditional appear not in the terminations, but in the *stem* of the verb. They are precisely the same as those of the future. These irregularities will be found in the preceding section, and need not be repeated here.

5. The conditional past is formed from the conditional present of one of the auxiliaries **avoir, être,** and the past participle of the leading verb [§ 121 (2)] :—

J'aurais écrit, je me serais flatté.	*I should have written, I should have flattered myself.*

6. The two futures and the two conditionals should not be used after the conjunction **si** (*if*). But in such case, the present and the imperfect of the indicative should be used :—

S'il peut quitter son père, il viendra.	*If he can leave his father, he will come.*
Si j'étais à votre place, j'irais.	*If I were in your place, I would go.*

KEY TO EXERCISES IN LESSONS IN FRENCH.

Exercise 4 (Vol. I., page 3).

1. Avez-vous le livre du tailleur ? 2. Non, Monsieur, j'ai la montre du médicin. 3. Qui a la montre d'or ? 4. La dame a la montre d'or et le porte-crayon d'argent. 5. Avez-vous le soulier du tailleur ? 6. J'ai le soulier de drap du tailleur. 7. Avons-vous la table de bois ? 8. Oui, Monsieur, vous avez la table de bois. 9. Ont-ils le couteau d'argent ? 10. Ils ont le couteau d'argent. 11. La dame a le couteau d'argent et le porte-crayon d'or. 12. A-t-elle la robe de satin ? 13. La sœur du médecin a la robe de satin. 14. Qui a le bois ? 15. Le frère du charpentier a *le bois*. 16. Avez-vous les bas de laine ? 17. Non, Monsieur, j'ai les bas de coton. 18. Qui a le pain du boulanger ? 19. Nous avons le pain du boulanger et la farine du meunier. 20. Avons-nous le foin du cheval ? 21. Vous avez l'avoine du cheval. 22. Avons-nous le chapeau de soie du tailleur ? 23. Oui, Monsieur, vous avez le chapeau de soie du tailleur et le soulier de cuir du cordonnier. 24. Avez-vous le soulier de drap de la sœur du médecin ? 25. Non, Madame, j'ai la robe de soie de la dame.

Exercise 5 (Vol. I., page 20).

1. Have you some (*or any*) meat ? 2. Yes, Sir, I have a pound of meat. 3. Has your son a piece of bread ? 4. Yes, Madam, he has a piece of bread. 5. Has the bookseller a book ? 6. He has ink and paper. 7. Has your sister a gold watch ? 8. She has a gold watch and a silver thimble. 9. Has the baker wine or beer ? 10. The baker has tea and coffee. 11. Has your brother cheese ? 12. He has cheese and butter. 13. Has the lady a silver spoon ? 14. The lady has a fork and silver spoon. 15. Has the butcher any meat to-day ? 16. Yes, Sir, he has a piece of beef. 17. Has the carpenter a table ? 18. Yes, Sir, he has a *mahogany table*. 19. Have you the physician's book ? 20. No, Madam, but I have your sister's book. 21. Who has coffee and sugar ? 22. The grocer has *coffee and sugar*. 23. Has the bookseller's sister a glove ? 24. No, Sir, but she has a book. 25. Has she a steel pen ? 26. No, Sir, she has a gold pen. 27. You have the physician's pencil-case.

Exercise 6 (Vol. I., page 20).

1. Avez-vous du thé ? 2. Oui, Madame, j'ai une livre de thé. 3. Qui a du pain ? 4. Le boulanger a du pain, du beurre, et du fromage. 5. Le tailleur a-t-il du drap ? 6. Le tailleur a un morceau de drap. 7. Le médecin a-t-il de l'or ? 8. Oui, Monsieur, le médecin a de l'or et de l'argent. 9. La dame a-t-elle une montre d'argent ? 10. Oui, Mademoiselle, la dame a une montre d'argent et une plume d'or. 11. Votre sœur a-t-elle de la soie ? 12. Oui, Monsieur, elle a de la soie et du coton. 13. Avez-vous un couteau ? 14. Oui, Monsieur, j'ai un couteau d'acier et une fourchette d'argent. 15. Avez-vous de la viande aujourd'hui, Monsieur ? 16. Oui, Monsieur, j'ai un morceau de bœuf. 17. Votre charpentier a-t-il une table d'acajou ? 18. Oui, Monsieur, il a une table d'acajou. 19. Votre sœur a-t-elle un *gant* ? 20. Oui, Monsieur, ma sœur a un gant de soie. 21. Le fils du libraire a-t-il un porte-crayon d'or. 22. Oui, Monsieur, il a un porte-crayon d'or et une plume d'acier. 23. Qui a la montre de votre sœur ? 24. Votre frère a la montre d'or et le chapeau de soie. 25. Nous avons de l'or, de l'argent, et de l'acier.

Exercise 7 (Vol. I., page 21).

1. Has the hatter silk ? 2. The hatter has no silk, but he has velvet. 3. Has he cotton velvet ? 4. No, Sir, he has no cotton velvet, he has *silk velvet*. 5. Have you meat ? 6. Yes, Sir, I have meat. 7. The physician has no money. 8. Who has money ? 9. The merchant has no money, but he has cloth, velvet, and silk. 10. Have you *anything* ? 11. No, Sir, I have nothing at all. 12. Has the tailor two silver buttons ? 13. No, Sir, he has two silk buttons. 14. Who has *your dog* ? 15. The neighbour has my cousin's dog. 16. Has he not your horse also ? 17. No, Sir, he has your friend's horse. 18. Have you the history of France ? 19. No, Madam, I have neither the history of France nor the history of England. 20. Have you neither the book nor the paper ? 21. No, Miss, I have neither the one nor the other.

Exercise 8 (Vol. I., page 21).

1. Le boulanger a-t-il du velours ? 2. Non, Monsieur, le boulanger n'a pas de velours. 3. Qui a du velours de soie ? 4. Le chapelier a du velours de soie et un chapeau de soie. 5. Avez-vous *deux boutons* d'argent ? 6. Non, Monsieur, j'ai un habit de drap, un chapeau de soie, et un soulier de velours. 7. Votre voisin a-t-il une table de bois ? 8. Oui, Monsieur, il a une table d'acajou. 9. Votre cousin a-t-il une histoire d'Angleterre ? 10. Non, Monsieur, il a une histoire de France. 11. Je n'ai ni le drap, ni le velours. 12. Nous n'avons ni la viande ni le café. 13. Quelqu'un a-t-il un livre ? 14. Votre cousin a un livre, un habit de velours, et un chapeau de soie. 15. Avez-vous le livre du médecin ? 16. Oui, Madame, j'ai le livre du médecin, et la plume d'or de la dame. 17. Le marchand a-t-il du drap ? 18. Le marchand n'a pas de drap, mais il a de l'argent. 19. Qui a le chien de votre voisin ? 20. Personne n'a le chien de mon voisin. 21. Quelqu'un a-t-il mon livre ? 22. Personne n'a votre livre. 23. Le frère de votre cousin a-t-il quelque chose ? 24. Non, Monsieur, il n'a rien. 25. Qui a le livre de votre ami ? 26. Votre frère a le livre de mon cousin.

Exercise 9 (Vol. I., page 43).

1. Who is sleepy ? 2. My brother is hungry, but he is not sleepy

that attended the worship of "the *image* that fell down from Jupiter;" and such was the terror of the Ephesians that their temple would be destroyed a second time, that, in the words of the sacred historian, "when they heard these sayings they were full of wrath, and cried out, saying, Great is Diana of the Ephesians;" and having assaulted Paul, and created a violent uproar, the mob continued to utter the same cry, without intermission, for the "space of two hours," in the chief city of Asia. (Acts xix. 23—28.)

The temple of Diana, at Magnesia, was built under the direction of Hermogenes. He made its general dimensions the same as for a double range of columns; but, in order to afford more space to the porticoes, he omitted the inner range. Thus a clear space was left between the outer range and the body of the building; and thus he established the style called the *pseudo-dipterick*. Vitruvius speaks with great veneration of this architect. The temple of Minerva Ulea, at Tegea, designed and erected under the direction of Scopas, was of singular construction. The peristyle of the temple was of the Ionic order; the interior was divided into three aisles by two rows of Doric columns, and over these were placed others of the Corinthian order. The sculpture upon the two pediments was executed by the artist himself.

The simplicity and severity of the Doric order having now been abandoned, the artists of Greece Proper, not to be behind the inventors of the Ionic order, by an effort of genius, gave birth to a third order, which surpassed the Ionic in delicacy of proportion and richness of decoration. This order was named the Corinthian. The merit of its invention is generally ascribed to Callimachus, a celebrated sculptor of Athens, who is supposed to have reached the zenith of his fame about 540 B.C. He is said to have taken the idea of this order from observing the leaves of the acanthus growing round a basket which had been placed, with some favourite trinkets, upon the grave of a young Corinthian lady; the stalks which rose among the leaves having been formed into slender volutes by a square tile which covered the basket. In the Corinthian order the column is more elegant, and the capital longer and more ornamented than in the Ionic, spreading in the form of a basket, and commingling the richest and lightest vegetation with the decorations of preceding orders. The top of the capital, instead of being square, assumes the curvilinear form, having angular projections supported by elegant volutes. The mouldings possess more beautiful ornaments than those of the Ionic or the Doric. The frieze is usually ornamented with scrolls of foliage; in the cornice, the corona is supported by modillions, which represent the extremities of the beams of the roof, and are usually carved into a scroll (see Fig. III, *a*.). These elegant improvements introduced into their orders rendered the Greeks the real masters of architecture; because, previous to their invention, the Egyptians and the Asiatic nations in general followed no precise rule in their constructions; but as soon as the orders were founded on rational proportions, of an exact and invariable nature, they were imitated in the edifices of every other nation.

While awarding every credit to the ingenuity of the Greeks, however, it must not be forgotten that in the columns of several temples in Upper Egypt, whose shafts represent bundles of reeds or lotuses bound together in several places by fillets, the capitals are formed by several rows of delicate leaves. In the ruins of Ellora, in India, the capitals of the columns are also composed of similar ornaments; and the Persians, at their great festivals, were accustomed to introduce ornaments of flowers at the tops of the pillars in their public apartments. From tradition, report, or personal observation, Callimachus might be made acquainted with these examples, and might be led to the composition of the Corinthian capital, the chief ornament of the Greek school. The Corinthian order, although distinguished for its richness and even luxuriousness of decoration in all its details, is essentially the most simple in its general character, and easiest in execution. The finest examples of this order were to be seen at Athens, in the monument of Lysicrates, the Tower of the Winds, the Stoa or public piazzas, and the Arch of Adrian, at Athens; the Pantheon of Agrippa, and the three columns of the Campo Vaccino, at Rome. The Corinthian order appears to have been but partially employed in Greece before the time of the Roman conquest; but the Romans themselves employed it to a great extent in every part of their empire; hence it is in edifices constructed under their influence that the most perfect specimens are found. It was only in the construction of temples that the turbulent states of *Greece could unite; and in* consequence of this union, they constructed edifices of great magnitude and splendour. Many of this description were built and maintained at the expense of confederate states, and even of all Greece — such were the temples at Delphi, Delos, Ephesus, Olympia, Eryx, etc.—and these temples had territorial revenues, besides being enriched by private donations. The Greeks appear to have made the greatest progress in the arts, and to have constructed the most admirable of their edifices, during the period from the age of Solon and Pythagoras to the era of Alexander the Great. Their architecture prevailed in the countries where they extended their influence along the coast of Asia. Alexander and his successors introduced it into Egypt, and probably in the cities he built on his route to India. To the westward it extended to Sicily, Italy, and the south of France. After the brilliant period to which we have alluded, the manners of the Greeks became Asiatic; their sublime spirit of independence was subdued; and although they continued for ages to be the instructors of their Roman conquerors, their glory in the arts declined, and with it the purity and elegance of the Greek architecture.

LESSONS IN GREEK.—VII.

INSTEAD of *os* and *ον*, some nouns and adjectives have the terminations *ως* (m. and f.) and *ων* (n.); the *ω* is retained through all the cases; the vocative is the same as the nominative. Though this form occurs in Ionic writers, as Herodotus, yet it bears the name of

THE ATTIC DECLENSION.

	Singular.			
	The people.	*The rope.*	*The chamber.*	*Merciful.*
Nom.	ὁ λεως.	ὁ καλως.	το ανωγεων.	ὁ, ἡ ἱλεως, το ἱλεων.
Gen.	λεω.	καλω.	ανωγεω.	ἱλεω.
Dat.	λεῳ.	καλῳ.	ανωγεῳ.	ἱλεῳ.
Acc.	λεων.	καλων.	ανωγεων.	ἱλεων.
Voc.	λεως.	καλως.	ανωγεων.	ἱλεως. ἱλεων.
	Plural.			
Nom.	λεῳ.	καλῳ.	ανωγεω.	οἱ, αἱ ἱλεω. τα ἱλεω.
Gen.	λεῶν.	καλῶν.	ανωγεων.	ἱλεων.
Dat.	λεῷς.	καλῷς.	ανωγεῳς.	ἱλεῷς.
Acc.	λεως.	καλως.	ανωγεω.	ἱλεως. ἱλεω.
Voc.	λεῳ.	καλῳ.	ανωγεω.	ἱλεῳ. ἱλεω.
	Dual.			
N.A.V.	λεω.	καλω.	ανωγεω.	ἱλεω.
G.D.	λεῷν.	καλῷν.	ανωγεῳν.	ἱλεῷν.

Some words of both the masculine and feminine gender often drop the *ν* of the accusative case, as *ὁ λαγως*, the hare; *τον λαγω*; *ὁ Αθως*, Mount Athos, *τον Αθω*; *ἡ ἑως*, the dawn, always has *την ἑω*.

VOCABULARY.

Αγηρως, -ων, free from old age, deathless (*α*, not; *γηρως*, old age).	Ενεδρευω, I lie in wait, capture.	Μινως, -ω, ὁ, Minos (a proper name).
Αετος, -ου, ὁ, an eagle.	Επαινος, -ου, ὁ, praise.	Νεως, -ω, ὁ, a temple.
Αιχμαλωτος, -ου, ὁ, a prisoner.	Ευχομαι, I pray (with dat.).	Πλειστος, -η, -ον, most, very many.
Ανδρειος, -α, -ον, manly, brave.	Ἡρα, -ας, ἡ, Hera (called by the Latins, Juno).	Πτερον, -ου, το, a feather, wing.
Ανδρογεως, -ω, ὁ, Androgeus (a proper name).	Θηρευω, I hunt, catch.	Ῥαδιος, -α, -ον, easy.
Απ...ω, I lead away.	Θηρευτης, -ου, ὁ, a huntsman.	Σαμιος, -ου, ὁ, a Samian.
Βαινω, I walk, go.	Κτιζω, I found, build.	Σεβομαι, I venerate, worship.
	Λαμβανω, I take.	Ταως, -ω, ὁ, a peacock.
	Μενελεως, -ω, ὁ, Menelaus (a proper name).	Ὑιος, -ου, ὁ, a son.
		Ὡσπερ, even as.

EXERCISE 15.—GREEK-ENGLISH.

1. *Τοις Θεοις νεφ κτιζονται.* 2. *Ου ῥαδιον εστιν επι καλως βαινειν.* 3. *Διωκομεν τους λαγως.* 4. *Ανδρογεως ην ὁ Μινω υἱος.* 5. *Οἱ λαγῳ θηρευονται ὑπο των θηρευτων.* 6. *Ευχου τῳ ἱλεῳ Θεῳ.* 7. *Οἱ αετοι τους λαγως ενεδρευουσιν.* 8. *Σεβεσθε τους ἱλεως θεους.* 9. *Οἱ ανδρειοι αγηρων επαινον λαμβανουσιν.* 10. *Ευχου τον Θεον ἱλεων εχειν.* 11. *Οἱ θεοι τοις αγαθοις ἱλεως εισιν.* 12. *Αἱ ἡδοναι απαγουσι τον πλειστον λεῶν ὡσπερ αιχμαλωτον.* 13. *Οἱ Σαμιοι Ἡρᾳ καλους ταως τρεφουσιν.* 14. *Τῳ ταῳ καλα πτερα εστιν.*

EXERCISE 16.—ENGLISH-GREEK.

1. You build temples to the gods. 2. Temples are built to the gods. 3. I build a temple to God. 4. They walk on ropes. 5. We hunt hares. 6. Hares are hunted. 7. The Samians worship beautiful peacocks. 8. They worship the merciful God. 9. God is merciful (gracious) to good men. 10. Huntsmen hunt hares. 11. Menelaus obtains deathless praise.

VOCABULARY.

Ανοητος, -ον, senseless.	Γαμετη, -ης, ἡ, a lawful wife.	Θηριον, -ου, το, a wild beast.
Απαγορευω, I name.	Δειλος, -η, -ον, timid, cowardly.	Ἱερος, -α, -ον, (gen.), sacred, holy.
Αρεσκω, I please.	Εκφερω, I bring out, produce.	Πλοος (πλοῦς), -ου, ὁ, a voyage.
Βαβυλωνια, -ας, ἡ, Babylon.	Ἑλενη, -ης, ἡ, Helen.	Ποιητης, -ου, ὁ, a poet.
Βασιλειος, -α, -ον, kingly, royal; *τα βασιλεια*, the kingly buildings, *i.e.*, the palace.	Επι (dat.), on account of.	Ῥοδοδακτυλος, -ον, rosy-fingered.
	Επικινδῦνος, -ον, dangerous.	Στηλη, -ης, ἡ, a pillar.

EXERCISE 17.—GREEK-ENGLISH.

1. *Οἱ ταῳ Ἡρας ἱεροι ησαν.* 2. *Θαυμαζομεν Μενελεων επι τῃ αρετῃ* 3. *Οἱ ποιηται την Ἑω ῥοδοδακτυλον απαγορευουσιν.* 4. *Ἡ αληθεια πολλακις ουκ αρεσκει τω λεῷ.* 5. *Ἑλενη ην ἡ Μενελεω γαμετη* 6. *Ἡ Βαβυλωνια εκφερει πδλλους ταως.* 7. *Εν τοις των θεων νεῳς πολλαι στηλαι εισιν.* 8. *Οἱ λαγῳ δειλα θηρια εισιν.* 9. *Ὁ περι τον Αθω πλοῦς ην κινδυνος.* 10. *Τα βασιλεια καλα ανωγεω εχει.*

EXERCISE 18.—ENGLISH-GREEK.

1. Menelaus is admired on account of his bravery. 2. We admire the rosy-fingered dawn. 3. Many peacocks are produced in Babylon. 4. In the temple of Hera is a beautiful peacock. 5. Huntsmen catch peacocks. 6. Peacocks are caught by huntsmen. 7. Good citizens avoid the senseless people.

THE THIRD DECLENSION.

The forms of the third declension in Greek are various, and can be learnt only by attentive practice. Some aid may, however, be given by means of classification.

The variations occur mostly in the singular number, and in the nominative and genitive cases. The forms of the nominative singular, which are numerous, will appear as we proceed, and may therefore be omitted from this table of

THE CASE-ENDINGS OF THE THIRD DECLENSION.

	Singular.	*Plural.*	*Dual.*
Nom.		ες	ε
Gen.	ος	ων	οιν
Dat.	ῐ	σι (ν)	οιν
Acc.	ν or α	ας	ε
Voc.		ες	ε

Neuter nouns have the nominative, the accusative, and the vocative alike. The student who is acquainted with Latin will readily see how much this Greek third declension corresponds with the Latin third declension.

The terminations given above are affixed to the stem. The stem is, in some words, the same as the nominative; thus, *λειμων*, *λειμων-ος*, a meadow, where the ending *ος* is simply added to *λειμων*. In masculine and feminine nouns, however, the stem often appears in the nominative in an altered form. When the stem is so altered, you must find it before you affix the case-endings to it. In order to find the stem, remove the genitive termination from the noun; what remains is the stem; *e.g.*, *κορακος* (of a crow), the *ος* is the sign of the genitive, which being removed, leaves *κορακ* as the stem; and *κορακ* is, for the sake of euphony, lengthened in the nominative into *κοραξ*, that is, *κορᾰξ*; for the laws of sound in Greek endure at the end of a word only these consonants, namely, *ν*, *ρ*, *σ* (*ξ*, *ψ*); the other consonants are either changed or thrown away. Hence the *τ* in the stem of Xenophon is dropped, as *Ξενωφωντ-ος*, *Ξενωφων*. Neuter nouns present the stem in the nominative.

But when a word ends in *τ*, the *τ* is either discarded or changed into *ς*; as:—

Stem.	*Nominative.*	*Genitive.*
πεπερι,	πεπερι, pepper;	πεπερι-ος.
σωματ,	σωμα, body;	σωματ-ος.
τερατ,	τερας, a prodigy;	τερατ-ος.

The accusative has *ν* in masculines and feminines ending in *ις*, *υς*, *αυς*, and *ους*, the stems of which severally terminate in *ι*, *υ*, *αυ*, and *ου*, as:—

Stem.	*Nom.*	*Acc.*
πολι,	πολις, a city;	πολιν.
βοτρυ,	βοτρυς, a bunch of grapes;	βοτρυν.
ναυ,	ναυς, a ship;	ναυν.
βου,	βους, an ox;	βουν.

If the stem ends in a consonant, *α* instead of *ν* is found in the accusative, as *φλεβ*, *φλεψ*, *φλεβα*, a vein; *κορακ*, *κοραξ*, *κορακ-α*, a raven; *λαμπαδ*, *λαμπας*, *λαμπαδ-α*, a torch.

The vocative is the same as the nominative or as the stem. The genders of the third declension are best learnt by practice.

The third declension may be distinguished from the first and the second by the fact that it adds a syllable to the nominative, while in them all the cases have the same number of syllables. Nouns which have the same number of syllables in all the cases are termed parisyllabic (in Latin par, *equal*), and nouns which lengthen the genitive and the cases derived from it, are termed imparisyllabic (Latin im [*in*], *not*). Hence the first and second declensions are called parisyllabic, and the third is called imparisyllabic.

In order to facilitate the acquisition of a knowledge of the nouns of the third declension, and to afford you thorough practice in them, I shall divide those nouns into several classes:*—

1. NOUNS WHOSE STEM ENDS IN A CONSONANT;

and of these I give in the first place—

a. Nouns of which the Nominative gives the pure Stem.

The case-endings are appended to the nominative.

	Singular.			
	The Song of Victory.	*Meadow.*	*Xenophon.*	*Nectar.*
Nom.	ὁ παιαν.	ὁ λειμων.	ὁ Ξενοφων.	το νεκταρ.
Gen.	παιᾶν-ος.	λειμων-ος.	Ξενοφωντ-ος.	νεκταρ-ος
Dat.	παιᾶν-ι.	λειμων-ι.	Ξενοφωντ-ι.	νεκταρ-ι.
Acc.	παιᾶν-α.	λειμων-α.	Ξενοφωντ-α.	νεκταρ.
Voc.	παιᾶν.	λειμων.	Ξενοφων.	νεκταρ.
	Plural.			
Nom.	παιᾶν-ες.	λειμων-ες.	Ξενοφωντ-ες.	νεκταρ-α.
Gen.	παιᾶν-ων.	λειμων-ων.	Ξενοφωντ-ων.	νεκταρ-ων
Dat.	παιᾶ-σι.	λειμω-σι.	Ξενοφω-σι.	νεκταρ-σι.
Acc.	παιᾶν-ας.	λειμων-ας.	Ξενοφωντ-ας.	νεκταρ-α.
Voc.	παιᾶν-ες.	λειμων-ες.	Ξενοφωντ-ες.	νεκταρ-α.
	Dual.			
N.A.V.	παιᾶν-ε.	λειμων-ε.	Ξενοφωντ-ε.	νεκταρ-ε.
G.D.	παιᾶν-οιν.	λειμων-οιν.	Ξενοφωντ-οιν.	νεκταρ-οιν.

The datives plural in full would be *παιανσι*, *λειμωνσι*, *Ξενοφωντσι*, but the *ν* is dropped before *σι* for the sake of euphony.

Απολλων, Apollo; Ποσειδων, Poseidon (in Latin, *Neptunus*), are declined thus:—Απολλων, Απολλων-ος, Απολλων-ι, Απολλων-α, also Απολλω-α and Απολλω, thus making the accusative singular in Απολλω; so Ποσειδω.

Απολλων, Ποσειδων, and σωτηρ, a deliverer, Saviour, have the short vowel in the vocative, as ω Απολλον, ω Ποσειδων, ω σωτερ.

The neuters of this subdivision end in *ρ* (*αρ*, *ορ*, *ωρ*, *υρ*); *το πῦρ*, fire, has *του πῠρος*.

VOCABULARY.

Αιδω, I sing.	Γιγνωσκω, I know.	Θαλλω, I bloom, flourish.
Αναγιγνωσκω, I know again, recognise, read.	Ἑλλην, ὁ, a Greek.	Θηρ, -ος, ὁ, a wild beast.
Βιβλιον, -ου, το, a book (Eng., Bible).	Ἡδεως, pleasantly, with pleasure.	Κιθαρα, -ας, ἡ, a harp.
	Θαλια, -ας, ἡ, a rich feast.	

* This arrangement is taken from the "Elementargrammatik der Griechischen Sprache," von Dr. Raphael Kühner, 13th edit., Hannover, 1852; to which most popular work, as well as to Dr. Kühner's Latin Manuals, the writer is much indebted.

3. Are you right or wrong? 4. I am right, I am not wrong. 5. Have you my brother's good gun? 6. I have not the gun. 7. Are you cold to-day? 8. I am not cold; on the contrary, I am warm. 9. Have you good bread? 10. I have no bread. 11. Are you not hungry? 12. I am neither hungry nor thirsty. 13. Are you ashamed? 14. I am neither ashamed nor afraid. 15. Have we pepper or salt? 16. You have neither pepper nor salt. 17. What book have you? 18. I have my cousin's book. 19. Have you the iron hammer or the silver hammer? 20. I have neither the iron hammer nor the silver hammer, I have the tinman's wooden hammer. 21. Is anything the matter with you? 22. Nothing is the matter with me. 23. Have you the bookseller's large book? 24. I have neither the bookseller's large book, nor the joiner's small book; I have the captain's good book.

LESSONS IN GEOGRAPHY.—XV.

ASTRONOMICAL PRINCIPLES OF GEOGRAPHY.

In our last lesson we endeavoured to explain to our geographical students the nature of the motion of the earth round the sun, and of its motion round its own axis. We there stated the principle or law of attraction in the language peculiar to the science of astronomy, somewhat modified and simplified; but as some of our readers may be entire novices, and may never have heard or understood several of the terms we made use of, we shall in this lesson endeavour to make the subject clearer still.

First, then, as to the said law of attraction: let us illustrate this, by a very familiar instance taken from the heat of a common fire. Suppose two persons, A and B, sitting at the same distance from the fire, both in front of it—at least, the one as much as the other; it is plain that they would both feel the same degree of heat; for, whatever reason may be assigned to show that A received more heat than B, the same reason might be assigned to show that B received more heat than A; therefore, they must both receive the same heat.

Now, suppose that B removes to double the distance that he was at when alongside of A, and that A remains in the same place; it might then be supposed that B would receive only *half* as much heat as he did before; or that A was now enjoying double the heat which B was receiving in his new position. Such is not the case, however; for the degree of heat does not diminish at the same rate that the distance increases, as you might expect at first sight; but it diminishes at a much greater rate, and the question is how much greater? Now, well-conducted and careful experiments in Natural Philosophy have proved that the heat received at the distances of 2, 3, 4, 5, 6, 7, 8, 9, etc., feet, is *not* $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, $\frac{1}{9}$, etc., of the heat received at 1 foot; but it is $\frac{1}{4}$, $\frac{1}{9}$, $\frac{1}{16}$, $\frac{1}{25}$, $\frac{1}{36}$, $\frac{1}{49}$, $\frac{1}{64}$, $\frac{1}{81}$, etc., of the heat received at 1 foot. So that B will receive at *double* the distance of A, only *one-fourth* of the heat which A receives; at *triple* the distance, only *one-ninth* of the heat; and so on.

The law of progression then is as follows:—Let the heat received at the distance of 1 foot be denoted by 1, then the heat received at the distance of 2 feet will be represented by 1 divided by 2 times 2, or $\frac{1}{4}$; the heat received at the distance of 3 feet will be represented by 1 divided by 3 times 3, or $\frac{1}{9}$; the heat received at the distance of 4 feet will be represented by 1 divided by 4 times 4, or $\frac{1}{16}$; and so on.

Now, dividing 1 by any number gives a result which in mathematics is called the *reciprocal* or *inverse* of that number; and multiplying any number by itself gives a result which is called the *square* of that number. But the numbers 1, 4, 9, 16, 25, 36, 49, 64, 81, etc., are the *squares* of the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, etc., because they are found by multiplying the latter numbers each by itself; and the fractions $\frac{1}{1}$, $\frac{1}{4}$, $\frac{1}{9}$, $\frac{1}{16}$, $\frac{1}{25}$, $\frac{1}{36}$, $\frac{1}{49}$, $\frac{1}{64}$, $\frac{1}{81}$, etc., are called the *reciprocals* or *inverses* of the *squares*; and *ratio* means the *rate* at which anything increases or decreases; hence, the force of heat, or quantity of heat received from a common fire, is in the *ratio* of the *inverses* of the *squares* of the distances; or more shortly, *in the inverse ratio of the squares of the distances.*

This may be explained in another way still. Suppose A to be placed at 2 feet distance from the fire, and B at 3 feet distance; then B will receive less heat than A, not in the ratio of 2 to 3, the numbers which represent their distances, but in the ratio of 2 times 2 to 3 times 3, that is, of 4 to 9: in other words, as 4 is contained $2\frac{1}{4}$ times in 9, so A will receive $2\frac{1}{4}$ times the quantity of heat that B receives; and this is all that is really meant by the phrase, *the inverse ratio of the squares of the distances.*

Having thus explained the law of the influence of heat upon two bodies, or any number of bodies at different distances from the source of heat, in the case of a common fire, we again observe that this law is equally true of the influence of light and of the influence of attraction upon bodies at different distances from the source of light and of attraction. Thus we know and feel that the sun is the great source of light and heat to this world of ours; and Astronomy teaches us that it is also the source of attraction, or of that power which has operated upon the earth and the other planets, and which continues still to operate upon them, by causing them to revolve in elliptical orbits or paths round that luminary, as explained in our last lesson.

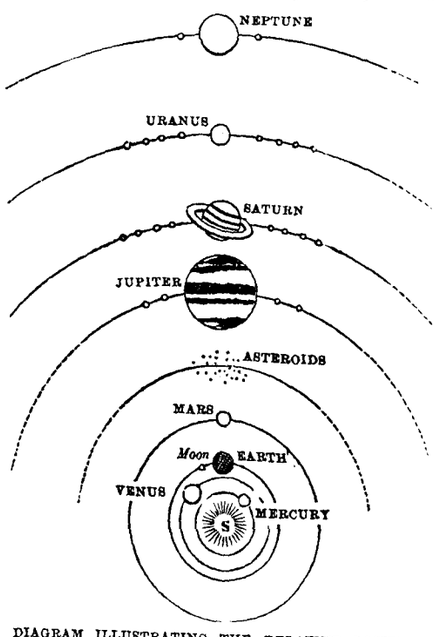


DIAGRAM ILLUSTRATING THE RELATIVE POSITIONS, ETC., OF THE SUN, PLANETS, AND PLANETOIDS.

From the earliest ages up to the time of Kepler, the planets (Greek, πλανητης, pla-ne'-tees, a *wanderer*), or *wandering* stars—so called in opposition to the *fixed* stars, which appear always to preserve the same relative distances from each other—were reckoned to be in number *only six*; and this number being mathematically *perfect*—that is, equal to the sum of all its factors, 1, 2, 3—it was imagined that no more planets could exist, or could be expected to be found. Kepler, indeed, inquired most earnestly *why* the telescope to astronomy, opened a new door in the temple of science, by the discovery of the *four* satellites of Jupiter, in 1610, and led by this discovery to that of the other planets at a later period, which put to flight all reasons why the number of the planets should be limited to any given number. He would be a bold man indeed now-a-days who would try to limit the number of the planets, seeing that so many have been discovered within these few years past.

The six planets known from antiquity are the following:—*Mercury, Venus, the Earth, Mars, Jupiter,* and *Saturn*; no satellite was known from antiquity but the *Moon*. The first addition to the planets of the Solar System was *Uranus*, at first called the Georgium Sidus (*the Georgian Star*), in honour of King George III., by Sir William Herschel, who discovered it, March 13th, 1781. It was afterwards called Herschel, in honour of the discoverer; but it is now called *Uranus*, because, forsooth, Uranus was in the Greek mythology (the fables of the heathen gods) the father of Saturn! Uranus has eight satellites, of which six were discovered by Sir William Herschel. Of these, five have since been observed by other astronomers. The planet *Neptune*, the third in point of size of those that

are yet known to form part of our Solar System, was discovered by Dr. Galle, of Berlin, September 23, 1846, in consequence of a letter received from Leverrier, of Paris, stating that he had calculated the position of a planet outside Uranus which would account for certain irregularities in the motion of that planet, hitherto unexplained, and indicating the part of the heavens in which it ought to be found. Neptune has two satellites. The credit of the discovery of the planet Neptune belongs to Leverrier and Galle, but it should be said that Mr. J. Couch Adams, of Cambridge, had also gone through a series of calculations establishing the existence of this planet, and would have had the honour of being its discoverer, had the French astronomer been a little less prompt in giving publicity to the result of his calculations. By means of the calculations of Mr. Adams, Professor Challis, of Cambridge, also detected the planet simultaneously with Dr. Galle. In 1859 a French physician named Lescarbault asserted that he had discovered a planet, to which he gave the name of *Vulcan*, moving in an orbit within that of Mercury. Leverrier was satisfied at the time that Lescarbault had really lighted on a fresh member of our Solar System, but as no astronomer was successful in detecting it for a considerable time, it was supposed that Lescarbault was mistaken, and that Leverrier gave credit to the supposed discovery because it satisfied an hypothesis he had formed, that a planet existed, moving between Mercury and the sun, and which would be at that time in that part of the heavens in which Lescarbault supposed he had found Vulcan.

At the close of the last century, and for some time prior to this, it was supposed that a planet, which had either escaped discovery or had disappeared from the Solar System, moved in an orbit between those of Mars and Jupiter, for reasons detailed at the close of this lesson. This suspicion was confirmed by the discovery of *Ceres* by a Sicilian astronomer named Piazzi, at Palermo, January 1, 1801, moving between the orbits of Mars and Jupiter. Further research has resulted in the discovery of nearly one hundred of these small planetary bodies having orbits near that of Ceres. These small planets are called planetoids or asteroids. They were at first supposed to be fragments of a shattered planet which once revolved round the sun between the orbits of Mars and Jupiter; but this supposition has been proved to be untenable. The following is a list of the earlier planetoids discovered since the finding of Ceres, with the names of their discoverers and the dates and places of their discovery:—

LIST OF PLANETOIDS REVOLVING BETWEEN THE ORBITS OF MARS AND JUPITER.

No.	Name.	Name of Discoverer.	Place of Discovery.	Date of Discovery.
1	Ceres	Piazzi	Palermo	Jan. 1, 1801.
2	Pallas	Olbers	Bremen	Mar. 28, 1802.
3	Juno	Harding	Lilienthal	Sep. 1, 1804.
4	Vesta	Olbers	Bremen	Mar. 29, 1807.
5	Astræa	Hencke	Driesen	Dec. 8, 1845.
6	Hebe	Hencke	Driesen	July 1, 1847.
7	Iris	Hind	London	Aug. 13, 1847.
8	Flora	Hind	London	Oct. 18, 1847.
9	Metis	Graham	Markree	April 25, 1848.
10	Hygeia	De Gasparis	Naples	April 12, 1849.
11	Parthenope	De Gasparis	Naples	May 11, 1850.
12	Victoria	Hind	London	Sep. 13, 1850.
13	Egeria	De Gasparis	Naples	Nov. 2, 1850.
14	Irene	Hind	London	May 19, 1851.
15	Eunomia	De Gasparis	Naples	July 29, 1851.
16	Psyche	De Gasparis	Naples	Mar. 17, 1852.
17	Thetis	Luther	Bilk	April 17, 1852.
18	Melpomene	Hind	London	June 24, 1852.
19	Fortuna	Hind	London	Aug. 22, 1852.
20	Massalia	De Gasparis	Naples	Sep. 19, 1852.
21	Lutetia	Goldschmidt	Paris	Nov. 15, 1852.
22	Calliope	Hind	London	Nov. 16, 1852.
23	Thalia	Hind	London	Dec. 15, 1852.
24	Themis	De Gasparis	Naples	April 5, 1853.
25	Phocea	Chacornac	Marseilles	April 6, 1853.
26	Proserpine	Luther	Bilk	May 5, 1853.
27	Euterpe	Hind	London	Nov. 8, 1853.
28	Bellona	Luther	Bilk	Mar. 1, 1854.
29	Amphitrite	Marth	London	Mar. 1, 1854.
30	Urania	Hind	London	July 2, 1854.
31	Euphrosyne	Ferguson	Washington	Sep. 1, 1854.
32	Pomona	Goldschmidt	Paris	Oct. 26, 1854.
33	Polyhymnia	Chacornac	Paris	Oct. 28, 1854.
34	Circe	Chacornac	Paris	April 6, 1855.
35	Leucothea	Luther	Bilk	April 19, 1855.
36	Fides	Luther	Bilk	Oct. 5, 1855.
37	Atalanta	Goldschmidt	Paris	Oct. 5, 1855.
38	Leda	Chacornac	Paris	Jan. 12, 1856.
39	Lætitia	Chacornac	Paris	Feb. 8, 1856.
40	Harmonia	Goldschmidt	Paris	Mar. 31, 1856.
41	Daphne	Goldschmidt	Paris	May 22, 1856.
42	Isis	Pogson	Oxford	May 23, 1856.
43	Ariadne	Pogson	Oxford	April 15, 1857.
44	Nysa	Goldschmidt	Paris	May 27, 1857.
45	Eugenia	Goldschmidt	Paris	June 28, 1857.
46	Hestia	Pogson	Oxford	Aug. 16, 1857.
47	Melete	Goldschmidt	Paris	Sep. 9, 1857.
48	Aglaia	Luther	Bilk	Sep. 15, 1857.
49	Doris	Goldschmidt	Paris	Sep. 19, 1857.
50	Pales	Goldschmidt	Paris	Sep. 19, 1857.
51	Virginia	Ferguson	Washington	Oct. 4, 1857.
52	Nemausa	Laurent	Marseilles	Jan. 22, 1858.
53	Europa	Goldschmidt	Paris	Feb. 6, 1858.
54	Calypso	Luther	Bilk	April 4, 1858.
55	Alexandra	Goldschmidt	Paris	Sep. 10, 1858.
56	Pandora	Searle	Albany, U.S.	Sep. 10, 1858.
57	Mnemosyne	Luther	Bilk	Sep. 22, 1859.
58	Concordia	Luther	Bilk	Mar. 4, 1860.
59	Danaë	Goldschmidt	Paris	Sep. 9, 1860.
60	Olympia	Chacornac	Paris	Sep. 12, 1860.
61	Erato	Forster	Berlin	Sep. 14, 1860.
62	Echo	Ferguson	Washington	Sep. 14, 1860.
63	Ausonia	De Gasparis	Naples	Feb. 10, 1861.
64	Angelina	Tempel	Marseilles	Mar. 4, 1861.
65	Cybele	Tempel	Marseilles	Mar. 8, 1861.
66	Maia	Tuttle	Cambridge, U.S.	April 9, 1861.
67	Asia	Pogson	Madras, U.S.	April 17, 1861.
68	Hesperia	Schiaparelli	Milan	April 29, 1861.
69	Leto	Luther	Bilk	April 29, 1861.
70	Panopea	Goldschmidt	Paris	May 5, 1861.
71	Feronia	Peters	Clinton, U.S.	May 29, 1861.
72	Niobe	Luther	Bilk	June 13, 1861.
73	Clytie	Tuttle	Cambridge, U.S.	April 7, 1862.
74	Galatea	Tempel	Marseilles	Aug. 30, 1862.
75	Eurydice	Peters	Clinton, U.S.	Sep. 22, 1862.
76	Freia	D'Arrest	Copenhagen	Oct. 21, 1862.
77	Frigga	Peters	Clinton, U.S.	Nov. 15, 1862.
78	Diana	Luther	Bilk	Mar. 1, 1863.
79	Eurynome	Watson	Ann Arbor, U.S.	Sep. 14, 1863.
80	Sappho	Pogson	Madras, U.S.	May 2, 1864.
81	Terpsichore	Tempel	Marseilles	Sep. 30, 1864.
82	Alcmena	Luther	Bilk	Nov. 27, 1864.
83	Beatrix	De Gasparis	Naples	April 26, 1865.
84	Clio	Luther	Bilk	Aug. 25, 1865.
85	Io	Peters	Clinton, U.S.	Sep. 19, 1865.
86	Semele	Tietjen	Berlin	Jan. 4, 1866.
87	Sylvia	Pogson	Madras, U.S.	May 17, 1866.
88	Thisbe	Peters	Clinton, U.S.	June 15, 1866.
89	Julia	Stephan	Marseilles	Aug. 6, 1866.
90	Antiope	Luther	Bilk	Oct. 1, 1866.
91	Ægina	Stephan	Marseilles	Nov. 4, 1866.
92	Undina	Peters	Clinton, U.S.	July 7, 1867.
93	Minerva	Watson	Ann Arbor, U.S.	Aug. 24, 1867.
94	Aurora	Watson	Ann Arbor, U.S.	Sep. 6, 1867.
95	Arethusa	Luther	Bilk	Nov. 23, 1867.
96	Ægle	Coggia	Marseilles	Feb. —, 1868.
97	Clotho	Tempel	Marseilles	Feb. —, 1868.
98	Ianthe	Peters	Clinton, U.S.	April 18, 1868.
99	Dike	Borelly	Marseilles	May 29, 1868.
100	Hecate*	Watson	Detroit	July 11th, 1868

The additions made to the satellites of the planets since the discovery of those of Jupiter and the ring of Saturn by Galileo, are the following:—M. Huygens discovered *one* of Saturn's satellites in 1665; M. Cassini, *four*, between 1671 and 1685; Sir W. Herschel, *two*, between 1787 and 1789; and Messrs. Lassell and Bond, *one*, September 19th, 1847; making in all *eight* satellites for Saturn. Mr. Lassell has discovered satellites belonging to Neptune. The following is a table of the principal planets of the solar system; their approximate mean distances from the sun; their approximate mean diameters; the

* We are obliged to curtail this list for want of space.

Κρατηρ, -ος, ὁ, a goblet, bowl.	Σπουδαιος, -α, -ον, earnest, or excellent.
Νιζω, I wash.	Τερπω, I delight, τερπομαι (with dat.), I am delighted.
Πλειστοι, -ων, ὁ, very many.	Χειρ, -ος, ἡ, the hand; dat. χερσι, dat. dual, χεροιν.
Πυρ, -ος, το, fire.	Χορος, -ου, ὁ, a choral dance.
	Ψην, -ος, ὁ, a wasp.

EXERCISE 19.—GREEK-ENGLISH.

1. Φευγε τους θηρας. 2. Χειρ χειρα νιζει. 3. Απεχου του ψηνος. 4. Οἱ λειμωνες θαλλουσιν. 5. Οἱ στρατιωται αδουσι παιανα. 6. Εν πυρι χρυσον και αργυρον γιγνωσκομεν. 7. Πολλοι παρα κρατηρι γιγνονται φιλοι πλειστοι δε εχθροι. 8. Οἱ ανθρωποι τερπονται κιθαρᾳ και θαλιᾳ και, χοροις και παιασιν. 9. Οἱ Ἑλληνες τον Απολλω και τον Ποσειδω σεβονται. 10. Οἱ σπουδαιοι μαθηται τα Ξενοφωντος β.βλια ἡδεως αναγιγνωσκουσιν.

EXERCISE 20.—ENGLISH-GREEK.

1. Avoid wild beasts. 2. They avoid a wild beast. 3. Wash the (thy) hands. 4. Keep ye from wasps. 5. A soldier is delighted with the cry of victory. 6. The cry of victory delights soldiers. 7. O earnest scholars, read the books of Xenophon. 8. The books of Xenophon are read by (ὑπο, gen.) earnest scholars. 9. We delight in beautiful meadows (dat.). 10. The meadows bloom. 11. Poets worship Apollo. 12. The poet worships Poseidon.

KEY TO EXERCISES IN LESSONS IN GREEK.—VI.

EXERCISE 11.—GREEK-ENGLISH.

1. Pursue honourable deeds, O beloved youth. 2. Obey the words of thy teacher. 3. Thou learnest excellent things from the excellent. 4. A faithful friend partakes of (your) good and (your) bad things (fortunes). 5. The gods (θεοι) care for men. 6. Men worship (θερᾰπευουσιν) the gods. 7. Danger attends many works. 8. Good things are mixed with bad. 9. The bad man is hostile to (at enmity with) gods and men. 10. Men rejoice in good (men or things). 11. O God, grant good fortune (happiness) to our friends. 12. O slave, bear the wine to the young man. 13. Wine (ὁ οινος) does not dissipate, but begets cares. 14. Glory follows a difficult achievement.

EXERCISE 12.—ENGLISH-GREEK.

1. Οἱ αγαθοι τῳ Θεῳ πειθονται. 2. Ου πειθονται τῳ Θεῳ οἱ κακοι. 3. Πειθεσθε, ω καλοι νεανιαι, τῳ διδασκαλῳ. 4. Οἱ κακοι τοις αγαθοις εχθροι εισιν. 5. Των κακων απεχου. 6. Οἱ σοφοι των παιδων επιμελουνται (φροντιζουσι) 7. Μη τῳ ψευστου λογῳ πιστευε, ω φιλε παι. 8. Πολλοις λογοις επεται κινδυνος. 9. Οἱ εσθλοι νεανιαι τους διδασκαλους θεραπευουσιν.

EXERCISE 13.—GREEK-ENGLISH.

1. Virtue, not time, is the measure of life. 2. Death liberates men from labours and evils. 3. Wine rejoices the minds of men. 4. With ten thousand trials honourable things arise (are produced). 5. The divinity conducts the bad to judgment. 6. A faithful friend in a difficult division (strife) is worth silver and gold. 7. There are many diseases among men. 8. Counsel leads to good. 9. Silence brings honour to a youth. 10. The door is shut by bars. 11. Art nourishes men. 12. O beloved disciples (scholars), strive after wisdom and virtue.

EXERCISE 14.—ENGLISH-GREEK.

1. Τῳ θανατῳ απολυονται των κακων οἱ ανθρωποι. 2. Τῳ βιῳ πολλοι πονοι ἑπονται. 3. Ἡ του Θεου σοφια προς ευδαιμονιαν τους εσθλους αγει. 4. Τοις του κριτου λογοις ἑπου. 5. Οἱ των νεων λογοι εισι κακοι. 6. Ἡ λυρα τιθε τον θειλου μεριμνας λυει. 7. Νεῳ προσηκει ἡ ησυχια. 8. Τους αγαθους τρεφει ἡ τεχνη. 9. Ὁ μοχλος κλειει την θυραν.

LESSONS IN GEOGRAPHY.—XX.

NATURAL DIVISIONS OF THE EARTH'S SURFACE.

THE whole surface of the globe contains, as we have seen in the last lesson (page 166), about 197,000,000 square miles. The land is considered to contain about 52,000,000 square miles; and consequently, the water or sea to contain about 145,000,000 of square miles. This makes the proportion of the water to the land nearly as 13 to 36, or, speaking in general terms, approximately as 3 to 1. The proportion of the land to the whole surface of the earth is about 4 to 15, or rather more than that of 1 to 4. There is much more land in the northern hemisphere than in the southern; and considerably more in the eastern hemisphere than in the western; this may be seen at once by looking at a map of the world; but it is more clearly seen by looking at a terrestrial globe. An accurate idea of the relative proportions of land and water on the earth's surface may be gained from the annexed diagrams, of which Fig. 11 shows the world in eastern and western hemispheres on the meridians of 160° W. long. and 20° E. long.; while Fig. 12 shows the world on the plane of the equator in northern and southern hemispheres; and Fig. 13 the world on the plane of the horizon of London in hemispheres—the one containing the greatest quantity of land, and the other the greatest quantity of water that can be obtained in single hemispheres by any similar bisection of the globe in any plane of a great circle. The land in the northern hemisphere is considered to occupy rather more than *two-fifths* of the whole hemisphere, and the land in the southern hemisphere about *one-eighth* of the whole hemisphere. The land preponderates in the north-eastern quarter of the globe, and the water in the south-western quarter. Scarcely any land has yet been discovered in the south frigid zone, and the limits of the land in the north frigid zone have not hitherto been correctly ascertained. By far the greater portion of the land lies within the north temperate zone; the greater part of the remainder lies within the torrid zone; still less within the south temperate zone; and the least within the north frigid zone. The greater part of the sea lies within the torrid zone; the greater part of the remainder within the south temperate zone; still less within the north temperate zone; and the least within the north frigid zone.

On looking at a globe or map of the world, the student will perceive that all the great and continuous tracts of land, commonly called *continents* (from the Latin continens, *holding together*), become pointed as they stretch towards the south, by which they are made to assume a pyramidal or triangular form at the extremity. The continents of North and South America and of Africa are the most remarkable illustrations of this fact. In consequence of this tendency to taper towards the south, so narrow is the connecting link or neck of land (commonly called an *isthmus*, from the Greek ισθμος, isth'-mos, *a neck*, or *narrow passage*) between North America and South America, that little more than forty miles of land separate Panama from Porto Bello, on opposite sides of the Isthmus of Darien. The southern points of the other two continents are well known; Cape Horn must be considered as that of South America, notwithstanding the Strait of Magellan; and the Cape of Good Hope that of Africa. Here it may be useful to remark that when a tapering point of land projects into the sea, it is called *a cape*, from the Latin caput, *a head*, a figurative but very natural expression for the extremity of the land, which may be considered as the top or vertex of the triangular shape which it assumes when jutting out *from* the continent to which it belongs. When the land thus projecting into the sea is elevated considerably above the sea-level, it is called a *promontory*, from the Latin pro, *in front of*; and mons, *a mountain*—that is, mountain-land in front of the continent. The English term *headland* is often used for capes and promontories on a small scale, connected with the land; so is also the term *naze* or *ness*, from the Saxon næse, or German nase, *a nose*, or projection from the face. With regard to the term *strait*, which is applied to a *narrow passage of the sea* between two continents, or between a continent and an island, or between two islands, it is evidently derived from *streht*, the past participle of the Saxon verb streccan, *to stretch*, and bears the same relation to the water that the term *isthmus* does to the land.

In reference to the continents of Europe and Asia, there is also the general tendency to taper towards the south; in the former continent, however, this tendency is greatly obstructed by the vicinity of the African continent, so that the Iberian Peninsula (Spain and Portugal) does not so manifestly assume the triangular form. Still this tendency is partially developed in various parts of the south of this continent; as in the conformation of Italy and Greece, which taper, but very irregularly, towards the south, evidently in consequence of the feebler action of the Mediterranean Sea, as compared with the full play of the great Atlantic and Pacific Oceans. In the latter continent, the tendency to taper toward the south has been divided in such a manner as to present the three peninsulas of Arabia, India, and Malacca, of which the two former are pretty regular in form; but the latter, in combination with what is called the Eastern Peninsula, is very irregular in this respect.

The term *island* is well known to signify a portion of land, whether large or small, which is completely surrounded by water. This word is derived from the Danish öie, *an eye*, and is literally eye-land, or land so called because it is surrounded by water, as

the eye in the face is encircled with the eyelids and the surrounding skin.

The term *peninsula*, from the Latin pene, *almost*, and insula, originally signified *land nearly surrounded by water*; that is, according to the etymology, *almost an island*: but it is now more frequently applied to the triangular-shaped portions of land which taper in any direction, and jut out from the great continents, as in the three cases above mentioned in Asia. The great European peninsulas have also been mentioned; namely, Greece, Italy, and Spain and Portugal combined; to these may be added the large peninsula of Sweden and Norway, and the smaller peninsula of Jutland or Denmark, the latter of which is an exception to the general rule, as it points northward. The continents of South America and Africa are justly entitled to the name of peninsulas; the former being attached to North America by the Isthmus of Panama or Darien, and the latter to Asia by the Isthmus of Suez. From the consideration of the series of islands which lies between the peninsula of Malacca and the small continent of Australia, there is reason to believe that the latter was in former ages connected with Asia, as South America now is with North America; Australia, and the island of Tasmania, to the south of it (and no doubt originally forming a part of it), then most probably constituting the apex of the great triangular-shaped peninsula (tapering to the south, according to the general law) in which this vast southern continent once terminated. It is further worthy of remark, in speaking of the great continents which become pointed as they approach the south, that their projections most generally terminate abruptly in lofty mountain chains, which there dip beneath the waters of the ocean.

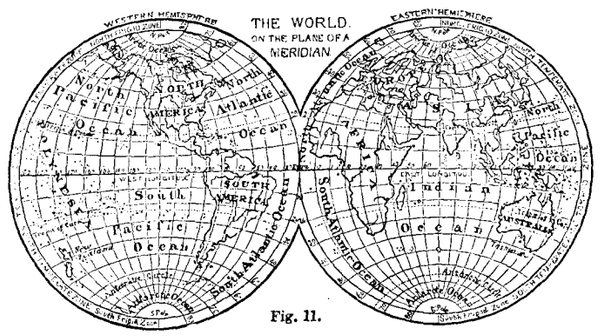


Fig. 11.

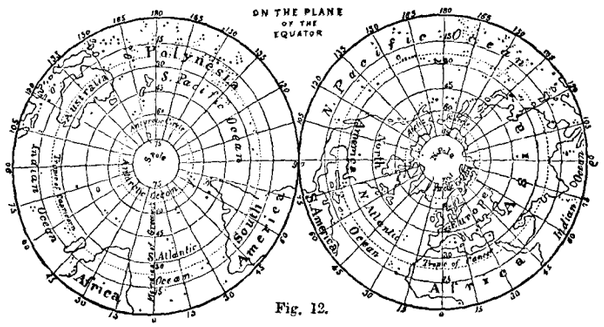


Fig. 12.

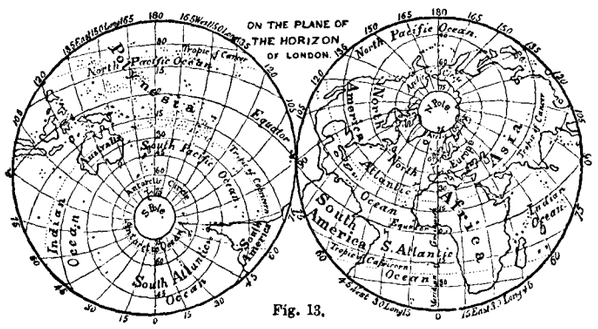


Fig. 13.

In regard to the divisions of the land on the surface of the globe, we find that by the older geographical writers it was divided into four great parts, called *quarters of the world*; namely, *Europe*, *Asia*, *Africa*, and *America*. This division, however, is very incorrect, inasmuch as it leaves out the continent of Australia, the great island of Borneo, etc., and vast groups of smaller islands scattered through the ocean, and valuable for their population and produce. A more common and more accurate division is that of *Europe*, *Asia*, *Africa*, *North America*, *South America*, and *Occania*, six great portions, of which the first five are *continental*, and the sixth *continental* and *insular*. *Occania* is further subdivided by geographers into four parts, namely, *Malaysia* in the north-west, *Australasia* in the south-west. *Micronesia* in the north-east, and *Polynesia* in the south-west. Without regarding artificial divisions, the land on the surface of the globe is naturally divided into *three* great sections, namely, 1st. *The Old World*, in the eastern hemisphere, comprehending the vast, united, triple continent of *Europe*, *Asia*, and *Africa*, which extends from Cape Severo, or North-east Cape, the most northerly point of Siberia, in the Arctic Ocean, to the Cape of Good Hope in the South Atlantic Ocean, a distance of 8,400 miles; and from Cape Verd, the most westerly headland of Africa, in the North Atlantic Ocean, across the Isthmus of Suez to the east coast of China on the Pacific Ocean, a distance of about 9,000 miles. 2nd. *The New World*, in the western hemisphere, comprehending the great, united, double continent of *North* and *South America*, with the neighbouring islands, extending from still undefined limits in the Arctic Ocean to Cape Horn, a distance of about 9,000 miles; and from the western shores of the Atlantic Ocean to the eastern shores of the Pacific Ocean, a distance varying in breadth from 40 to 3,500 miles. 3rd. *Occania*, comprehending the continent of Australia and the groups of islands in the *East Indian Archipelago* or *Malaysia*, *Australasia*, *Micronesia*, and *Polynesia*, the principal of which are the Sunda Isles, the Philippines, Borneo, Papua or New Guinea, Tasmania, New Zealand, and the various clusters of isles scattered far and wide over the Pacific.

The *Old World*, so called because its history is known for a period of nearly 6,000 years, is composed of the *three* great sections denominated continents, namely, Europe in the north-west, Asia in the north-east, and Africa in the south-west, taking Jerusalem as the central point. Europe is separated from Asia by a boundary composed of a mountain chain called the Oural or Ural Mountains; the river Oural or Ural; the Caspian Sea; Mount Caucasus, a range of mountains stretching from the Caspian Sea to the Black Sea; and a chain of inland seas, the Sea of Azov, the Black Sea, the Sea of Marmora, and the Archipelago, the north-eastern arm of the Mediterranean. These four bodies of water are connected by the Strait of Kertch or Yenikale, the Bosphorus, and the Dardanelles. Asia is separated from Africa by the Arabian Gulf and the Isthmus of Suez. Europe is separated from Africa by the Mediterranean Sea.

The *New World*, so called because its history is known only for a period of rather more than 350 years, is composed of two great sections denominated continents, namely, *North America*

inclinations of their axes and orbits to the ecliptic, or path in the heavens in which the sun and planets move; their periodic times, or times of a complete revolution round the sun, as far as they are known; and the axial time of rotation occupied by each planet. Further particulars respecting the planets and their satellites we must reserve for our Lessons on Astronomy, otherwise we shall lose sight of those on Geography. We may remind our readers that the actual existence of Vulcan has since been confirmed. During a total solar eclipse on July 28th, 1878, visible from America, two independent observers, Professor J. C. Watson and Professor Lewis Swift, discovered a light object near the sun, which has since been identified with Lescarbault's planet. In this table the planets are arranged according to their distance from the sun.

TABLE OF THE PRINCIPAL PLANETS OF THE SOLAR SYSTEM.

Names of the Planets.	Astronomical Marks.	Approximate Mean Distances from the Sun in Miles.	Approximate Mean Diameters in Miles.	Inclination of Axes to the Ecliptic.	Inclination of Orbits to the Ecliptic.	Times of Rev. round the Sun in Days.	Times of Rotation upon Axes.
Vulcan	...	13,082,000	...	...	7° 0′	24	...
Mercury .	☿	35,392,600	2,900	63° 0′	7° 0′	88	24h. 5m.
Venus . .	♀	66,131,500	7,510	73° 32′	3° 23′	225	23h. 21m.
The Earth	⊕	91,430,220	7,913	66° 32′	0° 0′	365	23h. 56m.
Mars . .	♂	139,312,200	4,920	61° 18′	1° 51′	687	24h. 37m.
Planetoids	...	...	...	...	...	...	...
Jupiter .	♃	475,693,100	88,390	86° 55′	1° 18′	4,333	9h. 56m.
Saturn .	♄	872,134,600	71,900	58° 41′	2° 29′	10,759	10h. 29m.
Uranus .	♅	1,753,851,000	33,000	...	0° 46′	30,687	9h. 30m.
Neptune .	♆	2,746,271,200	36,600	...	1° 46′	60,127	...

In the preceding table it will be observed that the new planets are found in the space *intermediate* between Mars and Jupiter. These planets were discovered in this space because they were sought for; and the origin of their search is curious. Kepler had discovered that the distance between Mars and Jupiter was anomalous as compared with the distances between the other planets, that it was greater in proportion to their distances from the sun, and he strove by some analogies of Nature to find out the reason, but failed. Titius, a professor of Wittenberg, in Saxony, endeavoured to discover the law of progression in the distances of the planets, and to a great extent succeeded. This discovery was published by Bode, in 1772, in the *Connaissance du Ciel Etoilé*; and hence it is usually called *Bode's law*. It is the following:—Calling the earth's distance from the sun 10, it was found that the distances of the other planets with that of the earth were very near to one another in the proportion of the following numbers:—

Planets—Mercury, Venus, Earth, Mars, Jupiter, Saturn.
Numbers— 4, 7, 10, 16, 52, 100.

On further inquiry it was discovered that these numbers were related as follow:—

$$4 = 4.$$
$$7 = 4 + 3.$$
$$10 = 4 + 3 \times 2.$$
$$16 = 4 + 3 \times 2 \times 2.$$
$$52 = 4 + 3 \times 2 \times 2 \times 2 \times 2.$$
$$100 = 4 + 3 \times 2 \times 2 \times 2 \times 2 \times 2.$$

An inspection of the foregoing series will show that between 16 and 52 there should be another number, $4 + 3 \times 2 \times 2 \times 2$, or 28, to make its progression regular and complete, and this encouraged the belief, originated by Kepler, that there was a planet revolving in an orbit between those of Mars and Jupiter that had not yet been discovered.

That there were good grounds for entertaining this idea was further shown by the discovery of Uranus, when it was found that its distance from the sun represented by 191·93, supposing the earth's distance be 10, agreed closely with the distance at which it should be according to Bode's law, namely, $4 + 3 \times 2 \times 2 \times 2 \times 2 \times 2$, or $4 + 3 \times 64 = 196$. Astronomers in all parts of Europe anxiously searched the field of the heavens for the planet that was supposed to be whirling through illimitable space between the orbits of Mars and Jupiter, and the supposition was shown at last to be true by the discovery of Ceres, the first of the long list of minor planets, by the fortunate Italian Piazzi.

RECREATIVE NATURAL HISTORY.

THE BUTTERFLY.

"WILL he catch it? Does that thoughtless little imp know what a creature of beauty he is trying to crush? Well done, bright fairy of the spring! that last wave of thy sun-tinted wings has carried thee over that blooming hedge now far away from the baffled, puffing, red-cheeked schoolboy." Such were our reflections as we once watched "my noble English boy" in hot pursuit of a "Swallow-tail" (*Papilio* Machaon*) butterfly. (See illustration, page 48.) "Kill, kill," were the words written on young Hodge's face as with determination, worthy of a Briton, he chased the winged type of beauty. At first it seemed two to one in favour of the boy; nearer and nearer he came, up went his cap full at the "Swallow-tail." It was so well aimed, that the insulted butterfly indignantly swept into a neighbouring field, leaving the young hunter in a rage at the useless expenditure of so much toil. To make his defeat more ignominious, the cap had stuck in a thorn bush, from which the little biped did not recover it without sundry pricks and provoking scratches. We rejoiced in the escape of the insect, knowing well that its hunter did not wish to examine the wonders of that tiny "thing of life," but to gratify his bump of destructiveness.

Now we are not going to write the history and adventures of that particular butterfly; we are not certain that we ever saw this particular insect again, but wish to make a few remarks on his relations and friends. In summer they are glancing hither and thither over meads and gardens, and we cannot let such beauties pass unnoticed.

It seems almost an insult to call such a brightly-robed creature an insect, but we must not flatter the proudest butterfly, merely because he wears a fine coat. How vast seems the difference between the abhorred cockroach and the splendid peacock butterfly! yet the latter cannot deny his distant relationship to that creeping thing, hated by all housemaids: both are insects. A long Greek name separates the princes of the insect world from the less honoured orders. *Lepidoptera* (a term meaning scale-winged) is the title of nobility applied by the great Swedish historian of the animal kingdom, Linnæus, to the butterflies and moths. We must pass over the latter for the present, and confine our attention to their less numerous but more admired relations.

The term "butterfly" seems to be unsuitable for an insect which has a taste far too refined for butter. The name was, it is thought, given to the insect by our Saxon ancestors, because it appeared in the butter-making season. Be it so; many a finer name has had a lower origin. Has the butterfly a memory? If so, does the insect recollect the two previous states through which it has passed? Perhaps not; but we must not forget the former condition of our brilliant white admiral, or swallow-tail. First a caterpillar; then cramped in bands and folds, which we call a chrysalis; and, lastly, a winged fairy of the air. Catch that large "White Cabbage," lady butterfly (*Pontia Brassicæ*), and ask her a few questions about "auld lang syne," just to illustrate what are called *metamorphoses*.

On the 1st of May last year—we like to be particular in dates—her grandmother was a bandaged chrysalis, and about the end of the month became a butterfly. Her elegantly-shaped eggs were carefully laid on the under side of nicely-selected cabbage leaves, without permission of the gardener. Mighty was his rage when, in a few days, his choicest cabbages were sawn into the most intricate patterns by a thriving family of ravenous caterpillars. To kill them all was out of the question. Napoleon's artillery might have failed to accomplish that. Many did perish; the sparrows especially delighted in such delicious morsels. One, however, escaped, in consequence of her exceeding cleverness in feeding on leaves concealed from the birds' eyes. Having formed a chrysalis, she secured the cradle-like bit of work to a sunny wall by a strong but elegant silken band.

From this came a butterfly about August, the mother of the one which is supposed to have been just caught by the reader. From her eggs sprang another succession of caterpillars, which changed to chrysalides in September last. Now mark what followed.

* The term *Papilio* is applied to a large butterfly family; *Machaon* is the name of a famous physician present at the siege of Troy, and designates this particular species.

No butterflies came from these chrysalis forms as usual. They must have died of starvation, as winter yields but little indeed of the delicate food required by them. This second series of chrysalides were therefore commissioned to keep the undeveloped insects safely wrapped within their folds through the cold and storms of the winter. In the May of this year, each little cradle gives up its brilliant child to sport with the perfumed zephyrs. Thus, in the course of a twelvemonth, the large white butterfly goes through a twofold round of most wonderful changes.

A question here will naturally arise. How does the cabbage butterfly know that she must deposit her eggs on the cabbage? She does not feed on it, and can have no notion of the food which her brood of caterpillars will require. Here is another of the unanswerable questions which we are accustomed to hush by the reply, "Oh, it is all instinct." Are we one whit the wiser for such an answer? Well, what is to be said? Nothing; or a plain confession, "We don't know why the butterfly always selects the very plant which the caterpillars will need."

Each butterfly may be said to have four epochs in its life—the egg state, the caterpillar, the chrysalis, and the fly. We have used the term chrysalis, what does it mean? Of course all readers know that it is the case or cradle in which the caterpillar takes the butterfly form. The word is derived from a Greek term, signifying *golden*, and was originally applied to the most richly-tinted envelopes of this insect. Sometimes the name *aurelia* (aurum, *gold*) is used to denote these bright forms. Chrysalis is properly applied to the butterflies only, the word *pupa* (a little thing) being the more correct designation for the third state of other insects. Linnæus saw some resemblance between the creature thus tightly packed up in its foldings, and babies bandaged up in close mummy-like wrappers. He therefore employed the term *pupa* to represent this stage of insect life. Let the reader by all means look for some chrysalides, and carefully examine them. He will sometimes see through the fine covering, the body, legs, and wings of the insect, most marvellously packed up in its case. The antennæ, or feelers, as they are wrongly called, are placed in a line with the legs. The long tongue, too, strange as it may sound, is placed straight between the legs; and the wings make a very small but very distinct package. The various parts of the butterfly may often be seen even in the interior of the caterpillar itself, which is thus but the living covering of the yet undeveloped purple emperor or peacock.

Has the reader ever seen a butterfly "coming out" into the world? Let him take the first opportunity, then, of witnessing the operation. How is it effected? The cradle cracks, the wrappers are torn, and the fly extricates itself, standing like a thing most forlorn. No mother is near to "introduce" the stranger; not a single friend to give help—the young butterfly is indeed coldly received by the world. Her very wings are puny things, and her limbs look as if rheumatic. But she has a cheerful heart, soon gets over her first amazement, and one of her earliest operations is to attend to her beauty. Suppose the wings should not open "nicely;" what if there should be a crease in that important part of her wardrobe! her life would be wretched then; the gentlemen would not look at her, and no female of her race would condescend to sip from the same flower. In about an hour, however, all is generally right; the gorgeous wings become fully expanded by the sun's heat, and the beauty sails exulting in the full luxury of life.

Have our friends ever seen a butterfly in the winter? The very question may seem absurd. How can the symbol of flowery summer live amid the snows of December? The surprise is natural; but some butterflies do live through the season of frost and tempest; in other words, they *hybernate*; sleep comes on them in some sheltered nook as winter approaches, and lasts, with a few breaks, till the return of spring. Sometimes a mild day, even in January, will rouse the sleepers, and they come out for a short airing, to the astonishment of the schoolboy or the young lady out for a walk. One of these hybernators is the brimstone butterfly, common in parts of Devonshire, Suffolk, and Essex. The small tortoiseshell butterfly is another species, sometimes seen on warm days in winter sailing merrily along under the shelter of some friendly hedge.

Now let us pause a minute to examine the wings of our butterfly. Touch them not; the friction of the softest finger will act like a rough file on the richly-tinted mosaic work of those wings. We all know how "the feathers" are rubbed off by the slightest touch. But what are these so-called feathers? They are really scales, laid upon the wings much in the manner of slates or tiles upon a roof. Get a microscope, and examine those of the "Peacock" or "Red Admiral." No unaided eye can discern the minute wonders. The brilliant, numerous, and diversified tints of the scales are beyond all verbal description and all artistic imitation. Few will talk of human skill in the combination of colours when those fairy-like tintings have once astonished the eye. Then consider the almost countless number of tinted scales on one wing. A mosaic picture has been exhibited, containing 870 distinct pieces in one inch of work. The delicacy of such mechanism might well excite admiration. What shall we say when we find more than 100,000 living pictures and richly-dyed scales on a square inch of a butterfly's wing?

Let us now turn to the head of our butterfly. What do we see there? The two "feelers," or antennæ, at once claim a notice. By the form of these the butterflies are readily distinguished from moths. Is the tip of the antennæ *knobbed*? then the insect is most likely a butterfly; if not, it is a moth. What is the use of these organs? Here we ask a favour from our readers: will they oblige us by putting that question to the most eminent philosopher of their acquaintance? Should he be able to answer decisively, will readers further oblige by communicating the replies with the *proofs*? We regret to say that these antennæ are the teasers of naturalists. We know not what to make of them. Whether the provoking insect feels, sees, hears, or smells with them, no one knows. A pretty confession is this for men to make, who have weighed the earth, and tested the minerals in the sun. "How like a god is man," says Shakespeare. It may be so; but we cannot forget that all our science is puzzled by the "feelers" of a butterfly. Some think the antennæ contain a sixth sense unknown to human beings; but this is only an attempt to escape from a puzzle by a guess. The experiment which suggested this notion was, perhaps, the following:—A female of one of the day moths, called the "Kentish Glory," which had been bred from the chrysalis in a house, was enclosed in a box, and taken into a wood frequented by her species. The box being laid on the ground, in a short time a number of the male moths settled on it. Yet a person might have frequented that locality for days without seeing one of the insects. This experiment has been often made with success. By what sense did these moths discover the presence of the lady? Not by sight—she was hidden; not by hearing—she uttered no cry. It is no marvel if some ascribe this strange power to a mysterious sense lodged in the antennæ. Does any one ask why the term *antennæ* was applied to these organs? The word denoted among the ancients the yard or mast of a ship, and was subsequently given to these "feelers" from a fancied resemblance to the projecting spars of a vessel. We have not done with the head of the butterfly yet. Look next at the eyes. Of course every one, in the year 1868, knows that the eyes of all insects are *compound*; in other words, that what seems one eye only consists of many thousands. The reader would be puzzled to count these butterfly eyes, even by the aid of a powerful microscope. But the calculation has been made by men who have devoted years to the study of insect structure. The eye of a butterfly contains, in reality, about 17,000 eyelets, giving to our gaudy insect 34,000 in all. Each little eye is a perfect organ in itself, six-sided, or hexagonal, in shape, so that the whole collection resembles the cells in a honey-comb—17,000 eyes all arranged in that small space! Yes, it is so. Some speculative readers may inquire why this creature has been endowed with eyelets in thousands. We must beg to be excused from answering so profound a question. Of course no one will suppose that when a butterfly looks on a female of his species he sees 34,000 fluttering beauties before him. As the two human eyes do not double objects, so the numerous lenses of the "Purple Emperor" may combine to form but one image. But some of these insects have also two *simple* eyes on the top of the head, so that we must confess ourselves to be altogether inferior in the matter of eyes to the "Swallow-tail" or the "Peacock."

We must now take a look, with his permission, at the butterfly's mouth. The insect luxuriates in such refined food that teeth are needless, and strong jaws not wanted. What does the observer see in the mouth? He finds a long tube, like a trunk, and also notes that the organ can be folded up, like a watch-spring, out of harm's way, when the animal is not making its breakfast on the delicious nectar of a summer flower. A closer

and *South America*, which are connected with each other by the Isthmus of Darien or Panama (pronounced *pan-a-mar'*). Between these continents, on the eastern side, north of the equator and within the torrid zone, are situated the *West Indies*, a range of islands stretching in a curved line from the Gulf of Florida to the mouth of the Orinoco. South of Asia, and east of the Arabian Sea, consisting partly of the continent and partly of the islands south of it, are situated the *East Indies*, lying almost wholly within the torrid zone, and comprehending the peninsulas of India and Further India, Hindostan within and India beyond the Ganges, with the island of Ceylon and the group of islands denominated the East Indian Archipelago, the Asiatic Archipelago, or Malaysia. Sumatra, Borneo, and Celebes, the principal of these islands, are situated directly under the equator.

The relative position of the greater part of the places mentioned in this lesson may be ascertained from an inspection of the figures in the preceding page, or the Map of the World in page 144. Our readers will find it useful, when studying our Lessons in Geography, to make a map of the world on a large scale according to the directions given in the last lesson, and to mark in the position and name of each place, as soon as it occurs for the first time.

LESSONS IN ARITHMETIC.—XXIX.

PRACTICE.

8. *Definition.*—Any fraction of a quantity the numerator of which is *unity*, is called an *aliquot* part of that quantity.

Thus 4s. and 6s. 8d. are each aliquot parts of a pound, being respectively $\frac{1}{5}$ and $\frac{1}{3}$ of it.

In finding the value of any given compound quantity from the given value of any other given quantity of the same kind, a convenient form of multiplication, called *Practice*, is often employed. It depends, as will be seen, upon the principles of fractions and the judicious choice of aliquot parts.

9. EXAMPLE 1.—Find the value of 3589 cwts. at £1 11s. 6¾d. per cwt.

This might be effected in various ways. We might, for instance, reduce the money to farthings, multiply by 3589, and then reduce the result to pounds, shillings, and pence; or we might reduce the money to the fraction of a pound, and then, multiplying by 3589, reduce the resulting fraction to pounds, shillings, and pence. But we may also evidently obtain a correct result if we divide the whole sum into portions, multiply each of these portions separately by 3589, and then add the results together. This we are able to do, simply by the aid of aliquot parts, as follows:—

	£	s.	d.
3589 cwts. at £1 per cwt.	£3589	0	0
Since 10s. is $\frac{1}{2}$, 3589 cwts. at 10s. each will cost $\frac{1}{2}$ of £3589, or	1794	10	0
Since 1s. is $\frac{1}{10}$ of 10s., 3589 cwts. at 1s. each will cost $\frac{1}{10}$ of the same number at 10s. each, or $\frac{1}{10}$ of £1794 10s., which is	179	9	0
Since 6d. is $\frac{1}{2}$ of 1s., 3589 cwts. at 6d. each will cost $\frac{1}{2}$ of the same number at 1s. each, or $\frac{1}{2}$ of £179 9s., or	89	14	6
Since ½d. is $\frac{1}{12}$ of 6d., 3589 cwts. at ½d. each will cost $\frac{1}{12}$ of the same number at 6d. each, or $\frac{1}{12}$ of £89 14s. 6d., which is	7	9	6½
Since ¼d. is ½ of ½d., 3589 cwts. at ½d. each will cost ½ of the same number at ½d. each, or ½ of £7 9s. 6½d., which is	3	14	9¼
Hence 3589 at £1 + 3589 at 10s. + 3589 at 1s. + 3589 at 6d. + 3589 at ½d. + 3589 at ¼d. will cost	£5663	17	9¾

The above is the explanation of the process, which may be arranged as follows:—

			£	s.	d.
3589 cwts. would cost at £1 per cwt.			3589	0	0
10s. which is	½	of £1	1794	10	0
1s. „	$\frac{1}{10}$	of 10s.	179	9	0
6d. „	$\frac{1}{2}$	of 1s.	89	14	6
½d. „	$\frac{1}{12}$	of 6d.	7	9	6½
¼d. „	½	of ½d.	3	14	9¼
			£5663	17	9¾

10. If the quantity whose value is to be found, and also the price given, be each expressed in various denominations, then a somewhat different method must be adopted.

For instance, suppose it to be required to find the value of 375 cwt. 3 qrs. 21 lbs. at £4 14s. 6d. per cwt.

First find the value of 375 cwt. at £4 14s. 6d. per cwt. by the previous method. This will be done as follows:—

	£	s.	d.
375 cwt. would cost at £1 per cwt.	375	0	0
„ „ „ „ £4 „ „	1500	0	0
10s. which is ½ of £1	187	10	0
4s. „ ⅕ of £1	75	0	0
6d. „ $\frac{1}{40}$ of 4s.	9	7	6
	£1771	17	6

Again, by the previous working—

				£	s.	d.
1 cwt. would cost				£4	14	6
375 cwt. would cost				1771	17	6
2 qrs.	„	½ of 1 cwt., or		2	7	3
1 qr.	„	½ of 2 qrs., or		1	3	7½
14 lbs.	„	½ of 1 qr., or		0	11	9¾
7 lbs.	„	½ of 14 lbs., or		0	5	10¾ ½
Therefore 375 cwt. 3 qrs. 21 lbs. would cost				£1776	6	1 ½

The fraction being ½ of a farthing. If, however, the fractional part of the farthing were put in terms of a fraction of a penny, the result would be written £1776 6s. 1½d.

11. Sometimes, by inspection, we can see that one or both of the compound quantities which are expressed in different denominations can be simply expressed as a fraction of one of the denominations. This will much simplify the operation.

EXAMPLE.—Find the value of 24 cwt. 1 qr. 9 lbs. 5⅓ oz. at £2 5s. 6d. per cwt.

Here it is readily seen that 1 qr. 9 lbs. 5⅓ oz. is ⅓ of a cwt.

Hence the question is reduced to finding the value of 24⅓ cwt.

			£	s.	d.
24 cwt. would cost at £1 per cwt.			24	0	0
„ „ „ „ „ £2 „ „			48	0	0
5s. which is	¼	of £1	6	0	0
6d. „	$\frac{1}{10}$	of 5s.	0	12	0
At £2 5s. 6d.			54	12	0
⅓ cwt. would cost			0	15	2
			£55	7	2 Ans

12. If *both* commodity and price are easily expressible by fractions, it will generally be found most convenient to treat the question as in the following

EXAMPLE.—Find the value of 15 cwt. 2 qrs. 7 lbs. at £1 6s. 8d. per cwt.

$$15 \text{ cwt. } 2 \text{ qrs. } 7 \text{ lbs.} = 15 + \tfrac{1}{4} + \tfrac{1}{16} = 15\tfrac{5}{16} \text{ cwt.}$$

£1 6s. 8d. = £1⅓.

Hence the required value will be $15\frac{5}{16} \times 1\frac{1}{3}$ pounds,

Or, $\frac{\frac{80}{5}}{\frac{16}{4}} \times \frac{4}{3} = £\frac{80}{4} = £20\frac{0}{4} = £20\ 15s.$

13. In employing the method of practice, a good deal must be left to the student's judgment as to dividing the compound quantity into separate portions, so that the aliquot parts shall be the most convenient.

Tables of aliquot parts of £1, of a hundredweight, an acre, etc., are drawn up for the convenience of persons much engaged in calculations; but the learner had better trust to his memory and knowledge of fractions in solving any question of the kind with which he may be concerned.

EXERCISE 48.—EXAMPLES IN PRACTICE.

Find the cost of

	£	s.	d.	
1. 1625 yards at	0	2	8½	per yard.
2. 1429 yards at	1	2	9	per yard.
3. 749 yards at	0	5	8	per yard.
4. 1689 yards at	0	4	10½	per yard.
5. 2476 yards at	0	18	6	per yard.
6. 313 cwt. at	0	8	8	per cwt.
7. 9999 tons at	7	17	6	per ton.
8. 5926 articles at	0	11	8	each.
9. 1000 articles at	5	7	6	each.
10. 2010 articles at	6	8	10½	each.
11. 89 articles at	3	11	5¼	each.
12. 535 articles at	1	5	10	each.
13. 112 cwt. 1 qr. 17 lbs. at	8	11	4	per cwt.
14. 271 cwt. 1 qr. 14 lbs. at	0	15	9½	per cwt.
15. 98 cwt. 3 qrs. 16 lbs. at	3	18	6	per cwt.
16. 219 cwt. 3 qrs. 11 lbs. at	2	11	9¾	per cwt.
17. 732 lbs. 5 oz. 13 dwts. at	1	3	7½	per lb.
18. 814 lbs. 9 oz. 16 dwts. at	1	13	4	per lb.
19. 912 yds. 2 qrs. 3 na. at	1	19	8	per yard.
20. 136 yds. 3 qrs. 1 na. at	1	1	1¼	per yard.
21. 897 a. 3 r. 32 p. at	2	2	2½	per acre.
22. 87 qrs. 4 bush. 2 pks. at	1	17	4	per quarter.
23. 996 qrs. 7 bush. 1 pk. at	2	4	8	per quarter.

KEY TO EXERCISE 47, LESSON XXVIII. (Vol. II., page 142).

1. 16s.; 17s. 6d.; 7½d.
2. 5s. 10d.; 5¾d.; 3s. 6d.
3. 6 oz. 13⅓ drms.; 12 dwts. 12 grains; 64 lbs.
4. 12 cwt. 56 lbs.; 2 ft. 4½ in.; 2 yds. 2¼ in.
5. 4 fur. 97 yds. 2 ft. 4 in.; 2 qts. 1¼ pts; 1¼ gals.
6. 46 m. 40 sec.; 22½ sec.; 17′ 8½″.
7. 2 m. 2 fur. 211 yds. 2 ft. 6½ in.; 3 d. 19 hrs.
8. £4 16s.; 2s. 0¼d.
9. $\frac{5}{16}$f.
9. 1s. 6d.
10. £88.
11. £2.
12. £1.
13. 12s. 9d.
14. 15s. 10d.
15. 11s. $0\frac{4}{11}$d.
16. $\frac{7}{36}$; $\frac{11}{45}$; $\frac{221}{450}$.
17. $\frac{209}{320}$; $\frac{7}{480}$; $\frac{3737}{9600}$.
18. $\frac{77}{720}$.
19. $\frac{7}{20}$.
20. $\frac{1}{5}$.
21. $\frac{7}{1000}$.
22. $\frac{3}{8}\frac{4}{4}\frac{3}{1}$.
23. $\frac{1}{4}$.
24. $\frac{1}{1}\frac{7}{4}\frac{5}{1}$.
25. $\frac{1}{3}\frac{1}{2}\frac{1}{4}\frac{5}{0}$.
26. $\frac{6}{2}\frac{5}{4}$.
27. $\frac{8}{1}\frac{0}{3}\frac{0}{4}$.
28. 2688 minutes.
29. $\frac{7}{20}$.
30. $\frac{1}{2}\frac{9}{0}$.
31. £9 12s.
32. 335160 square feet.
33. 61 yds. 2 ft. 4 in.

GREAT BOOKS.

VII.—THE PILGRIM'S PROGRESS.

PROBABLY the most universally-read book in the world, after the Bible, is "The Pilgrim's Progress" of John Bunyan, tinker, itinerant preacher, enthusiast, and visionary. Of this famous work it is recorded that it has been reproduced in every language, and in almost every dialect, of civilised Europe; while at the same time it has been translated into the speech of many savage races.

Bunyan was a man of very humble origin, born at Elstow, near Bedford, in the year 1628. His family had been tinkers for several generations, and as tinkers in those days were often gipsies, it has been inferred from this circumstance that the author of "The Pilgrim's Progress" belonged to the so-called Bohemian race. However this may have been (and the fact seems far from established), it is certain that the education of Bunyan, though not entirely neglected, was very slight, and that his surroundings were of a nature rather to extinguish than to develop any literary capabilities which may have lain dormant within him. His early life, if we may rely on the account which he himself afterwards gave of it, was passed in the midst of coarse indulgences, and he appears to have been generally regarded as a vagabond. Doubtless he was not nearly so bad as his awakened conscience supposed; yet it can hardly be questioned that his manners were sufficiently objectionable. A woman of profligate life told him one day that he was the ungodliest fellow for swearing that she had ever heard in her life, and that his oaths made her tremble. At an early age, however, his mind was directed to religious topics, and it was not long before he was drawn into the full vortex of that Puritan excitement which distinguished the middle of the seventeenth century.

It was in Bedford Jail that the First Part of "The Pilgrim's Progress" was composed, and it is apparently to this circumstance that the author alludes in the opening sentence of the allegory:—"As I walked through the wilderness of this world, I lighted on a certain place where was a den; and I laid me down in that place to sleep; and as I slept I dreamed a dream." He was imprisoned for unlawful preaching, and lay in Bedford Jail from 1660 to 1672. After his release, he employed himself, for the remainder of his life, in the duties of the ministry, and died in 1688, at the age of sixty. That a man of mean acquirements, whose knowledge of literature must have been small indeed, should yet have been able to compose a work full of such powerful and impressive writing as the story of Christian and his trials, is surprising until we consider all the facts of the case. It should be borne in mind that the Elstow tinker lived in an age of strong intellectual excitement—an age, moreover, in which the English language had not yet lost the native force and vigour by which it had been characterised in the days of Elizabeth. The purely literary style of the eighteenth century had not arisen. Milton and Sir Thomas Browne, it is true, were introducing a more scholarly and academic manner into our prose; but such examples were probably unknown to Bunyan, or at any rate did not influence him. His power over the language was derived from the same source which supplied him with his principles—from the English Bible of the reign of James I. His incessant study of the Old and New Testaments not merely fashioned his mind, but prompted his utterance; and it may be safely affirmed that no other course of reading could have given him so thorough a mastery of the kind of expression that he needed for his purpose. "Bunyan," says Hallam, "saw and makes us see what he describes; he is circumstantial without prolixity, and in the variety and frequent changes of his incidents never loses sight of the unity of his allegorical fable. His invention was enriched, or rather his device determined, by one rule he had laid down to himself—the adaptation of all the incidental language of Scripture to his own use. There is scarcely a circumstance or metaphor in the Old Testament which does not find a place, bodily and literally, in the story of 'The Pilgrim's Progress;' and this particular artifice has made his own imagination appear more creative than it really is." "The style of Bunyan," says Macaulay, "is delightful to every reader, and invaluable as a study to every person who wishes to obtain a wide command over the English language. The vocabulary is the vocabulary of the common people. There is not an expression, if we except a few technical terms of theology, which would puzzle the rudest peasant." In that fact lies one of the principal secrets of the immense popularity enjoyed for two centuries by "The Pilgrim's Progress." Bunyan knew exactly what he wanted to say, and he knew exactly how to say it.

It is certainly a rare testimony to a work of fiction when it can be said that it has attracted the regards both of the illiterate and the cultured. Such is the case with the narrative of Bunyan. It has been read in countless cottages; it has been equally the delight of scholars. Dr. Johnson ranked "The Pilgrim's Progress" among the very few books of which the reader, when he comes to the conclusion, wishes they had been longer. Cowper spoke of it in terms of the highest praise. Southey admired it for its imagination and its style. Sir Walter Scott preferred its allegory to the allegory of Spenser. Macaulay said that the latter half of the seventeenth century produced only two great creative minds—Milton's and Bunyan's. And these judgments have been ratified by general consent. With artists, also, "The Pilgrim's Progress" has long been a favourite, and the subjects of some of the best book-illustrations have been derived from its marvellous pages.

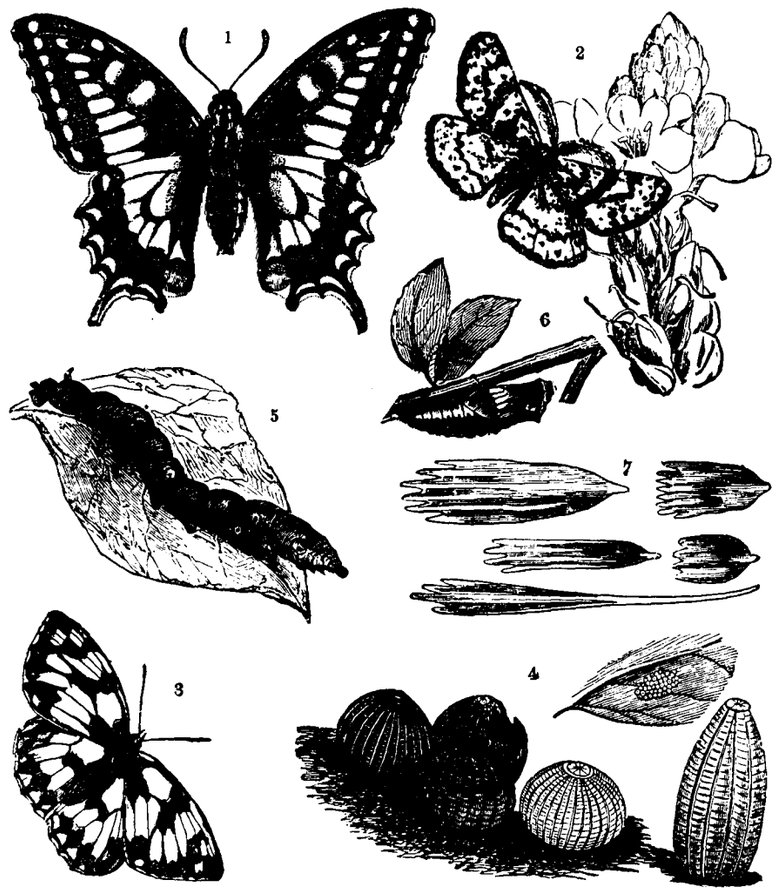
Bunyan wrote several works besides that by which he is mainly known. The number of his tracts on doctrinal subjects is very large, and he has given an account of his religious experiences in the book entitled "Grace Abounding to the Chief of Sinners." This is in fact an autobiography, and contains a vivid and interesting picture of the writer's mental struggles in pursuit of what he regarded as a state of sanctification. His opinions were those of the most extreme Calvinism; but his great allegory will always be read even by many who disagree with some of the theological conclusions which it is designed to recommend.

LESSONS IN DRAWING.—XIX

THE HUMAN FIGURE.

WE now enter upon the study of the human figure, a subject of quite a different character to any which have gone before—one that requires the closest attention and all the energies of the draughtsman to accomplish. No one must entertain a slight idea of the necessary amount of perseverance it demands. We have frequently heard it remarked that "he who can draw the figure well, can draw anything else besides." This may be true to a certain extent, but it does not follow, as a necessary consequence, that they who are capable of drawing the form of man are always equally successful with landscape. The above assertion in the abstract may be considered true with this addition—"he who can draw the figure well *may very soon be able* to draw anything else besides," for in connection with free-hand drawing—*and figure drawing is purely free-hand*—there is no

inspection shows a remarkable bit of living mechanism. The trunk is found to consist of three sucker-like tubes, secured in an elegant case, the whole protected from injury by horny defences and supports. This complex tube is not thicker than a hair, and through this all the food of the butterfly must be conveyed. Does not so fine a tube get clogged up sometimes from the thick flowery juices in which the winged beauty delights? Yes, there is a liability to this; for, though a butterfly cannot have toothache, he is not quite free from all accidents. What does the insect do then? Clears out his trunk, of course, the mechanism of the central tube allowing it to be opened for this purpose. Is not this a beautiful provision, enabling the butterfly to be its own surgeon in so dangerous a crisis? "Doth God care for oxen?" is a question put in an ancient book. It is also clear that the wants of a butterfly have been wonderfully cared for by the Creator. A whole paper might be filled with the description of the sucker or trunk of the butterfly. We can only state here that it seems to be formed of a countless number of fine elastic rings, moved by a multitude of muscles. Some naturalists have supposed the muscles in this small and delicate organ to exceed in number those in the elephant's trunk: these are estimated at 70,000. Space does not admit of our saying more about the marvels to be seen on the head of a butterfly.



1. SWALLOW-TAIL BUTTERFLY (PAPILIO MACHAON). 2. FIDONIA PLUMISTARIA. 3. MARBLED WHITE BUTTERFLY (PAPILIO GALATHEA). 4. EGGS OF BUTTERFLIES. 5. CATERPILLAR. 6. CHRYSALIS. 7. SCALES OF BUTTERFLIES' WINGS.

We have but a few lines to remark that the nerves and digestive system of the butterfly have been closely examined by naturalists, and would require a volume to describe them fully. "As giddy as a butterfly" is a remark applied to some pretty bipeds; but the insect's so-called giddiness is really its work, by which it gets its living, speeding from flower to flower for food. A "Purple Emperor's" brain may be as much taxed by these labours, as that of the said biped's, by reading three sets of novels in one week. The nervous system of the butterfly is near the stomach, so that "weak nerves" must tell upon the digestion of a "Blue Argus" or "White Admiral." It will easily be imagined that the nerves connected with the complex eye and wonderful trunk of a butterfly must form an elaborate microscopical system. When speaking of a butterfly's brain, we allude rather to the whole nervous mass than to one organ, like that found in the larger animals. The brains of insects may in truth be called *many*. If we insist upon finding *one* brain, the first knot, or ganglion as it is called, in the spinal marrow, may be so regarded. The same remark must be made respecting the heart, which is not one organ, but consists of numerous circulating vessels. A butterfly may be as truly said to have many hearts as one.

The nine air-holes on each side, eighteen in all, may be regarded as so many nostrils by which the air enters. Naturalists call them spiracles.

How many species of these insects are found in Britain? About 70; but some are only met with in limited districts, and few persons have seen them all in their native haunts. The total number of known species is about 3,000.

Readers who wish to make a collection should endeavour to obtain the caterpillar, chrysalis, and butterfly of each species; they will then possess a specimen of each form of life through which the insect passes. No one will, of course, run a pin through a butterfly to secure it, before either killing or benumbing the creature, by placing it in a vessel, into which some chloroform has been dropped. The captive may also be killed by a "nip," or pinch between the wings. The "hug" is fatal to the whole family.

Poets, philosophers, and theologians have used the butterfly to illustrate their sentiments. The ancients regarded the bright ethereal creature as a symbol of the human soul, searching after a higher home and a more perfect life. A noble being, called Psyche (*the soul*), was described as falling in love with visible beauty, then losing through her folly the bright possession, and after a sorrowful search, finding again the long-lost and glorious prize. This Psyche was represented under the form of a butterfly, and such marbles may be seen in the Townley Collection in the British Museum. We all know that Christians have long deemed the uprising of so bright a form, from the chrysalis-like grave, as a type of the resurrection. Thus, even a butterfly, sculptured on a tomb, may suggest a volume of rich and ennobling thoughts.

LESSONS IN GEOMETRY.—XV.

PROBLEM XXXV.—*To find the centre of any given circle, or of any given arc of a circle.*

Let A B C (Fig. 53) be the given circle of which it is required to find the centre. First, draw any straight line, A B, dividing the circle into two unequal segments. Bisect A B in D, and through the point D draw the straight line E C at right angles to A B. Bisect E C in F. The point F is the centre of the circle A B C.

There are other methods by which the centre of the circle A B C may be found, although the one that has just been described is perhaps the most simple. For instance, we might have drawn the straight lines G H, K L as tangents to the circle A B C, through the points A and B, and at the points of contact, A and B, drawn the straight lines A N, B O, at right angles to the straight lines G H, K L, and intersecting each other in the point F; from which we learn that if any two points be taken in the circumference of a circle, *which are not the opposite extremities of a diameter of that circle*, and tangents to the circle be drawn through these points, the straight lines drawn at right angles to the tangents through the points of contact shall intersect each other, if produced far enough, in the centre of the circle.

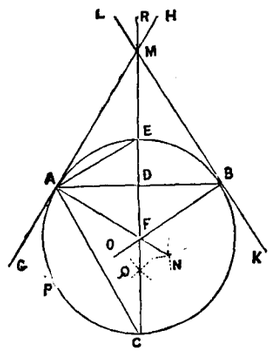


Fig. 53.

This method is useful when we wish to find the centre from which an arc or part of the circumference of a circle of very great extent has been described. The following is a third method of finding the centre of a given circle or the given arc of any circle. Let us suppose, as before, that A B C in Fig. 53 represents the given circle. Set off along any part of the circumference three equal arcs, B E, E A, and A P. Then from the points P and E as centres, with any radius greater than the radius of the given circle, describe two arcs intersecting each other in the point N; and from the points A and B as centres, with any radius greater than the radius of the given circle, describe two arcs intersecting each other in the point Q. Join A N, E Q. The point F in which these lines intersect each other is the centre of the circle A B C.

Our figures, as we have said before, sometimes appear complicated from the necessity that there is of saving as much space as we can by making one diagram serve as an illustration either to many methods of doing the same thing, or to sequences that may arise out of the consideration of the problem in question. Our readers are therefore in all cases when it is necessary recommended to study our problems with a piece of paper, a pair of compasses, and a parallel ruler at hand, that they may construct for themselves just so much of our diagram as is necessary for an illustration of the process in course of description, disentangling it as it were from the figure that we have given as a means of explaining our directions. As an example of this, we give in Fig. 54, on a reduced scale, just so much as is absolutely necessary of Fig. 53 to enable a reader to understand the first method that we have given of finding the centre of any given circle.

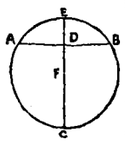


Fig. 54.

Some of the methods that have been described for finding the centre of a given circle apply equally well, as it may have been seen, to finding the centre from which any given arc of a circle has been described; but there is another method of finding the centre of any given arc that we will now proceed to bring under the reader's notice.

First, let A C B in Fig. 53 be the arc of which it is required to find the centre. Join A B; bisect A B in D; draw D C at right angles to A B, and join A C. Then at the point A in the straight line C A make the angle C A F equal to the angle A C F, and produce the leg A F of the angle C A F, if necessary, far enough to intersect C D in F. The point F is the centre from which the arc A C B has been described.

Now let A E B in Fig. 53 be the arc of which it is required to find the centre. Join A B as before; bisect A B in D. Draw D E perpendicular to A B, and join A E. Produce E D indefinitely towards C, and at the point A in the straight line E A, make the angle E A F equal to the angle A E F, producing the leg A F of the angle E A F, if necessary, far enough to intersect E D produced in the point F. This point, as before, is the centre from which the arc A E B has been described.

In the first of these two cases it will be noticed that the arc of which the centre is required is greater than half the circumference of the circle of which it is an arc, but in the second it is less than half the circumference. If the arc were half the circumference, it is plain that to find its centre all we have to do is to join its extremities, and bisect the chord that joins them.

On further inspection of Fig. 53 it will be noticed that the straight lines G H, K L, which were drawn as tangents to the circle A B C through the points A and B, have their points of intersection M in the straight line C R obtained by producing C E in an upward direction; and the angle A M C is equal to the angle B M C. This leads to another mode of finding the centre of the circle A B C, which is as follows:—

Through any two points, A and B, in the circumference of the given circle A B C, draw the tangents G H, K L, intersecting each other in the point M. Bisect the angle A M B by the straight line M E, and produce it to cut the circumference of the circle in C. Bisect C E in F. The point F, as before, is the centre of the circle A B C.

PROBLEM XXXVI.—*To describe a circle through any three given points which are not in the same straight line.*

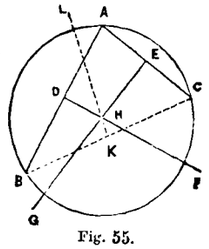


Fig. 55.

Let A, B, C (Fig. 55), be the three given points through which it is required to describe a circle, or rather the circumference of a circle. Join A B, A C, and bisect these straight lines respectively in the points D and E. Through D draw the straight line D F of indefinite length, perpendicular to A B, and through E draw the straight line E G, also of an indefinite length, perpendicular to A C. The point of intersection, H, of the straight lines D F, E G, is the centre from which a circle may be described with a radius, H A, that shall pass through the other two given points, A, B, and C. The same result would be obtained by joining the straight lines A B, B C, or A C, C B, bisecting them, and drawing perpendiculars through the points of bisection as shown in the figure.

PROBLEM XXXVII.—*To draw a tangent to a given circle through any given point either in the circumference of the circle or without it.*

The case in which the given point is in the circumference of the circle needs no illustration and very little explanation, for it is manifest that nothing more is required than to draw a straight line joining the centre of the circle and the given point, and then through the given point to draw a straight line at right angles to the radius of the circle thus obtained. The straight line drawn through the given point at right angles to the radius will be a tangent to the given circle.

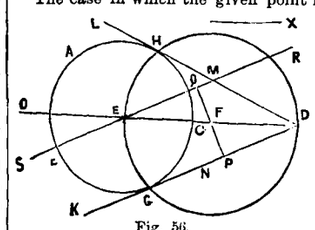


Fig. 56.

In the case in which the given point lies without the circumference of the circle, let A B C (Fig. 56) represent the given circle, and D the given point without it. Find E, the centre of the circle A B C, and join D E. Bisect D E in F, and from the point F as centre, at the distance F E or F L as radius, describe the circle D G H, cutting the circumference of the circle A B C in the points G, H. Join D G, D H, and produce them indefinitely towards K and L respectively. The straight lines D K, D L are

other subject in the whole range of art that so thoroughly depends upon the judgment, the eye, and the power of the hand. There are very few practical rules which can afford us any help, except the general rules of proportion, and some knowledge of anatomy, which is indispensable; beyond these there is very little besides the all-important principle of *arranging the work*: therefore, before we give the rules relating to the proportions of the human figure, or say anything upon its anatomical construction, we must again repeat some of our former observations respecting the necessity of arrangement. Our pupils will remember how earnestly in the early lessons we advised them *first* to decide where the lines are to be drawn, and not to attempt the finished drawing until the *positions* of the lines are *satisfactorily determined*: the success or failure of their efforts will depend upon how far they follow or neglect this fundamental course of proceeding. We trust this once more repeated appeal to their practical sense and judgment will suffice, being ourselves assured that if they are really in earnest in their desires and endeavours to draw the human figure well, they will show their appreciation of this advice by following it out to the letter: for both master and pupil must now remember they have entered upon a noble, and at the same time a difficult subject.

We have just observed that it is indispensably necessary to be acquainted with the various proportions of the human body, and to have some knowledge of anatomy. To these points we wish for a few moments to direct the attention of our pupils, and to place before them some powerful reasons why this course is so necessary. It must be borne in mind that the human figure in its action is almost independent of any fixed laws; it is seen in every possible position, and under every form of expression; it is seen at rest, and in violent action; it is seen in its strength and in its weakness; it is seen in old age and childhood, in delicate womanly beauty and manly vigour. Then in addition to this there is the face, the index to the mind, subject to every variety of change resulting from inward emotions of joy or sorrow, revealing the best and the worst feelings of the heart—passion, despair, love, hatred, malice, revenge—and though last, not least, the various gradations of mental power, from the highest intellectuality to imbecility and madness. Surely here is a field for study which in its extent and grandeur has no rival. Now we wish our pupils thoroughly to understand that we are in earnest in what we are about to lay before them, and they must be *in earnest* also in their application. We are desirous to impart something more than a superficial knowledge of the human form; we wish to go thoroughly, as far as we can, into the subject, but at the same time it is not our intention to write a work upon anatomy in our drawing lessons; instead of this, we will recommend our pupils to study carefully the lessons upon this and kindred subjects which are to be found elsewhere in the pages of the POPULAR EDUCATOR. In these they will find quite sufficient information for all they may require. Our object is only to open out a path for them to pursue, to point out other sources of information, and direct them in the way of *applying* the knowledge thus gained: therefore any of our pupils who do not care to enter into the subject to the extent we propose may stop when they think fit; but as to those who desire to make their knowledge really useful for all practical purposes—and there are many engaged in the mechanical arts who will find it a great acquisition to be able to draw the figure well—we will endeavour not to disappoint them. When we consider how much this branch of art is required in decorating, stone-masonry, modelling, wood-engraving, and many other occupations, including all kinds of designing, we feel it incumbent on us not to allow so useful an addition to their education to be passed over lightly, and oblige them to lay our lessons aside, disappointed in not finding the instruction they require.

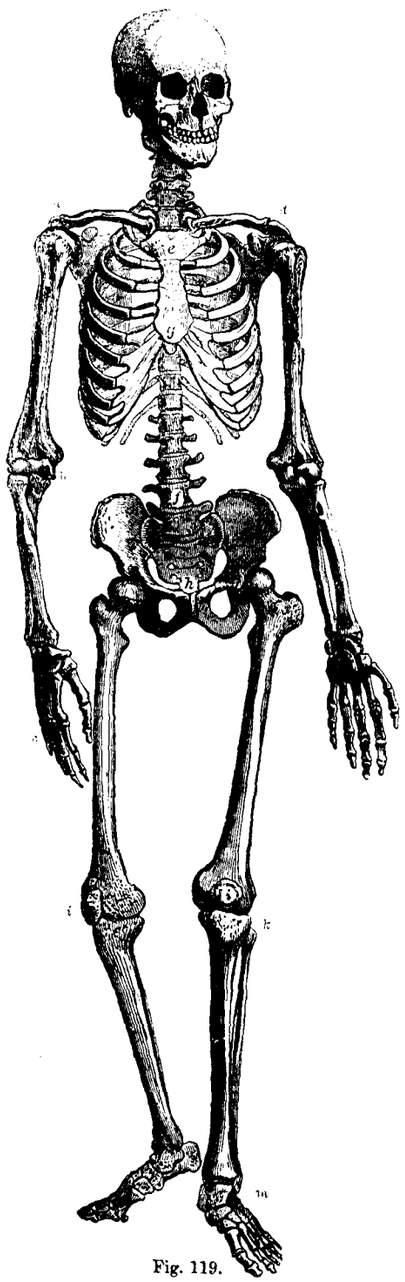


Fig. 119.

We will first give the relative proportions of the whole form, as represented in Fig. 119. The skeleton may be properly considered the framework upon which the whole body is built, and by which it is strengthened and supported; the proportion and height, the efficiency and freedom of the whole structure, depend principally upon the right formation of the skeleton; this hard and solid framework may be considered the timbers and beams of the superstructure, and the muscles which cover it are the ropes and pulleys for moving it; thus the framework is for strength, the muscles for action, and these determine the visible and varying outline of the body.

Taking the head as a standard—that is, from the crown to the chin—the whole length of the figure of a man may be considered as measuring seven and a-half or eight heads; of a child, the proportion will be according to its age; one of seven or eight years old may be allowed five and a-half heads; and an infant, nearly four. When the arms and hands are fully extended horizontally from the body, and if the distance between the tips of the fingers from the right hand across to the left be measured, it will be found equal in length to the whole body, so that a well-proportioned man can stand in a square frame and be able to touch the sides of the square respectively with his head, his feet, and the extremities of his fingers. The distance from the top of the shoulder—that is, from the head of the *humerus*, *a* (the upper bone of the arm)—to the elbow, *b*, is the same as from the elbow *b* to the first knuckle of the hand, *c*; the same distance occurs horizontally between the outer parts of the shoulders from *a* to *d*; from the top of the sternum (breast-bone), *e*, to the navel *f*, the same; from the lower part of the breast-bone, *g*, to the pubis *h* (the bone across the lower part of the body), the same; thence to the top of the patella *i* (or small bone on the knee, generally called the knee-cap), the same; and from the lower part of the patella *k* to the instep *m*, the same. The knowledge of these uniform lengths, so repeatedly occurring, is a very material help in drawing the figure, preventing many doubts

and difficulties. In the same way that the skeleton establishes the proportion and construction of the body, so in like manner does the skull, by its peculiarities of character and diversity of form, assist us to define and classify peoples, nations, and tribes, and also to decide upon their different intellectual capabilities. All must have noticed how very different the size of the human cranium or brain-case is, when compared with the face, to that of the brute creation; and also that the head itself, comparatively speaking, undergoes very little change from growth: likewise that the brain almost reaches maturity at a very early period, and consequently the head of the infant is considerably larger in proportion to its body than when it has arrived at manhood; the cause of this is to be attributed to the brain only, in which there is less development, in proportion, than there is in the growth of the body. The face increases, but not to the same extent as the limbs and other parts. We remark in the infant head the smallness of the bones of the nose, the shallow jaw, and the elongated form of the head, having the brain-case large and projecting considerably behind. The roundness of the child's face is to be attributed to the incompleteness of the lower part, which, as the teeth grow, expands from a greater extension of the jaw; when in old age the teeth have fallen out, and the face has contracted again, it resembles in many respects that of the child, excepting for the falling in of the lips and the wrinkling of the skin. Thus as the child grows the face becomes elongated, and the proportionate difference between the length of the face and the depth from the forehead to the back of the head is less striking. The characteristic difference in the human head between the Grecian standard, as usually seen in ancient sculpture, and that of the negro, exists in the *facial line*. (See Fig. 120.) Draw a line from the lower part of the ear to the closing of the teeth in front, and from thence draw another to touch the outer projection of the forehead; this last line is called the *facial line*, and the two together form the *facial angle*—the angle at *a*. The more acute this angle is, the nearer it approaches that of the lower animals; the most desirable angle, as characteristic of the higher powers of intellect, judgment, capability, and we include beauty also, is that of about 80°. The Grecian sculptors, in representing their gods, reached 90°, the right angle, and in some instances they went even beyond this. We will not enter into any argument as to whether this modification of the facial angle indicated greater strength of mind and wisdom: it certainly has not been found to represent the standard of excellence in man. As the facial angle formed by these two lines decreases, so we approach the negro, and when it is farther diminished we descend to the projecting jaws and smaller brain of the brute creation. (See Fig. 121, the *facial angle* of the cow.) These remarks are merely hints for the pupil, showing him the course he is to pursue in studying the human head. To go into a classification of the skulls of various tribes and nations, and point out the remarkable differences between them, is not our immediate object; to show there are these varieties, and to establish a standard as a base of construction, is all that is necessary: we leave our pupils to discover these differences for themselves, and resume our more legitimate subject—the method of drawing them. Now before we say anything about the proportions of the head and face, we wish to make a few observations upon the kind of drawing which belongs to the human figure more than any other subject, and which will become more evident as we proceed. In drawing the human form, the term *outline* must be used in a far wider sense than that in which it is generally considered when it relates to inanimate objects or ornaments. *Within* the boundary line of any portion of the human form, be it face or limb, there is as great an amount of character and form to be expressed as in the outward or marginal line itself, and we cannot consider any one to be proficient who has not the power fully to represent it. The foreshortenings and projections of the body, and the unequal surfaces upon every part, arising from muscular action, as they press forward towards the eye, require an amount of anatomical knowledge which any one who attempted to draw them, without possessing, would soon discover to be indispensable. To confine our practice to the mere outline of the human figure, would give but a small idea of what is meant by drawing it; children do no more than this. To represent an advancing limb, or an uneven surface when placed directly before us, is quite another affair to that of representing the surface or limb when it is turned a quarter round, and is seen in profile. To acquire this



Fig. 120.

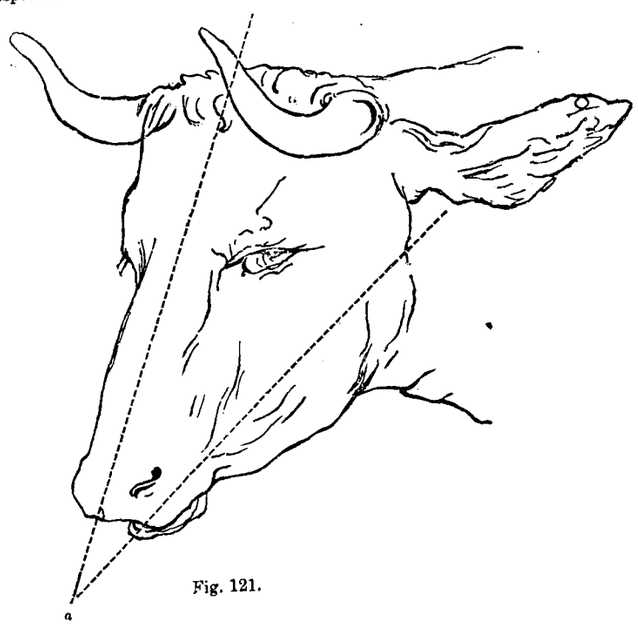


Fig. 121.

tangents to the circle A B C, and they are drawn from the given point D, without the circumference of the circle A B C, as required.

From this problem we learn that from any point without a circle two straight lines can be drawn which are tangents to that circle, and that the angle formed by any pair of tangents drawn to a circle from a point without it is bisected by the straight line which joins that point and the centre of the given circle.

We also learn from this problem how, with a given radius, to draw a circle touching two given straight lines. In Fig. 56, let L M, K N represent the two given straight lines, and X the given radius of the circle that is required to be drawn, touching the given straight lines L M, K N. If necessary, produce the straight lines L M, K N in the direction of M and N, and let them meet in D. Bisect the angle L D K by the straight line D O, and at any point, P, in the straight line D K draw P Q perpendicular to D K, and equal to the given radius X. Then through the point Q draw the straight line R S of indefinite length, parallel to D K, and intersecting the straight line D O in the point E. From the point E as centre, with a radius equal to the given radius X, describe the circle A H G. This circle touches the given straight lines L M, K N, in the points H and G.

READING AND ELOCUTION.—XV.

ANALYSIS OF THE VOICE (*continued*).

[NOTE.—Those examples, in this and a former lesson, in which the accents are purposely omitted, are intended as exercises for the student.]

EXERCISES ON INFLECTIONS.

Simple Concluding Series.

It is a subject interesting alike to the old and to the young.

Nature, by the very disposition of her elements, has commanded, as it were, and imposed upon men, at moderate intervals, a general intermission of their toils, their occupations, and their pursuits.

The influence of true religion is mild, and soft, and noiseless, and constant, as the descent of the evening dew on the tender herbage, nourishing and refreshing all the amiable and social virtues; but enthusiasm is violent, sudden, rattling as a summer shower, rooting up the fairest flowers, and washing away the richest mould, in the pleasant garden of society.

Compound Concluding Series.

The winter of the good man's age is cheered with pleasing reflections of the past, and bright hopes of the future.

It was a moment replete with joy, amazement, and anxiety.

Nothing would tend more to remove apologies for inattention to religion than a fair, impartial, and full account of the education, the characters, the intellectual processes, and the dying moments of those who offer them.

Then it would be seen that they had gained by their scepticism no new pleasures, no tranquillity of mind, no peace of conscience during life, and no consolation in the hour of death.

Well-doing is the cause of a just sense of elevation of character; it clears and strengthens the spirits; it gives higher riches of thought; it widens our benevolence, and makes the current of our peculiar affections swift and deep.

A distant sail, gliding along the edge of the ocean, was sometimes a theme of speculation. How interesting this fragment of a world, hastening to rejoin the great mass of existence! What a glorious monument of human invention, that has thus triumphed over wind and wave; has brought the ends of the earth in communion; has established an interchange of blessings, pouring into the sterile regions of the north all the luxuries of the south;* diffused the light of knowledge, and the charities of cultivated life; and has thus bound together those scattered portions of the human race, between which nature seems to have thrown an insurmountable barrier!

1. "Disconnected series."

Youth, in the fulness of its spirits, defers religion to the sobriety of manhood; manhood, encumbered with cares, defers it to the leisure of old age; old age, weak and hesitating, is unable to enter on an untried mode of life.

Let me prepare for the approach of eternity; let me give up my soul to meditation; let solitude and silence acquaint me with the mysteries of devotion; let me forget the world, and by the world be forgotten, till the moment arrives in which the veil of eternity shall fall, and I shall be found at the bar of the Almighty.

Religion will grow up with you in youth, and grow old with you in age; it will attend you, with peculiar pleasure, to the hovels of the poor, or the chamber of the sick; it will retire with you to your closet, and watch by your bed, or walk with you, in gladsome union, to the house of God; it will follow you beyond the confines of the world, and dwell with you for ever in heaven, as its native residence.

2. "Emphatic series."

Assemble in your parishes, villages, and hamlets. Resolve, petition, address.

This monument will speak of patriotism and courage; of civil and religious liberty; of free government; of the moral improvement and elevation of mankind; and of the immortal memory of those who, with heroic devotion, have sacrificed their lives for their country.

I have roamed through the world, to find hearts nowhere warmer than those of New England, soldiers nowhere braver, patriots nowhere purer, wives and mothers nowhere truer, maidens nowhere lovelier, green valleys and bright rivers nowhere greener or brighter; and I will not be silent, when I hear her patriotism or her truth questioned with so much as a whisper of detraction.

What is the most odious species of tyranny? That a handful of men, free themselves, should execute the most base and abominable despotism over millions of their fellow-creatures; that innocence should be the victim of oppression; that industry should toil for rapine; that the harmless labourer should sweat, not for his own benefit, but for the luxury and rapacity of tyrannic depredation;—in a word, that thirty millions of men, gifted by Providence with the ordinary endowments of humanity, should groan under a system of despotism, unmatched in all the histories of the world.

3. "Poetic series."

He looks in boundless majesty abroad,
And sheds the shining day, that burnished plays
On rocks, and hills, and towers, and wandering streams,
High-gleaming from afar.

Round thy beaming car,
High-seen, the Seasons lead, in sprightly dance
Harmonious knit, the rosy-fingered Hours,
The Zephyrs floating loose, the timely Rains,
Of bloom ethereal, the light-footed Dews,
And, softened into joy, the surly Storms.

Hear him compare his happier lot, with his
Who bends his way across the wintry wolds,
A poor night-traveller, while the dismal snow
Beats in his face, and dubious of his paths,
He stops and thinks, in every lengthening blast,
He hears some village mastiff's distant howl,
And sees, far streaming, some lone cottage light;
Then, undeceived, upturns his streaming eyes,
And clasps his shivering hands, or, overpowered,
Sinks on the frozen ground, weighed down with sleep,
From which the hapless wretch shall never wake.

There was neither tree, nor shrub, nor field, nor house, nor living creatures, nor visible remnant of what human hands had reared.

I am charged with pride and ambition. The charge is true, and I glory in its truth. Who ever achieved anything great in letters, art, or arms, who was not ambitious? Cæsar was not more ambitious than Cicero. It was but in another way. All greatness is born of ambition. Let the ambition be a noble one, and who shall blame it? I confess I did once aspire to be queen, not only of Palmyra, but of the East. That I am. I now aspire to remain so. Is it not an honourable ambition? Does it not become a descendant of the Ptolemies and of Cleopatra? I am applauded by you all for what I have already done. You would not it should have been less.

But why pause here? Is so much ambition praiseworthy, and more criminal? Is it fixed in nature that the limits of this empire should be Egypt on the one hand, the Hellespont and the Euxine on the other? Were not Suez and Armenia more natural limits? Or hath empire no natural limit, but is broad as the genius that can devise, and the power that can win? Rome has the West. Let Palmyra possess the East. Not that nature subscribes this and no more. The gods prospering, and I swear not that the Mediterranean shall hem me in upon the west, or Persia on the east. Longinus is right: I would that the world were mine. I feel, within, the will and the power to bless it, were it so.

Are not my people happy? I look upon the past and the present upon my nearer and remoter subjects, and ask nor fear the answer. Whom have I wronged?—what province have I oppressed?—what city pillaged?—what region drained with taxes?—whose life have I unjustly taken, or estates coveted or robbed?—whose honour have I wantonly assailed?—whose rights, though of the weakest and poorest, have I trenched upon? I dwell, where I would ever dwell, in the hearts of my people. It is written in your faces, that I reign not more *over* you than *within* you. The foundation of my throne is not more power than love.

How shall I know thee in the sphere which keeps
The disembodied spirits of the dead,
When all of thee that time could wither, sleeps,
And perishes among the dust we tread?

For I shall feel the sting of ceaseless pain,
If there I meet thy gentle presence not;
Nor hear the voice I love, nor read again
In thy serenest eyes the tender thought.

Will not thy own meek heart demand me there?
That heart whose fondest throbs to me were given?
My name on earth was ever in thy prayer,
Shall it be banished from thy tongue in heaven?

In meadows fanned by heaven's life-breathing wind,
In the resplendence of that glorious sphere,
And larger movements of the unfettered mind,
Wilt thou forget the love that joined us here?

The love that lived through all the stormy past,
And meekly with my harsher nature bore,
And deeper grew, and tenderer to the last,
Shall it expire with life, and be no more?

A happier lot than mine, and larger light,
Await thee there; for thou hast bowed thy will
In cheerful homage to the rule of right,
And lovedst all, and renderest good for ill.

For me, the sordid cares in which I dwell,
Shrink and consume the heart, as heat the scroll;
And wrath has left its scar,—the fire of hell
Has left its frightful scar upon my soul.

Yet, though thou wear'st the glory of the sky,
Wilt thou not keep the same beloved name,
The same fair thoughtful brow, and gentle eye,
Lovelier in heaven's sweet climate, yet the same?

Shalt thou not teach me, in that calmer home,
The wisdom that I learned so ill in this,—
The wisdom which is love,—till I become
Thy fit companion in that land of bliss?

Both Inflections, in connection.

Rule 1.—"Negation opposed to affirmation."

It is not a parchment of pedigree,—it is not a name derived from the ashes of dead men, that make the only charter of a king. Englishmen were but slaves, if, in giving crown and sceptre to a mortal like ourselves, we ask not, in return, the kingly virtues.

The true enjoyments of a reasonable being do not consist in unbounded indulgence,* or luxurious ease, in the tumult of passions, the langour of indolence, or the flutter of light amusements. Yielding to immoral pleasures corrupts the mind; living to animal and trifling ones, debases it; both, in their degree, disqualify it for genuine good, and consign it over to wretchedness.

What constitutes a state?
Not high-raised battlements, or laboured mound,
Thick wall, or moated gate;
Not cities proud, with spires and turrets crowned,
Not bays and broad-armed ports,
Where, laughing at the storm, proud navies ride;
Not starred and spangled courts,—
Where low-browed baseness wafts perfume to pride!
No!—*men*,—high-minded MEN,—
Men who their duties know,
But know their rights, and, knowing, dare maintain.

Note.—"Concession and unequal antithesis."

The clouds of adversity may darken over the Christian's path; but he can look up with filial trust to the guardian care of a beneficent Father.

I admit that the Greeks excelled in acuteness the versatility of mind. But in the firm and manly traits of the Roman character, I see something more noble, more worthy of admiration.

We war against the leaders of evil—not against the helpless tools: we war against our oppressors,—not against our misguided brethren.

Still, still, for ever
Better, though each man's life-blood were a river,
That it should flow, and overflow, than creep
Through thousand lazy channels in our veins,
Dammed, like the dull canal, with locks and chains,
And moving, as a sick man in his sleep,
Three paces, and then faltering; better be
Where the extinguished Spartans still are free,
In their proud charnel of Thermopylæ,
Than stagnant in our marsh.

Exception.—"Emphatic negation."

I'll keep them all;
He shall not have a Scot of them;
No, if a Scot would save his soul, he shall not.

Do not descend to your graves with the disgraceful censure, that you suffered the liberties of your country to be taken away, and that you were mutes as well as cowards. Come forward, like men; protest against this atrocious attempt.

I am not sounding the trumpet of war. There is no man who more sincerely deprecates its calamities than I do.

Rest assured that, in any case, we shall not be willing to rank last in this generous contest. You may depend on us for whatever heart or hand can do, in so noble a cause.

I will cheerfully concede every reasonable demand, for the sake of peace. But I will not submit to dictation.

Rule 2.—"Question and answer."

Do you think these yells of hostility will be forgotten? Do you suppose their echo will not reach the plains of my injured and insulted country, that they will not be whispered in her green valleys, and heard from her lofty hills? Oh! they will be heard there; yes, and they will not be forgotten.

I will say, what have any classes of you, in Ireland, to hope from the French? Is it your property you wish to preserve?—Look to the example of Holland; and see how that nation has preserved its property by an alliance with the French! Is it independence you court?—Look to the example of unhappy Switzerland: see to what a state of servile abasement that once manly territory has fallen, under France! Is it to the establishment of Catholicity that your hopes are directed? The conduct of the First Consul, in subverting the power and authority of the Pope, and cultivating the friendship of the Mussulman in Egypt, under a boast of that subversion, proves the fallacy of such a reliance. Is it civil liberty you require? Look to France itself, crouching under despotism, and groaning beneath a system of slavery, unparalleled by whatever has disgraced or insulted any nation.

Shall I be left forgotten, in the dust,
When Fate, relenting, lets the flower revive?
Shall Nature's voice,—to man alone unjust,—
Bid him, though doomed to perish, hope to live?
Is it for this fair Virtue oft must strive
With disappointment, penury, and pain?
No: Heaven's immortal spring shall yet arrive,
And man's majestic beauty bloom again,
Bright through the eternal year of Love's triumphant reign.

Rule 3.—"Disjunctive 'Or.'"

Will you rise like men, and firmly assert your rights, or will you tamely submit to be trampled on?

Did the Romans, in their boasted introduction of civilisation, act from a principle of humane interest in the welfare of the world? Or did they not rather proceed on the greedy and selfish policy of aggrandising their own nation, and extending its dominion?

Do virtuous habits, a high standard of morality, proficiency in the arts and embellishments of life, depend upon physical formation, or the latitude in which we are placed? Do they not depend upon the civil and religious institutions which distinguish the country?

The remaining rules on "inflection," as they are of less frequent application, are thought to be sufficiently illustrated by the examples appended to each rule. A repetition of these, however, may be useful to the student as an exercise in review.

LESSONS IN MUSIC.—VIII.

MENTAL EFFECT OF NOTES.

WE have now to treat of a most important subject, and one which should be thoroughly well understood by every pupil. We refer to the *mental effect of notes*. Let us put the topic in the form of a question. What is the principal source of a note's power to affect the mind? We observe, for instance, in one of Handel's songs, that a certain note produces a certain effect upon our minds. *Why* does it produce that effect? Is there

* Accidental "falling" inflection, for contrast.

* The penultimate inflection falls, when a sentence ends with the rising slide.

knowledge is not so difficult a matter as it is important. Let our pupils try as we have advised them, and as we intend further to point out, and they will find the task *easy* and profitable; we know what a little acquaintance with anatomy has done for others by opening out the shortest way to their object, and ensuring success.

LESSONS IN FRENCH.—XXXIII.

SECTION LXXV.—THE IMPERFECT AND PLUPERFECT OF THE SUBJUNCTIVE.

1. The terminations of the imperfect of the subjunctive are *in all the verbs, regular and irregular*, of the four conjugations, **sse, sses, t**, preceded by a vowel with a circumflex accent, **ssions, ssiez, ssent.**

2. CONJUGATION OF THE IMPERFECT OF THE SUBJUNCTIVE OF THE REGULAR VERBS.

Que je chantas **-se**	finis **-se**	reçus **-se**	rendis **-se**	
That I might sing	*might finish*	*might receive*	*might render*	
Que tu parlas **-ses**	chéris **-ses**	aperçus **-ses**	vendis **-ses**	
That thou mightest speak	*mightest cherish*	*mightest perceive*	*mightest sell*	
Qu'il donnât **-t**	fournî **-t**	perçût **-t**	tendît **-t**	
That he might give	*might furnish*	*might gather*	*might tend*	
Que nous cherchas**sions**	puni**ssions**	conçu**ssions**	entendi**ssions**	
That we might seek	*might punish*	*might conceive*	*might hear*	
Que vous portas**siez**	saisi**siez**	du**siez**	perdi**siez**	
That you might carry	*might seize*	*might owe*	*might lose*	
Qu'ils aimas**sent**	uni**sent**	déçu**sent**	mordi**sent**	
That they might love	*might unite*	*might deceive*	*might bite*	

3. This tense is formed by adding to the *second person* singular of the Preterite Indicative the following terminations, viz., **se** for the first person singular, **ses** for the second; **sions** for the first plural, **siez** for the second, **sent** for the third.

4. The third person singular is formed by putting a circumflex accent on the last vowel of the same second person singular of the preterite indicative, and changing its final **s** into **t**. This rule has no exceptions.

Tu allas, *j'allasse*; tu finis, *je finisse*.	*Thou wentest, I might go; thou finishedst, I might finish.*

5. *All the observations* made in Sect. 52, on the changes of the stem of the irregular verbs, *in the past definite*, apply equally to the imperfect of the subjunctive.

6. The pluperfect of the subjunctive is *formed* from the imperfect of the same mood of one of the auxiliaries **avoir, être**, and the past participle of the leading verb:—

Que j'eusse fini; que je fusse venu.	*That I might have finished; that I might have come.*

7. All the rules given on the use of the subjunctive in the three preceding sections apply, of course, to the imperfect and pluperfect of this mood.

8. In the same manner as the present or future of the indicative of the first part of a sentence governs, under the above-*mentioned* rules, the verb of the second part, in the present or past of the subjunctive; so the imperfect and other past tenses of the indicative, and the two conditionals, govern the verb in the second part of the sentence, in the imperfect or pluperfect of the subjunctive:—

Ne fallait-il pas que je lui parlasse?	*Was it not necessary that I should speak to him?*
Il faudrait que je lui donnasse ce livre.	*It would be necessary for me to give him that book.*

MISCELLANEOUS EXAMPLES.

Voudriez-vous que je donnasse un coup de bâton à cet enfant?	*Would you wish me to give that child a blow with a stick?*
Je voudrais que vous tirassiez un coup de fusil sur cet oiseau.	*I would wish you to fire your gun at that bird.*
Exigeriez-vous que nous revinssions de bonne heure?	*Would you require us to return early?*
Que voudriez-vous que ces hommes fissent?	*What would you wish those men to do?*
Que voudriez-vous que je fisse?	*What did you wish me to do?*
Il faudrait que j'eusse mon argent.	*It would be necessary for me to have my money.*
Je ne voulais pas que vous mourussiez de froid.	*I did not wish you to die with the cold.*
Elle craignait que vous ne mourussiez de misère et de faim.	*She feared lest you might die with want and hunger.*
Voudriez-vous que je jetasse un coup d'œil sur ces papiers?	*Would you wish me to cast a glance upon these papers?*

EXERCISE 145.

Bécasse, f. *woodcock.*	Ivrogne, m. *drunkard.*	Rétablissement, m. *recovery.*
Bord, m. *shore.*	Lièvre, m. *hare.*	Santé, f. *health.*
Charger, l. *to load.*	Mer, f. *sea.*	Se rendre, 4. *refl. to repair.*
Coup, m. *blow.*	Perdrix, f. *partridge.*	Tir-er, 1. *to fire, shoot.*
Coup de fusil, m. *shot.*	Poste, m. *post.*	
Coup d'œil, m. *glance.*	Ressembl-er, 1. *to resemble.*	
Demi-usé, *half-worn.*		
Fouet, m. *whip.*		

1. Voudriez-vous que j'achetasse un habit à demi-usé? 2. Je voudrais que vous en achetassiez un neuf. 3. Voulait-on que ce soldat malade se rendît à son poste? 4. On voulait qu'il se rendît à son régiment. 5. Faudrait-il que je demeurasse au bord de la mer? 6. Il faudrait pour le rétablissement de votre santé, que vous vous rendissiez en Suisse. 7. Ne pensez-vous pas que cet enfant ressemble à sa mère? 8. Je ne pense pas qu'il lui ressemble. 9. À qui ressemble-t-il? 10. Il ressemble à sa sœur aînée. 11. Consentiriez-vous que votre fille épousât cet ivrogne? 12. Voudriez-vous que nous mourussions de misère? 13. Je craignais que ces dames ne mourussent [§ 123 (5), Sect. 72, 9] de froid. 14. Ne voulez-vous pas tirer sur ce lièvre? 15. Je tirerais sur cette bécasse si mon fusil était chargé. 16. Combien de coups de fusil voudriez-vous que je tirasse? 17. Si vous aviez de la poudre, je voudrais que vous tirassiez sur cette perdrix. 18. Voulez-vous que je jette un coup d'œil sur cette lettre? 19. Je voudrais que vous la lussiez. 20. Que voudriez-vous que je fisse? 21. Je voudrais que vous fissiez attention à vos études. 22. Faudrait-il que je sortisse? 23. Il faudrait que vous restassiez à la maison. 24. Que voudriez-vous que je fisse à ce cheval? 25. Je voudrais que vous lui donnassiez des coups de fouet.

EXERCISE 146.

1. What would you have me do? 2. I would have you cast a glance upon this letter. 3. Would you wish me to give that dog blows with a stick? 4. I would wish you to give that horse blows with a whip. 5. Would you require us to return at five o'clock? 6. I would require you to return early. 7. Do you think that your brother resembles your father? 8. I do not think he resembles my father. 9. Whom do you think that he resembles? 10. I think he resembles my mother. 11. How many shots have you fired? 12. I have fired five shots at that woodcock. 13. Would you not have me fire at that partridge? 14. I would have you fire at that partridge, if your gun were loaded. 15. Where would it be necessary for me to dwell? 16. *It would be necessary for you to dwell on the sea-shore?* 17. Would you have me die with hunger? 18. I would not have you die of hunger. 19. Would you have your brother die with cold? 20. I would not have him die with cold or want. 21. What would you have your son do? 22. I would have him learn his lessons. 23. Would you have him learn German? 24. I would have him learn German and Spanish. 25. *Have you fired at (sur)* that hare. 26. *I have* not fired at that hare. 27. Would it be necessary for me to go out? 28. It would be necessary for you to go out. 29. Would it be necessary for me to remain here? 30. It would be necessary for you to go to church. 31. What did you wish? 32. I wished you to write to me. 33. Did you wish me to buy a coat half worn out? 34. I wished you to buy a good hat.

KEY TO EXERCISES IN LESSONS IN FRENCH.

EXERCISE 26 (Vol. I., page 115).

1. Êtes-vous plus attentif que votre sœur? 2. Je ne suis pas aussi attentif que votre frère. 3. Avez-vous plus de courage que mon frère? 4. J'en ai tout autant. 5. Le maréchal a-t-il autant d'argent que de fer? 6. Il a plus de celui-ci que de celui-là. 7. A-t-il plus de modestie que l'Espagnol? 8. Il en a davantage. 9. Il en a plus que la sœur de votre ami. 10. N'avez-vous pas froid, Monsieur? 11. Non, Monsieur,

mais j'ai peur et sommeil. 12. Le Hollandais a-t-il plus de fromage que l'Italien? 13. Il a plus de fromage et plus d'argent. 14. Avez-vous autant de soie anglaise que de soie italienne? 15. J'ai plus de celle-ci que de celle-là. 16. Qui a plus d'amis que l'Espagnol? 17. Votre ami en a plus. 18. L'Espagnol a-t-il autant de votre argent que du sien? 19. Il a moins du mien que du sien. 20. Avons-nous plus de manteaux de soie que de manteaux de drap? 21. Nous avons plus de ceux-ci que de ceux-là. 22. Avez-vous de bons manteaux? 23. Oui, Monsieur, j'ai de bons manteaux, de bons chapeaux, et de bons souliers de cuir. 24. Avez-vous plus d'assiettes que de plats? 25. Je n'ai pas plus d'assiettes que de plats, mais j'ai plus de verres que d'assiettes. 26. N'avez-vous pas très-froid? 27. Non, Monsieur, je n'ai ni froid ni chaud. 28. Votre charpentier a-t-il du bois? 29. Oui, Monsieur, il a du bois, de l'argent, du fromage et de la viande. 30. Qui a plus d'argent que le charpentier? 31. Le Hollandais en a davantage. 32. Qui a plus d'estampes que de livres? 33. Le libraire a plus de ceux-ci que de celles-là. 34. Êtes-vous aussi attentif que votre ami? 35. Je suis plus attentif que mon ami.

EXERCISE 27 (Vol. I., page 115).

1. Is your dictionary very correct? 2. It is more correct than Boyer's. 3. Your dictionary is the most correct of all. 4. Which is the most beautiful of those gardens? 5. *This is the most* beautiful of all the gardens of the city. 6. Have you any more money? 7. I have no more money, but I have still some credit. 8. Have we more salad? 9. We have no more. 10. We have no more meat. 11. Who has more? 12. My brothers and sisters have some more. 13. Have you much more? 14. I have not much more. 15. Has your aunt more dresses than your niece? 16. She has not many. 17. Is your nephew more learned than your niece? 18. He is not so learned as she. 19. She is more learned than he. 20. Are you still cold? 21. I am no longer cold, I am very warm. 22. Have you no more news? 23. I have no more. 24. Have you many? 25. I have but few.

EXERCISE 28 (Vol. I., page 115).

1. Votre frère a-t-il un très-bon dictionnaire? 2. Son dictionnaire n'est pas très-correct. 3. Votre père a-t-il plus de courage que lui? 4. Il a beaucoup plus de courage que votre neveu. 5. Vos frères ont-ils du crédit? 6. Ils n'ont guère de crédit, mais ils ont de l'argent. 7. Votre tante est-elle obligeante? 8. Ma tante est bien obligeante. 9. Avez-vous encore des livres, des plumes et du papier? 10. Je n'ai plus de livres, mais j'ai encore de bonnes plumes et d'excellent papier anglais. 11. Qui a encore du papier? 12. Je n'en ai plus, mais mon frère en a encore. 13. Avez-vous des nouvelles, Monsieur? 14. Non, Madame, je n'en ai pas aujourd'hui. 15. Avez-vous autant de bois que le fils de mon frère? 16. J'en ai plus que vous ou que lui. 17. Avez-vous encore tort? 18. Non, Monsieur, je n'ai plus tort, j'ai raison. 19. Vos sœurs ont-elles encore faim? 20. Elles n'ont ni faim ni soif, mais elles ont encore sommeil. 21. Votre nièce est-elle aussi savante qui lui? 22. Elle est plus savante que lui et que sa tante. 23. N'avez-vous pas de nouvelles, Monsieur? 24. Non, Madame, je n'ai plus de nouvelles. 25. Qui a des nouvelles? 26. Je n'en ai plus. 27. Les avez-vous toutes? 28. Oui, Monsieur, je les ai toutes. 29. Votre tante en a-t-elle encore beaucoup? 30. Elle n'en a plus guère. 31. Votre frère a-t-il encore des chevaux anglais? 32. Il n'en a plus. 33. Il en a encore deux. 34. Avez-vous encore un beau châle français? 35. Je n'ai plus de châles français, mais j'en ai encore un anglais.

EXERCISE 29 (Vol. I., page 116).

1. How many potatoes has your brother? 2. He has not many. 3. Has the grocer much sugar in his warehouse? 4. He has but little, but he has much butter and pepper. 5. Has your gardener many cherries? 6. He has more cherries than plums. 7. Are plums better than cherries? 8. Cherries are better than plums. 9. Have you a few ripe pears? 10. We have a few, we have *also* many pine-apples and apricots. 11. Has your uncle anything good in his garden? 12. He has something good and beautiful. 13. He has beautiful vegetables and beautiful flowers. 14. Have you foreign flowers? 15. I have a few. 16. Which have you? 17. I have your brother's and your gardener's. 18. Have you not mine also? 19. No, Sir, I have them not. 20. Who has many? 21. Nobody has many. 22. I have a few. 23. Have you tea enough? 24. I have enough. 25. I have more than he.

EXERCISE 30 (Vol. I., page 116).

1. Votre jardinier a-t-il beaucoup de légumes? 2. Oui, Monsieur, il en a beaucoup. 3. Combien de jardins a-t-il? 4. Il a plusieurs jardins et plusieurs maisons. 5. Avez-vous beaucoup de livres? 6. Je n'en ai guère, mais mon ami en a beaucoup. 7. Quel habit votre frère a-t-il? 8. Il a un bon habit de drap. 9. Votre oncle a-t-il beaucoup de pêches? 10. Il n'a pas beaucoup de pêches, mais il a beaucoup de cerises. 11. Combien de prunes le tailleur a-t-il? 12. Le tailleur n'a pas de prunes, il a du drap et de la soie. 13. Quelle soie votre ami le marchand a-t-il? 14. Il a beaucoup de soie et beaucoup d'argent. 15. Le jardinier a-t-il quelque chose de bon dans son jardin? 16. Il a beaucoup d'ananas. 17. A-t-il plus de légumes que de fruit? 18. Il a plus de ceux-ci que de ceux-là. 19. Votre oncle a-t-il beaucoup de poires et de cerises? 20. Il en a quelques-unes, et il a beaucoup de pommes et de prunes. 21. En avez-vous quelques-unes? 22. J'en ai encore beaucoup, mais mon frère n'en a plus. 23. Quelles pêches a-t-il? 24. Il a de grosses pêches. 25. Lesquelles avez-vous? 26. J'ai les meilleures pêches. 27. Le marchand a-t-il quelque chose de bon dans son magasin? 28. Il n'a rien de bon dans son magasin, mais il a quelque chose de bon dans son jardin. 29. Combien de pommes de terre l'étranger a-t-il? 30. Il n'en a pas beaucoup. 31. A-t-il de bons légumes? 32. Il a de bons légumes. 33. A-t-il raison ou tort? 34. Il a raison, mais vous avez tort. 35. Il n'a ni ce livre-ci ni celui-là, il a celui du libraire.

EXERCISE 31 (Vol. I., page 131).

1. Is the horse which you have good? 2. It is better than that which you have, and than that of our friend. 3. How many children have you? 4. I have only one, but the Italian has more than I. 5. Is it the tenth of September? 6. No, Sir, it is the ninth of February. 7. Have you my silk cravat or my muslin cravat? 8. I have both. 9. Have you eight kilogrammes of cinnamon? 10. No, Sir, I have only half a kilogramme. 11. How many francs have you, Sir? 12. I have only half a franc, but my friend has two francs. 13. Has your *sister* twenty-five centimes? 14. Yes, Sir, she has a quarter of a franc. 15. Is it not the first of August? 16. No, Sir, it is the sixth of September. 17. Is to-day the tenth? 18. No, Sir, it is the eleventh. 19. Has your brother the first place. 20. No, Sir, he has the tenth. 21. *Has your joiner many* tools? 22. Yes, Sir, he has many. 23. Has that work ten volumes? 24. No, Sir, it has only nine. 25. I have the sixth volume of Molière's works, and the first volume of Michelet's History of France.

LESSONS IN CHEMISTRY.—VII.

WATER.

SYMBOL . . H_2O — COMBINING WEIGHT . 18

As we have already seen, hydrogen, when it burns in air, enters *into* combination with the oxygen, forming water. The most direct way of proving this is by means of the *Eudiometer*, an instrument by which the composition of water is determined by *synthesis*.

A strong glass tube (Fig. 27) is hermetically sealed at one end, and through the glass two platinum wires are thrust when in its melted condition; these wires are opposite each other, and almost meet.

The tube is filled with mercury, and inverted into a bath of the same metal. A mixture of the gases, in the proportion of two volumes of hydrogen to one of oxygen, is passed into the tube, until the greater part of the mercury is displaced. The tube is now held firmly down with its mouth on a piece of sheet india-rubber; for if this were not done, when the gases explode the mercury would be driven out of the tube, and the experiment rendered fruitless. A Leyden jar is charged with electricity, a chain attached to one of the platinum wires is held against the outside of the jar, whilst with the knob the other wire is touched. The jar is thus discharged, a spark passing between the wires in the tube and exploding the gas. Upon releasing the pressure of the tube against the india-rubber, the mercury from the bath rushes into the tube, completely filling it, leaving only a small globule of water in the place of the tube full of gas.

The composition of water by *analysis* is easily determined by means of electricity. It is a well-known property of the galvanic current that whenever it passes through water, the water is decomposed. The hydrogen passes *with* the current, and appears in bubbles at the negative wire, whilst the oxygen comes off *from the positive wire*. Fig. 28 indicates the arrangement for the experiment.

The two test tubes and the vessel are filled with water, to which is added one-eighth of sulphuric acid, to make the water a conductor of electricity. The test tubes are now inverted over the two leaves of platinum, *h. n.* which are connected with the screws A and B. To A is attached a wire from the platinum end of a Grove's battery, to B the wire from the zinc end. The electric current in the battery is generally said to pass *from* the zinc *to* the platinum; it leaves the battery by the wire attached to the platinum, passes from the screw A through the water to B, and back to the zinc end of the battery. Because the current *enters* the instrument by the wire attached to A, that is said to be the *positive* wire, the other being the *negative*.

The gases as they rise from the plate are received in the tubes, and it will be found that the hydrogen is *nearly* twice the

any *law* by which such mental effects are chiefly regulated? To these questions we answer, that many circumstances may *modify* the mental effect of a note, but that it is mainly *produced* by the principle of *key-relationship*, in connection with *rate of movement*. We believe that every note of *the scale* (whatever may be the pitch of the key-note) has a peculiar "mission" of its own to the human mind—a proper mental effect, which circumstances of *pitch, quality of voice, rhythmical arrangement*, peculiarities of *expression*, etc., may modify, but cannot efface. Let us take an example, and look at it in these various lights. It cannot be doubted that the last note in the following phrase, from Dr. Calcott's well-known glee, produces a mental effect peculiarly appropriate to the word to which it is set. That note we call LAH. The question is, How comes that note to produce a sorrowful impression on the mind? What is the *law*, if there is one, by virtue of which that note possesses its power? Let the pupil, to the best of his ability, sing the phrase:—

KEY D.



Try first the various conditions of *pitch*. Take a higher sound, say G, for your key-note or DOH, and sing the phrase again. You will notice that the mental effect is *modified*, but it remains *essentially the same*. Again, while in the key of G, sing the phrase, taking the *lower* LAH, instead of the upper. The effect on the mind is more gloomy, but it is still *the same* effect. It is not the mere *height in pitch*, then, that gives to the LAH its peculiar characteristic of sorrowfulness. The difference between the same tune set in a low and in a high key is undoubtedly great, but the special effect of each individual note remains of the same kind. Next try the effect of what is called in French "*timbre*," or different *qualities* of sound, upon this note. Let the phrase be sung by a *rough* voice, a *clear* voice, a *hard* voice, a *mellow* voice, etc., or let it be played first on a *flute*, next on a *trumpet*, and again on a *violin*. Such changes will certainly *modify* the mental effect. One voice or instrument may be better than the other, but they will all agree in expressing, on the note LAH, the sorrowful sentiment, and, if they sound the note correctly, they cannot help doing so. This mental effect is therefore independent of the mere qualities of sound, and is governed by some other law. Let the next experiment be in relation to *interval*, for some persons *might* imagine that the "distance in pitch" between RAY and LAH, called a fifth, produces the mental effect. Therefore sing the word "tear," when you come to the close, thus:—



You will find that every change produces a modification of the idea, but the idea itself belonging to LAH remains still the same. *Interval*, therefore, is not the law which governs mental effect. In a similar way you may try whether singing the same sound to different *words* or syllables, or with different modes of "expression" (as loud, soft, etc.), will produce any material changes. And when you have found that none of these various conditions of the note can rob it of its own peculiarly emotional character, then try another and most important experiment. Vary the *rate of movement*. Instead of singing the phrase slowly, sing it as rapidly as though it were a jig. You will then understand why we said that key-relationship, *in connection with rate of movement*, was the chief cause of mental effect. The note seems, now, to express an abandonment to *gaiety*, instead of *sorrow*. But notice that LAH, sung quickly, *always* produces this second mental effect, and that *no other note* produces the same effect, however you may quicken its rate of movement. There is still, therefore, a *law* presiding even in this "duplicity" of mental effect. This note LAH (sixth above or "minor third" below the key-note) is now proved to possess twin mental effects, the one showing the grave, the other the gay side of a certain emotion. So is it with every note of the scale. "Key-relationship" gives it a certain acceptance with the mind, and "rate of movement" has a certain way of modifying that impression. To prove, however, that the key-relation into which a note is thrown, by the sounds which have been heard before it, is the principal producing cause of mental effect, we must try another experiment. Take the *same sound*, as to absolute pitch, and *vary its key-relationship*. Strike the "chord" and scale of B, for instance, and then the note B, at length, noticing its mental effect. Next strike the chord and scale of A, followed by the same note B (the same in pitch), as a long note. Notice, now, its effect on the mind. How changed! Try, next, the chord and scale of G, and observe the note, in the same way. How changed again! Try other keys, and you will find that every change of key-relationship makes a change in the reception which the mind gives to that particular sound of unaltered pitch. If you wish to prove this to an incredulous friend, tell him that you are about to play to him, on the flute or piano, a number of long notes, and that, without looking at your playing, he is to tell you, as well as he can, what notes they are, and describe their mental effect. Then play to him the following phrases, and ask him, at the close, whether the notes were the same, or, if not, how they differed. Unless he takes care to keep singing the note B all through (which would be a physical rather than a mental test), he is sure to suppose the notes different. Of course you must be acquainted with some instrument to perform this experiment. The violin will give it most accurately.

KEY B.



KEY A.



KEY G.



KEY F♯.



KEY E.



KEY D.



KEY C.



KEY B.



Why each note on the scale should have a particular musical effect, we do not know. We can only notice the fact, and make use of it in teaching. There must come to us, along with the actual sound itself, some mental *association* of the relationship of interval (indicated by preceding notes) which has been thrown around it. The memory of notes just heard hovers around that which we now hear, and gives it its *character*. Quick succession approaches in effect to co-existence, as is familiarly shown in reference to the eye by the zoetrope and other optical toys. Thus when once the key is established by the opening notes of the tune, it is still felt to be present, as a mental element, with every single note that follows. In a similar manner, the *effect* of a given *colour*—the artist will tell us—is modified by the surrounding ones, or those on which the eye has just rested. This is a deeply interesting subject, and deserves to be well studied and further explored, especially in connection with harmonic combinations and effects; and it is to be hoped that something will soon be done in this direction.

These mental effects of notes in key have often been noticed in books of science. Dr. Calcott refers to them in his "Musical Grammar." M. Jeu de Berneval, Professor to the Royal Academy of Music, in his "Music Simplified," illustrates them very ingeniously and beautifully. Dr. Bryce introduces them into his "Rational Introduction." It would seem surprising that these interesting facts, so well calculated to aid the pupil, have been so little used in elementary instruction. It is obvious that the moment a pupil can *recognise* a certain musical property in any note, he will be able to *produce* the note with the greater accuracy and satisfaction. From extensive experience we have found that infants and persons with untrained voices are able to appreciate these points, and derive constant pleasure and assistance from the knowledge of them. The teacher will find himself well repaid by a most careful attention to this subject. There is much to be learned in this department of music, even by people who have studied the art for many years.

EXERCISE 17.—AS OFT IN MY SMITHY. KEY C. M. 138.

(The Tune OLD ENGLISH. The Words by the Rev. Professor PLUMPTRE.)



volume of the oxygen. The reason why there is a little too much hydrogen is that oxygen is more soluble in water than hydrogen, and as the gases rise through the water more oxygen is retained than hydrogen.

It was said in the last lesson that the escape of hydrogen from the surface of zinc when in acidulated water was really due to galvanic action. It is a most difficult thing to get zinc perfectly pure; in the ordinary metal, the surface is composed of particles of pure and of impure zinc. If now any two different metals be acted upon by dilute acid, a current of electricity will be developed, so that over the zinc surface there are thousands of "galvanic couples." A particle of pure metal and its neighbour of impure metal forming a "couple," between the two a current begins to *circulate*, and as it passes the water is decomposed—the hydrogen escapes from one particle and the oxygen attacks the other.

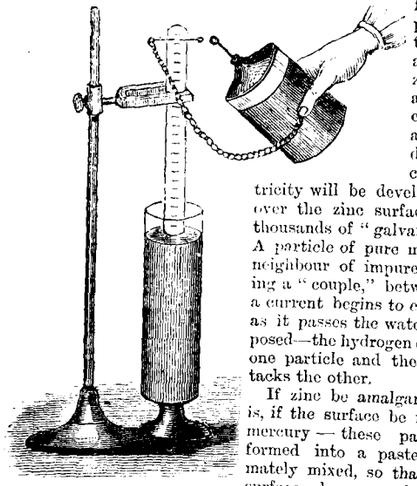


Fig. 27.

If zinc be amalgamated—that is, if the surface be rubbed with mercury — these particles are formed into a paste, and intimately mixed, so that the whole surface becomes impure, and therefore amalgamated zinc will not liberate hydrogen. For this reason the zinc plates in galvanic batteries are always amalgamated.

The other method of getting hydrogen in large quantities will suggest at once another means of analysing water. If the porcelain tube and its contents, the iron turnings, be carefully weighed, and also the water in the flask, and then the tube, after the whole of the water has been sent over the red-hot turnings, be also weighed, the difference will evidently be the weight of the oxygen, which has combined with the iron, or the weight of the oxygen which was in the water; the difference between this and the whole weight of the water will give the hydrogen.

It will at once occur to the student that the "reduction" of black oxide of copper by hydrogen offers a fourth means of determining the constitution of water. By weighing the "reduction tube" and its contents before and after the experiment, the weight of oxygen given off by the cupric oxide will be ascertained, and also the weight of the water formed be known. It will also be found that 88·89 parts of oxygen by weight unite with 11·11 parts of hydrogen to form 100 of water. The oxygen and hydrogen, in entering into combination to form water, produce a very high degree of heat. This has been taken advantage of in the "oxy-hydrogen blow-pipe." Two strong india-rubber bags are filled with the gases, which are carried by separate tubes to the burner. The mixed gases issue through a fine nozzle, and when lit they burn with a pale non-luminous flame, which has a very high temperature: wire, watch-springs, etc., are melted immediately, and in many instances the metal scintillates beautifully.

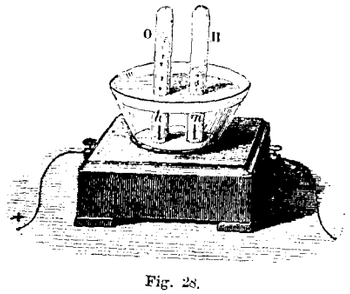


Fig. 28.

When the jet is directed on a piece of lime, the lime is raised to such a white heat as to produce one of the most brilliant of lights—the oxy-hydrogen light. The best arrangement is the one sketched in Fig. 29. In this manner it is used for magic-lanterns; the stand sliding into the bottom of the lantern, the handles, D and C, remaining outside. Instead of hydrogen, ordinary coal-gas is generally used. The greatest care must be taken after each exhibition to empty the bags, H, O, lest, when they are re-filled, the oxygen should by any chance be put into the hydrogen-bag, when a very violent explosion would be the consequence.

The gases mix in B, a brass tube, which is packed with fine wire gauze. The cylinder of lime, L, is supported on a wire which is threaded with a screw which passes through a collar soldered between the two tubes. By this wire the lime can be turned or raised, for after a time the jet burns a hole in the lime.

For a further precaution it is well to have a differently shaped handle, C, for the oxygen. It is possible to burn the gases mixed from one bag, through Hemming's Safety Jet, which is simply a brass tube packed with discs of fine wire gauze; but the flame has been known to pass down through forty of these discs before it was extinguished by their cooling action. It is therefore more safe to burn the gases from separate bags.

If we follow water in passing through its three states, we shall discover many strange properties. If a piece of ice be placed in a vessel over a fire, with a thermometer, the thermometer will rise or fall until it reaches 0° Cent., when the ice will begin to melt. Although heat is continually passing from the fire into the vessel, yet the thermometer will remain at 0° until the last particle of ice has disappeared. Where, then, has all this heat gone? It has gone to do a certain work, *to turn the solid into a liquid*, and because this heat does not affect the thermo-

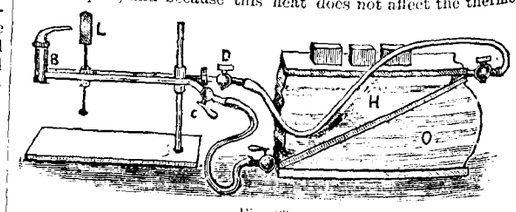


Fig. 29.

meter it is called "latent heat." To measure this "latent heat" we must have some standard. We cannot speak of a mètre or a litre of "caloric;" therefore the *unit of heat*, or the measure of heat, is *that amount of heat which is required to raise a unit of water 1° Cent.* The latent heat of water is 79 of these thermal units; that is to say, to melt a kilogramme of ice, which is at 0° Cent., requires as much heat as it does to raise 79 kilogrammes of water 1°.

Every solid upon assuming the liquid condition renders latent a certain quantity of heat; and every liquid becoming a solid gives out its latent heat.

Let sodium sulphate be added to boiling water until the water will dissolve no more, and then allow the water to cool; if undisturbed the salt will not crystallise, but upon stirring it with a thermometer, a large quantity of the Glauber salt will assume the solid state, and a rise in the temperature will be indicated by the thermometer.

The fact that a solid cannot pass into a liquid without rendering "latent" a certain quantity of heat, has been taken advantage of to form *freezing mixtures*. Whenever a solid is so acted upon by another solid or a liquid as to be compelled to assume a liquid condition, heat must be taken from surrounding bodies. Snow, or powdered ice, and salt liquefy each other, and produce the temperature of Fahrenheit's zero. *Ammonium nitrate* and an equal weight of water will offer an example of a freezing mixture in which one of the bodies is already in a liquid condition. If either of these mixtures be made in a test tube, moisture will first condense on the outside and then *freeze*. If ice be required in some quantity, a thin dish containing water is placed in the mixture.

In the raising of the temperature of water from 0°, a very remarkable exception to an otherwise universal law is observed. All bodies expand when heated; but upon heating water at 0° Cent. it *contracts* until it reaches 4° Cent., and from this point

it again obeys the law; 4° Cent. is therefore the point of *maximum density* of water—that is, at this temperature a given weight of water occupies the smallest volume. If this exception to the law did not exist, it is evident that ice would be heavier than water, and therefore would sink; the ice of winter would then rest in the beds of the rivers and lakes, and the summer sun would not be able to melt it. Thus in a few years our island would be as uninhabitable as an Arctic region!

Throughout the wide domain of science there is no fact which more distinctly indicates that an all-wise God overrules and directs the laws which are the offspring of his own great mind. If this deviation carried with it all other consequences of an altered density, we might have thought it was only the natural result of some undiscovered law; but here it stands isolated, and the effects which in other cases would follow as natural consequences are arrested.

For instance, when light passes through a transparent medium, it is diverted from its path, or "refracted." If the density of this body be increased, its power of refraction increases. We should expect, therefore, that as water increases in its density from 0° to 4°, its refractive power would likewise increase, but Arago and Fresnel have proved that such is not the case.

When water freezes a sudden expansion takes place; 1 volume of water becomes 1·099 of ice. This is the reason why water-pipes burst during a frost. If the pipes will not stretch they crack, and when the thaw melts the ice the damage appears. This is the great geological agent in disintegrating rocks.

When water is heated the thermometer steadily rises until it reaches 100° Cent., when the liquid enters into ebullition. The heat still passes into the vessel, but it does not affect the thermometer; as in the case of the melting ice, it becomes "latent" in turning the water into steam. *The latent heat of steam is said to be 536 units of heat;* that is, in condensing a kilogramme of steam at 100° into water at 100°, as much heat is given out as will raise 536 kilogrammes of water 1°.

Evaporation is the turning of water into steam at the surface only, and it is carried on at all temperatures. Even ice and snow evaporate.

Ebullition, on the other hand, is the turning of water into steam throughout the mass of the liquid.

The surface of the water sustains the weight of the atmosphere —760 *mm.*: if, therefore, a particle of water be converted into steam within the mass of the liquid, it must have a force sufficient to lift up the superincumbent pressure of the atmosphere; therefore ebullition is said to take place when the "tension" of the steam is 760 mm., or when the steam has a force capable of lifting 14·67 pounds on every square inch of the surface of the vessel in which it is confined.

At all temperatures steam has some "tension."

At	0° its tension is		4·600 mm.
	50°	,, ,,	91·982 mm.
	100°	,, ,,	760·000 mm.
	150°	,, ,,	3581·23 mm.
	200°	,, ,,	11688·96 mm.

If at any temperature the tension of the steam equal the pressure to which the water is subjected, ebullition will commence.

Make some water in a Florence flask boil; while the steam is escaping cork it tightly. Now the flask contains no air, only water and its vapour. Invert the flask, so that the hot water fills the neck; pour cold water on the flask. The steam inside is condensed, and therefore the pressure on the water greatly diminished, whereupon it will again boil. It will be found that when the flask is suddenly jerked the water strikes the glass like a solid body, because there is no air to cushion the blow. This is the "philosopher's hammer."

Whenever a liquid becomes a vapour it can only do so by absorbing a large amount of heat. By exhausting the air from a vessel containing water or ether, the liquid is made to evaporate very rapidly. To effect its evaporation it abstracts heat from all the bodies in its neighbourhood. By this means, as we shall afterwards find, we can produce great cold.

Water may be made to freeze by its own evaporation. A shallow dish of water, A (Fig. 30), is supported on a wire triangle over a vessel containing a little sulphuric acid, and both placed under the receiver of an air-pump. Upon exhausting the air, the water evaporates, and the acid absorbs the vapour as soon as it is formed, and thus the rate of evaporation is increased. The water, surrendering all its own heat to produce the vapour, begins to freeze.

A limited space can only contain a certain quantity of vapour. When it cannot hold any more it is said to be *saturated*. Whether there be air or not in the space does not affect the *quantity* of vapour; but if the space be a vacuum—as Torricelli's vacuum—it is *immediately* filled; whereas if there be air in it, the evaporation goes on slowly; and just as hot water can contain more salt than cold water, so hot air can contain more steam than cold. Hence when the cold east wind meets a warmer current, the moisture which this latter contains is condensed, and we have rain. The less moisture the air contains—that is, the "dryer" the air—the more rapid will be the evaporation. Around the body there is an atmosphere containing much moisture, which is constantly evaporating from the skin. If we blow upon any part of the body we remove this atmosphere loaded with moisture, and replace it by a much dryer one; therefore we increase the rate of evaporation, and consequently more heat is demanded from that part, and we feel "cold."

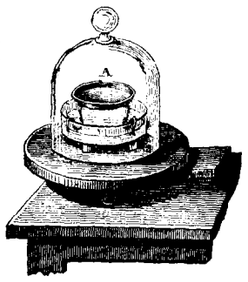


Fig. 31.

Bodies have different "capacities for heat," or their "specific heats" vary. If, for example, we place at the same distance from the same fire, for the same time, a glass of mercury and a glass of water, we shall find that although each of the liquids has received the *same* quantity of heat, yet the mercury has a very much higher temperature than the water. The water, having absorbed the heat, gives very little out; whereas the mercury, being capable of containing only $\frac{1}{30}$ of the heat taken in by the water, gives off a much larger quantity, and therefore has a much higher temperature.

Water has the highest specific heat of any solid or liquid, hence the "specific heat of water" is taken as the standard, 1.

This fact is of great service in the economy of Nature. The seas are great reservoirs of heat, and during the hot times they cool the countries whose shores they wash, and during the nights and the winters they give out their heat, and thus equalise the temperature.

In perusing the following examples the subject of "latent heat" will be rendered clearer.

If I place 5 kilogrammes of ice at 0° in 60 kilogrammes of water at 100° Cent., what will be the resulting temperature?

Let $x°$ = the required temperature; the ice in melting into water at 0° would require

$$79 \times 5 \text{ kilogs.} = 395 \text{ units of heat.}$$

This water would now be raised from 0° to $x°$, and would require for this

$$5 \text{ kilogs.} \times x° = 5x \text{ units of heat.}$$

That is, to turn ice at 0° into water at $x°$, $395 + 5x$ units of heat are required. This heat is supplied from the cooling of the 60 kilogrammes of water from 100° to $x°$, that is, through $100 - x°$.

This heat would be—

$$60 \text{ kilogs.} \times (100 - x) = 6000 - 60x \text{ units of heat.}$$

Therefore

$$395 + 5x = 6000 - 60x$$
$$65x = 5605$$
$$x = \frac{5605}{65} = 86{\cdot}2°;$$

that is, the temperature of the water after the ice is melted and the mixture has become of uniform temperature, is 86·2°.

How much steam at 100° must be passed into a tank containing 400 kilogrammes of water at 15° Cent. in order to make the water boil?

Let x = the kilogrammes of steam required. In condensing this steam will give off

$$536 \times x \text{ units of heat.}$$

2. *In searching your heart should you find you intend*
Some good to yourself or another to do,
To relieve the distress'd or yourself to amend,
Oh! watch the bright time when the purpose shall glow;
For happiness hangs on the moment I wot,
IF YOU FAIL NOT TO STRIKE WHEN THE IRON IS HOT.

3. *Whene'er by a smithy you happen to pass,*
And hear on the anvil the hammer's loud clang,
This truth in your mind do not fail to rehearse,
That you heard from a blacksmith as blithely he sang—
"IF GOOD BE YOUR AIM, BE WHATEVER YOUR LOT,
NEVER FAIL, SIR, TO STRIKE WHILE THE IRON IS HOT."

In the "second part" of this tune note FE occurs. This note will be more fully and clearly explained in a subsequent lesson; we will not, therefore, discuss it here.

In singing the words, be careful to notice the *italics* and *small caps* which indicate expression. The little mark, like two interlacing crosses, is called a sharp. It raises the note, before which it stands, something less than half a tone, and should be observed in each case.

In the next lesson we shall commence an examination of the different notes, with this point in view, and furnish illustrations from the great masters. It is sufficient for us here to request the pupil to read with care, and put to the test, the following remarks:—

The notes DOH, SOH, and ME give to the mind an idea of rest and power (in degrees corresponding with the order in which they are named), while TE, FAH, LAH, and RAY (in similar degrees), suggest the feelings of suspense and dependence. Thus, if after we have heard the principal notes of the key, the voice dwells on the sound TE, the mind is sensible of a desire for something more, but the moment TE is followed by DOH[1] a sense of satisfaction and repose is produced. In the same manner the mind is satisfied when FAH resolves itself into ME, and LAH (though not so decidedly) into SOH. RAY also excites a similar feeling of inconclusiveness and expectancy, which is resolved by ascending to ME, or, more perfectly, by falling to DOH.

Notice the *power* and *vigour* given to Exercises 15, 16, and 17, by the notes DOH, SOH, and ME. Sing the tunes over for the purpose of forming an independent judgment on this point. Then, to show the effect of the "leaning" notes, sing slowly as follows:—

: d | m : s | f : — | m : d | m : s | t : — | d^1 : d^1 | s : m
| l : — | s : d^1 | s : m | r : — | m : d | m : s | r : — | d

LESSONS IN LATIN.—XV.

POSSESSIVE OR ADJECTIVE PRONOUNS.

IT will be remembered that in our last lesson we discussed the personal pronouns, and gave a table of their declension. We also noticed the peculiar use of the reflective pronoun Sui. The personal pronouns are used substantivally when they are substituted for any case of a noun.

The personal pronouns which have an adjective force, are formed from the genitive of the personal substantive pronouns. They are called possessive, because they denote an object as the possession of the first, the second, or the third person. From mei, *of me*, is formed meus, mea, meum, *my*; as appears in this table.

Mei makes	meus, m.	mea, f.	meum, n.	*my* or	*mine*
Tui „	tuus	tua	tuum	*thy*	*thine*
Sui „	suus	sua	suum	*his*	*his own*
Nostri „	noster	nostra	nostrum	*our*	*ours*
Vestri „	vester	vestra	vestrum	*your*	*yours*

To increase the force, pte is added to the ablative singular of suus, as suapte manu, *with his own hand*; suopte gladio, *with his own sword*. Met, with the same view, is appended to the oblique cases of suus; as, suismet capitibus, *to their own heads*. All the cases except the nominative are called oblique. This title was bestowed on them by the old grammarians. The idea is that the nominative is a perpendicular straight line, forming at one end various angles with the lines representing the other cases which from their inclination from the perpendicular have obtained the name of oblique.

I must here recall to your mind that the personal pronouns are in Latin used only when emphasis is required, or to express a contrast; as, *ego* stultus sum, *tu* sapiens, *I* am foolish, *thou* art wise. The same is the case with the possessive pronouns. We frequently find the same idiomatic use of the article in French, where it is used when we should employ a possessive pronoun.

VOCABULARY.

Absens, -tis, *absent.*	**Desiderium**, -i, n., *a desire, an object of desire.*	**Memor**, -ŏris, *mindful* (E. R. *memory*).
Ango, 3, *I torture.*	**Immĕmor**, -ŏris, *unmindful.*	**Mirus**, -a, -um, *wonderful* (E. R. *admire*).
Benignus, -a, -um, *benignant, kind* (E. R. *benign*).	**Impŏtens**, *powerless* (E. R. *impotent*).	**Perfidus**, -a, -um, *treacherous* (E. R. *perfidy*).
Conservātrix, -icis, f. *preservative* (E. R. *conservative*).	**Industrius**, -a, -um, *industrious.*	**Potens**, -tis, *powerful* (E. R. *potent*).
Cura, -æ, f., *care* (E. R. *a cure, curacy, curate*).	**Insipiens** (in and sapiens), *unwise.*	**Teneo**, 2, *I hold* (E. R. *tenet*).
	Ira, -æ, f., *anger* (E. R. *ire*).	

EXERCISE 53.—LATIN-ENGLISH.

1. Omnis natura est conservatrix sui. 2. Mirum desiderium urbis, meorum, et tui, tenet me (*desire for, or after*). 3. Pater vehementer tuâ sui memoriâ (*thy recollection of him*) delectatur. 4. Ira est impotens sui (*has no power over itself*). 5. Sapiens semper potens sui est. 6. Vestri cura (*care for you*) me angit. 7. Omnes homines benigni judices sui sunt. 8. Vehementer grata mihi est memoria nostri tua. 9. Amicus mei et tui est memor. 10. Pater absens magno desiderio tenetur mei, et tui, mi frater, et vestri, O sorores. 11. Amici sunt nostri memores. 12. Multi vestrum mihi placent. 13. Plurimi nostrum te valde diligunt.

EXERCISE 54.—ENGLISH-LATIN.

1. The unwise man (fool) has no power over himself (impotens sui). 2. The father has power over himself. 3. Virtue has power over itself. 4. Vice has not power over itself. 5. Has anger power over itself? 6. Nature is preservative of herself. 7. The nature of virtue is preservative of itself. 8. No one of you has power over himself. 9. Very many of us have power over ourselves. 10. A treacherous friend is unmindful of me. 11. Faithful friends are not mindful of themselves. 12. Thy recollection and desire of me are very pleasant to me. 13. Care for thee tortures me. 14. Most of you, my scholars, are industrious. 15. Wonderful is the love of self.

Certain pronouns in Latin bear the name of *demonstrative*, because they point out (in Latin, demonstro, *I point out*; E. R. *demonstrate*) the person or persons that are intended. The demonstrative pronouns are is, ea, id; ille, illa, illud; iste, ista, istud; hic, hæc, hoc. Of these, is signifies *this* or *that*, and approaches to our personal pronoun *he, his*, etc.; hic denotes *this person*, that is, the nearer to the speaker; ille, *that person*, farther from the speaker; iste, *that person*, particularly when a person is addressed, the second person. From is, ea, id, idem, *the same*, is formed by the addition of dem; thus, is-dem contracted into idem (pronounced *i'-dem*), eă-dem, ĭd-dem or ĭdem (pronounced *id'-em*). To these may be added, ipse, ipsa, ipsum, *he himself, that very person*. In the following manner decline the

DEMONSTRATIVE PRONOUNS.

Is, m.; ea, f.; id, n., *he or that.*

	Singular.			*Plural.*		
Cases.	M.	F.	N.	M.	F.	N.
N.	is	ĕă	ĭd	ii	eæ	eă
G.	ejus	ejus	ejus	eōrum	eārum	eōrum
D.	ei	ei	ei	iis (eis)	iis	iis
Ac.	eum	eam	id	eos	eas	ea
Ab.	eō	eā	eō	iis (eis)	iis	iis

Also the pronoun, idem, m.; eadem, f.; idem, n., *the same.*

Cases.	*Singular.*			*Plural.*		
N.	idem	ĕădem	ĭdem	iidem	eædem	ĕădem
G.	ejusdem	ejusdem	ejusdem	eorundem	earundem	eorundem
D.	eidem	eidem	eidem	iisdem(eisdem)	iisdem	iisdem
Ac.	eundem	eandem	idem	eosdem	easdem	eadem
Ab.	eodem	eādem	eodem	iisdem(eisdem)	iisdem	iisdem

Iste, m.; ista, f.; istud, n., *that person.*

Cases.	*Singular.*			*Plural.*		
N.	iste	ista	istud	isti	istæ	ista
G.	istius	istius	istius	istōrum	istārum	istōrum
D.	isti	isti	isti	istis	istis	istis
Ac.	istum	istam	istud	istos	istas	ista
Ab.	isto	istā	isto	istis	istis	istis

Ille, m.; illa, f.; illud, n., *that person.*

Cases.	*Singular.*			*Plural.*		
N.	ille	illa	illud	illi	illæ	illa
G.	illius	illius	illius	illōrum	illārum	illōrum
D.	illi	illi	illi	illis	illis	illis
Ac.	illum	illam	illud	illos	illas	illa
Ab.	illō	illā	illō	illis	illis	illis

Ipse, m.; ipsa, f.; ipsum, n., *that very person.*

Cases.	*Singular.*			*Plural.*		
	M.	F.	N.	M.	F.	N.
N.	ipse	ipsa	ipsum	ipsi	ipsæ	ipsa
G.	ipsius	ipsius	ipsius	ipsōrum	ipsārum	ipsōrum
D.	ipsi	ipsi	ipsi	ipsis	ipsis	ipsis
Ac.	ipsum	ipsam	ipsum	ipsos	ipsas	ipsa
Ab.	ipsō	ipsā	ipsō	ipsis	ipsis	ipsis

Hic, m.; hæc, f.; hoc, n., *this person.*

Cases.	*Singular.*			*Plural.*		
N.	hic	hæc	hoc	hi	hæ	hæc
G.	hujus	hujus	hujus	hōrum	hārum	hōrum
D.	huic	huic	huic	his	his	his
Ac.	hunc	hanc	hoc	hos	has	hæc
Ab.	hoc	hac	hoc	his	his	his

EXAMPLES.—After these models decline—

Eadem rana, *the same frog.*	**Idem equus**, *the same horse.*	**Illud cornu**, *that horn.*
Hæc puella, *this girl.*	**Idem vitium**, *the same vice.*	**Ista femina**, *that woman*
Hic puer, *this boy.*	**Illa res**, *that thing.*	**Iste vir**, *that man.*
Hoc præceptum, *this command.*	**Ille sensus**, *that sense.*	**Istud nomen**, *that name.*

VOCABULARY.

Addictus, -a, -um, *given to, attached to.*	**Fidus**, -a, -um, *faithful.*	**Sallustius**, -i, *Sallust, the name of a Roman historian.*
Auctoritas, -ātis, f., *an authority.*	**Firmo**, 1, *I strengthen* (E. R. *firm*).	**Schola**, -æ, f., *a school.*
Carmen, -inis, n., *a poem.*	**Hebĕto**, 1, *I grow dull.*	**Scriptor**, -ōris, m., *a writer.*
Credo, 3, *I believe* (E. R. *creed*).	**Ignavia**, -æ, f., *idleness.*	**Sententia**, -æ, f., *an opinion* (E. R. *sentence*).
Diligentia, -æ, f., *diligence.*	**Iners**, -rtis, *inactive, sluggish.*	**Tarditas**, -ātis, f., *slowness* (E. R. *tardy*).
Displiceo, 2, *I displease.*	**Memoria**, -æ, f., *memory.*	**Vita** (imp. mood of *vito*), *avoid.*
Elegans, -ntis, *elegant.*	**Mendax**, -ācis, *lying* (E. R. *mendacity*).	
Expeto (imp. mood of *expeto*), *seek for.*	**Placeo**, 2, *I please.*	
	Sævus, -a, -um, *cruel.*	

EXERCISE 55.—LATIN-ENGLISH.

1. Sallustius est elegantissimus scriptor. 2. Ejus (*his*) libros libenter lego. 3. Amicum fidum habeo. 4. Ei addictissimus sum. 5. Fratris carmen valde mihi placet, id legere debes. 6. Ignavia corpus hebetat, labor firmat. 7. Illam vita, hanc expete. 8. Hæ literæ graviter me movent. 9. Hæc carmina suavissima sunt. 10. Isti homini mendaci non credo. 11. Huic duci milites libenter parent. 12. Illi viro omnes favent. 13. Præclarum est istud tuum præceptum. 14. Hæc sententia mihi placet, illa displicet. 15. Hoc bellum est sævissimum. 16. Hic puer industrius est, ille iners. 17. Memoriâ teneo præclarum illud præceptum. 18. Iste tuus amicus est vir optimus. 19. Ista vestra auctoritas est maxima. 20. Hujus discipuli diligentiam laudo, illius tarditatem vitupero. 21. Illi schola est gratissima, huic molestissima.

EXERCISE 56.—ENGLISH-LATIN.

1. Sallust is an elegant writer, Livy a more elegant (writer), and Cicero the most elegant. 2. I gladly read their books. 3. His (*ejus*) brother and friend are dear to me. 4. Thou hast a faithful friend, and art attached to him. 5. My sons have faithful wives and love them much. 6. I am greatly moved by that letter. 7. Thou dost not believe a lying woman (dative). 8. This boy pleases, that boy displeases me. 9. This poem is very elegant, that more elegant. 10. This thy soldier is brave. 11. The diligence of this scholar is praised by me the teacher. 12. In this school (there) are more diligent scholars than in yours.

VOCABULARY.

Admirabilis, -e, *admirable.*	**Imperātor**, -ōris, m., *a commander* (E. R. *emperor*).	**Pompeius**, -i, m., *Pompey, the name of a Roman general.*
Agnosco, 3, *I recognise, know.*	**Inimīcus**, -a, -um, *unfriendly* (E. R. *enmity*).	**Pro** (prep.), *for* (with the ablative).
Cæsar, -āris, m., *Cæsar, the name of a Roman general.*	**Laudabilis**, -e, *laudable, praiseworthy.*	**Quia** (conj.), *because.*
Clarus, -a, -um, *illustrious.*	**Meritum**, -i, n., *a merit.*	**Resisto**, 3, *I stand against, resist* (with dative).
Delphĭcus, -a, -um, *Delphian, belonging to the oracle at Delphi, in Northern Greece.*	**Modo**—modo, *now—now, at one time—at another.*	**Seditiosus**, -a, -um, *seditious.*
Diffīdo, 3, *I distrust* (E. R. *diffident*).	**Nosco**, 3, *I become acquainted with.*	**Sentio**, 4, *I feel, think* (E. R. *sentient*).
Expugno, 1, *I take by storm.*	**Obsideo**, 2, *I besiege.*	**Studeo**, 2, *I strive after, endeavour* (E. R. *student*).
Faustum, -i, n., *a deed.*	**Opus, operis**, n., *a work* (E. R. *operative*).	**Tracto**, 1, *I treat, pursue.*
Fido, 3, *I trust.*	**Oraculum**, -i, n., *an oracle.*	**Virtus**, -tūtis, f., *bravery.*
Fortūna, -æ, f., *fortune.*		

EXERCISE 57.—LATIN-ENGLISH.

1. Multi homines de iisdem rebus eodem die non eadem sentiunt. 2. Insipiens eidem sententiæ modo fidit, modo diffidit. 3. Ipsi imperatori seditiosi milites resistunt. 4. Animus ipse se movet. 5. Virtus est per se ipsa laudabilis. 6. Sæpe nihil est homini inimicius quam sibi ipse (*himself to himself; than he is to himself*). 7. Omne animal se ipsum diligit. 8. Carior nobis esse debet patria quam nosmet ipsi (*we ourselves*). 9. Præclarum est illud præceptum oraculi Delphici. Nosce (*know*, imp.) te ipsum.

EXERCISE 58.—ENGLISH-LATIN.

1. The enemies besiege the city, and endeavour to take it by storm. 2. The deed of that great man is praised by all writers. 3. Cæsar and Pompey are very illustrious Roman generals. 4. To that (one) fortune is more favourable than to this (one). 5. The bravery of that (one) and this (one) is wonderful. 6. The king himself is the general of the army. 7. Not always dost thou think the same concerning the same things. 8. The father and the son pursue the same learning (literæ). 9. Virtues are lovely in (*by*) themselves. 10. All men love themselves. 11. Thy native country ought to be dearer to thee than thyself. 12. Know yourselves, young men. 13. A liar often distrusts himself.

KEY TO EXERCISES IN LESSONS IN LATIN.—XIV.

EXERCISE 47.—LATIN-ENGLISH.

1. The soldiers fight bravely. 2. Do the soldiers fight bravely? 3. Do not the soldiers fight bravely? 4. The Romans fight more bravely than their enemies. 5. Of Greece I think more and more. 6. Dost thou not think much on thy father? 7. We every day more and more expect a letter. 8. Most desiringly thou lookest for the coming of thy mother. 9. The country pleases (my) father every day more and more. 10. Thou art building a house well. 11. Does he build a house very well? 12. The letter is very badly written. 13. Thy words sound badly. 14. Slaves think very ill concerning their master. 15. Girls labour more patiently than boys. 16. Very hidden dangers are avoided with very great difficulty. 17. It is difficult to overcome the Greeks. 18. The Greeks fight very bravely. 19. Sedition is put down more easily than war. 20. The state is excellently administered. 21. He boldly denies (it). 22. The citizens inhabit the city in happiness.

EXERCISE 48.—ENGLISH-LATIN.

1. Facile ne bellum sedatur? 2. Difficillime bellum sedatur. 3. Pugnat fortiter. 4. Fortius pugnant. 5. Fortissime pugnant Græci. 6. Magnopere expectas veris adventum. 7. A pueris puellisque omnibus cupidissime expectatur adventus veris. 8. Epistolam tuam in dies plus plusque expectant. 9. Male mala verba sonant. 10. Milites magis atque magis dimicant. 11. Occulta non facile evitantur. 12. Matres patientius quam filiæ laborant. 13. Seditio feliciter sedatur. 14. Pulchre literas scribit. 15. Romani fortius quam Græci pugnant. 16. Rus animum meum maxime delectat. 17. Multum animus ne tuus delectatur a rure? 18. Maxime cogito de domo mea, de fratribus, et de sororibus. 19. Pessime administratur civitas a Romanis.

EXERCISE 49.—LATIN-ENGLISH.

1. I sing. 2. Thou shoutest. 3. The friend calls. 4. We narrate. 5. You dance. 6. Brothers labour. 7. I weep. 8. Thou laughest. 9. Brother grieves. 10. We teachers teach, you scholars learn. 11. I play. 12. Thou learnest. 13. Sister paints with the needle (that is, embroiders). 14. We write. 15. You read. 16. Brothers paint. 17. I leap. 18. Thou strikest. 19. The boy sleeps. 20. We masters instruct you, O pupils. 21. You, O good pupils, attentively hear our precepts. 22. Virtues are equal among themselves (one to another). 23. To command one's self is the greatest command. 24. An angry man is not his own master. 25. The pursuit (handling) of letters is salutary to us. 26. Truth is always pleasant to me.

EXERCISE 50.—ENGLISH-LATIN.

1. Ego narro. 2. Tu saltas. 3. Frater labōrat. 4. Nos cantāmus. 5. Vos laborātis. 6. Amici saltant. 7. Ego, præceptor, doceo; vos, O discipuli, discitis. 8. Nos dolemus. 9. Tu pingis. 10. Juvenes feriunt. 11. Nos præceptores non tentamus docere vos, O irati pueri. 12. Boni discipuli debent sibi imperare. 13. Imperare sibi est virtus. 14. Difficile est irato sibi imperare. 15. Irati non sunt apud se. 16. Imperium semper est tibi gratum. 17. Nonne gratum nobis est imperium? 18. Tibi haud mihi grata est veritas. 19. Veritas est salutaris tibi, mihi, nobis, omnibus.

EXERCISE 51.—LATIN-ENGLISH.

1. Vices creep on us under the name of virtues. 2. We favour you, you do not favour us. 3. Thou lovest me, I love thee. 4. My life is dear to me, thine (is dear) to thee. 5. Virtue always shines of itself (by its own light). 6. The song delights us. 7. Our parents are loved by us. 8. O my son, thou never obeyest me! 9. Our brother loves me and thee. 10. I am nearest to myself. 11. Thou well commandest thyself. 12. Virtue is cultivated on its own account (for itself). 13. Virtue is sought for, for its own nature (*for its own qualities*) 14. The citizens fight for their own heads (*lives*). 15. The sage carries with him all his property. 16. We rejoice with you on the return of

(our) father. 17. Thou well contendest with thyself. 18. God is with thee. 19. Often the mind is in discord (disagrees with itself). 20. The enemies fight earnestly with us. 21. Thy speech is not in unison with thyself.

EXERCISE 52.—ENGLISH-LATIN.

1. Omnia mea mecum porto. 2. Secumne omnia sua portant sapientes? 3. Tu me amas, ego te amo. 4. Vita tua mihi est cara, mea tibi. 5. Mali semper secum discordant. 6. Tractatio literarum gratissima est nobis. 7. Amant sese homines. 8. Amantne sese mulieres? 9. Pessime amant sese mali. 10. Per se pulchra est virtus. 11. Propter te ipsum te amo. 12. Mea patria gratior est mihi quam tua tibi.

LESSONS IN BOTANY.—XV.

SECTION XXVII.—CRUCIFERÆ OR BRASSICACEÆ, THE CRUCIFEROUS (CROSS-BEARING) OR CABBAGE TRIBE.

ALREADY, in an early lesson, we have had occasion to make a statement respecting the *cross-bearing* flowers that we hope the reader has not forgotten. We mentioned that a strange plant being referred to this natural order might at once be considered harmless, and probably very good to eat.

Let us now go a little more minutely into the characteristics of these *cross-bearers*. They are these: Sepals, four, free; petals, hypogynous, four, free, cruciform; stamens, six, tetradynamous; ovary, bilocular, placenta parietal; fruit, ordinarily a pod; seed, dicotyledonous.

Let us now proceed to the application of such of the preceding characters as may be necessary. Firstly, the propriety of the term *cruciferous* will be rendered evident from an examination of the representation of the flower of a plant termed Shepherd's Purse, one of the cruciferous family (Fig. 147).

This same individual, the Shepherd's Purse, shall also serve to teach us yet something more regarding the peculiarities of the natural order *Cruciferæ*.

Let us now examine a branch of the plant (Fig. 146).

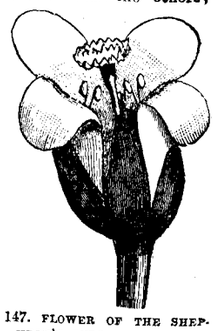
Directing our attention at first to the flowers, we find them to be arranged after the manner of a raceme, and totally devoid of bracts. This absence of bracts pervades the whole natural order *Cruciferæ*, which is the only natural order in which the bracts are uniformly absent. Hence by this sign a cruciferous vegetable may be as readily known as by the structure of the flower; indeed, the sign of absence of bracts has a wider sphere of application. The flowers of the *Cruciferæ* are at the best very small, but perhaps they might not yet have fully developed themselves at the period of observation. Consequently, if the cruciferous shape of flowers were the only guide, the student might not be able to wait for the sign of discrimination; whereas by noticing the absence of bracts, he would know the plant under consideration to be cruciferous, and knowing this, he would be assured of its harmlessness at least. Most probably it would be good to eat, either in the form of salad or cooked.



146. SHEPHERD'S PURSE.

The advantages of being thus able to refer an unknown plant to a harmless and useful order we need not specially indicate. They will be self-apparent. Let the reader consider the bearing of this anecdote. It is related that, when during Anson's voyages his crews disembarked in unknown places, the surgeon, fearful of poisons, would not suffer them to partake of any vegetables except grasses, notwithstanding the scurvy was making great ravages amongst them. Now the reader must be informed, if he does not already know, that the scurvy is a disease almost entirely dependent upon too exclusive a diet of salt meat, without accompaniment of vegetables, more especially vegetables of succulent character. Formerly the scurvy made great ravages in our navy; at present it is scarcely known, having been banished, partly by the administration of fresh preserved provisions, but chiefly by the administration of lime-juice, which now constitutes a portion of the rations of every sailor. If Anson's crew had been provided with fresh vegetables to eat, their scurvy would have been cured; and they knew it. How great, then, must have been the fear of the surgeon, and how valuable is the knowledge of Botany!

Returning to our investigation of the distinctive signs by which cruciferous plants may be known, we shall merely call attention to the fact that each flower has six stamens, of which two are more spreading and shorter than the others; hence the denomination *Tetradynamia* (or four-powered) in the Linnæan or artificial classification, and this is another essential characteristic of cruciferous plants. The other characteristic signs being for the most part microscopic, we pass them over without notice.



147. FLOWER OF THE SHEPHERD'S PURSE, ENLARGED.

The *Cruciferæ* are dispersed all over the surface of the globe; the greater number, however, inhabit the northern temperate zone, more especially of the Old World; between the tropics they are rare, and when they exist, are found on mountain elevations; beyond the Tropic of Capricorn they become less frequent, even more so than beyond the Tropic of Cancer.

When we mention that cabbages, sea-kale, mustard, cress, and radishes belong to this order, we shall have stated enough to demonstrate the utility of its species. When we state again that wall-flowers (Fig. 149) and stocks are cruciferous plants, the reader will see that utility is not the only claim which the *Cruciferæ* present to our notice.

The *Cruciferæ* are imbued with an acrid volatile principle dispersed throughout all their parts, and frequently allied with sulphur. To this volatile principle cruciferous plants owe their piquancy and their peculiar odour, which, after putrefaction, is *ammoniacal*; thus proving the *Cruciferæ* to contain the simple body, nitrogen, ammonia being a compound of nitrogen with hydrogen. In many species of *Cruciferæ* there exists in connection with the odorous principle also a bitter material and a *fixed oil*; the latter is chiefly developed in the seed. The active principles of annuals belonging to this order reside in the leaves, those of perennials in the root. Certain species, the leaves of which are inoperative, produce very acrid seeds. Many *Cruciferæ* grow mild by cultivation, which augments their amount of sugar and mucilage. The anti-scorbutic properties of many *Cruciferæ* have been known from times of great antiquity; the species which possesses the greatest fame in this respect being the Scurvy Grass (*Cochlearia Officinalis*), a drawing of which is given in Fig. 148.

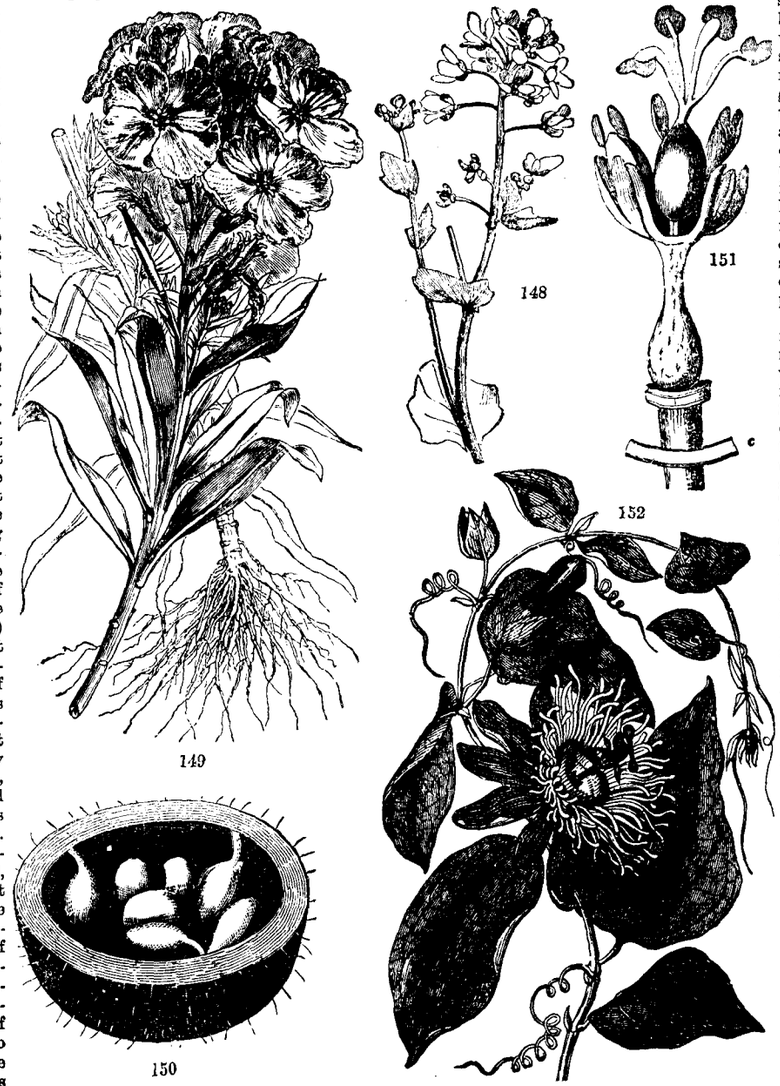
SECTION XXVIII.—PASSIFLORACEÆ, OR THE PASSION-FLOWER TRIBE.

The beautiful Passion-flower, now so common in English gardens, is a native of the forests of Central America, where it grows on large stems which hang like festoons from the boughs of forest trees, interweaving them with a network of gorgeous leaves and flowers. The term Passion-flower was applied by the Spaniards, owing to the supposed resemblance presented in various parts of the floral whorls to the accessories of Christ's crucifixion. The conspicuous ray-like appendages, sprinkled with blood-like spots, were compared to the crown of thorns; the stigma is cruciform; nor were the ardent Spaniards slow to discover other fancied resemblances, which eyes less prejudiced than their own in favour of a dominant idea can scarcely recognise.

Characteristics: Calyx tubular, urceolate (like a pitcher, from the Latin urceus, *a pitcher*) five-parted, ordinarily furnished at its throat with one or more series of filaments. Corolla of five petals. Stamens five, hypogynous, adherent to the support of the ovary. Ovary stipulate superior, one-celled; three or five placentæ; three or four styles terminated by club-like stigmas: ovules reflexed; fruit, a berry, indehiscent (not splitting), or straight, central.

We shall be able to individualise the Passion-flower order without giving ourselves the trouble to appeal to all the characteristics mentioned. Nevertheless, botanists who penetrate more deeply into the study of plants find it necessary to examine all the characters present.

Many species of Passion-flower are now common enough in our gardens. For the purpose of examination we shall select an individual of the species termed *amabilis*, the representation of which we subjoin (Fig. 152). The student will first observe, on glancing at the broad characteristics of the specimen, that the flower is supplied with three large bracts, which constitute what botanists term an *involucrum*. Proceeding inward, we next arrive at what? The calyx? It should be the calyx, judging from its position, but the appearance of its separate parts (sepals) is different from the appearance of those sepals we have already met with. They are not green, but coloured like the petals of most flowers. We have already stated, however, that amongst the other transformations of parts which occasionally ensue, the transformation of the calyx into the appearance of a corolla is not unfrequent. So frequently, indeed, does this occur, that mere green colour is not to be regarded as more than a collateral circumstance. The external floral whorl is always considered by botanists as a calyx, whatever its colour may be. That colour is often very brilliant, as in the fuchsia, for example, where the gay-looking part of the flower is not corolla or aggregation of petals, but calyx, or aggregation of sepals. This assumption by the parts of the calyx of the appearances usually presented by the corolla gives rise to what botanists term a *petaloid* calyx. The term *petaloid* means resembling a petal; the termination *oid* being derived from the Greek word εἶδος (ei-dos), *likeness*, which word, in composition, changes *eid* into *oid*. Directing the eye to the lower part of the sepals, they will be observed to rise from a shallow cup-like body, to which also are attached the petals and other portions of the flower. As regards the petals themselves, they are coloured similarly to the inside of the sepals, and are of the same colour on both sides, by which circumstance they may be distinguished from the sepals, as also by the circumstance of their not having a little horn, which may be found on examination springing from each of the sepals.



148. SCURVY GRASS (COCHLEARIA OFFICINALIS). 149. THE WALL-FLOWER. 150. TRANSVERSE SECTION OF OVARY OF PASSION-FLOWER. 151. COLUMN OF PASSION-FLOWER. 152. SCARLET PASSION-FLOWER (PASSIFLORA AMABILIS).

We next arrive at the filamentary rays which the imaginative Spaniards compared to the crown of thorns! What are those rays? They are petals so modified in shape that they almost present the appearance of stamens. This modification, and yet more frequently its converse, stamens modified into petals, is not at all unfrequent in many flowers, as the result of cultivation. In the Passion-flower tribe, however, it exists as the usual condition of the flower. Let us now proceed to examine the reproductive, or fruit and seed-producing portions of the flower, which are very peculiar. We have already mentioned a cup-like body in connection with the structure of a Passion-flower. It corresponds with the part lettered *c* in Fig. 151. From the centre of this cup a column-like body is observed rising aloft in the centre of the flower, to which certain appendages are attached. The nature of these appendages will at once be obvious. Externally, we easily recognise five anthers, and internally we recognise the club-headed styles; but looking again at the stamens, we search in vain for the filaments, which are, in fact, united to the stalk which elevates the ovary,

The water, in rising from 15° to 100°, will use

$$(100 - 15) \times 400 = 34000 \text{ units of heat.}$$

These are supplied by the steam, therefore

$$536x = 34000$$

$$x = \frac{34000}{536} = 63{\cdot}4 \text{ kilogs.}$$

If the water was to have been raised to 80° instead of 100°, then the condensed steam must have cooled from 100° to 80°—that is, 20°; thus it would have contributed

$$20x \text{ units of heat more,}$$

which would have been added to the $536x$.

LESSONS IN ENGLISH.—XX.

UNCOMBINED SUFFIXES.

THE suffixes of which we have spoken enter into the structure of the words with which they are severally connected. Thus the *ment* in amend*ment* forms an essential part of the term. If *ment* is sundered from amend, the word amendment ceases to exist; and instead of a noun, there arises a verb, the verb to amend.

Other words are appended to *roots* without entering into union with them. For instance, we say, *cast down* and *cast up*. Here *down* and *up* form no part of *cast*. Cut off *down* and *up*, and *cast* remains the same. Yet *down* and *up* modify the meaning of *cast*, and they modify *it* in a very important way. And *down* and *up* come after *cast*. In some sort, then, they are suffixes. They perform the part of suffixes in regard to meaning, and they differ from suffixes chiefly in not combining with the root as do the suffixes already considered. Hence they appear to be uncombined suffixes. Putting the two together, I may designate suffixes, properly so called, *combined suffixes*, and those that do not enter into the composition of words, *uncombined suffixes*.

The uncombined suffixes *down* and *up* are adverbs. Adverbs form one class of uncombined suffixes. Another class consists of prepositions; for instance, we say, *I speak to*, and *I speak of*. Here *to* and *of* are prepositions. These uncombined suffixes, you see, very materially modify the meaning of the verb to *speak*. Consequently, the right employment of prepositions as suffixes is a matter of great consequence.

If you carefully follow me in what immediately ensues, you will see that there is good reason to believe that the English is a very flexible and a very rich language, and that it owes these qualities largely to the existence in a free and uncompounded state of many of its words. Let me explain what I mean by "a free and uncompounded state." Suppose that *fall* and *down* had coalesced into one word: thus, to *falldown*; then *falldown* would be a compound, and neither *fall* nor *down* would be free, being absorbed in the new term. Indeed, we have in the shape of a noun this very compound, only the terms are inverted as in *downfall*. Now *down* and *fall* thus combining, you cannot modify *fall* by using other prefixes; you cannot, for instance, say *outfall* in the sense of a quarrel, although the term is used for the opening from which the water of a canal, sewer, or drain escapes. But with *down*, as an uncombined prefix, you can say *fall out* equally well with *fall down*; and as you can say *fall out*, so can you also say *fall in*. Indeed, the power of expression thus acquired is almost endless. The greater is the pity that some writers, ignorant of the treasures of the Saxon element of our language, and misled by false views of elegance, should have given preference to Latinisms, and frowned on the idiomatic diction which ensues from the employment of our uncombined suffixes.

UNCOMBINED SUFFIXES.

1. *Adverbs.*

Aback,

"Away there! lower the mizen yard on deck,"
He calls, and, "brace the foremost yards *aback*."
Falconer, "Shipwreck."

Abaft, on the aft or hind part.

"Let all hands go *abaft*."—*Anon.*

Aboard, on board ship.

"Resolved, he said; and rigged with speedy care,
A vessel strong, and well equipped for war;
The secret ship with chosen men he stored,
And, bent to die or conquer, went *aboard*."

The facility of combination afforded by these uncombined suffixes may be exemplified in this verb *went*.

He went	
aback	the binnacle
aboard	the ship
aloft	in a balloon
aback	suddenly
afar	from his country
back	in a carriage
forward	in good works
backward	in morality
sideward	to avoid a nuisance
sideways	between the posts
amidst	the crowd
below	the floor
above	the roof
apart	from the mass
ashore	from the boat
through	the folding doors
on	successfully
off	altogether
aright	in all he undertook
near	the place intended
by	the church

He went	
amongst	the scholars
before	the picture
behind	the door
into	the house
out of	the church
upwards	to the ceiling
round	the monument
in	to see his friends
out	to take a walk
high	in the air
low	in pocket
along	the highway
over	the seas
across	the meadow
under	the archway
far	to prove it
wrong	in his mind
right	into the theatre
up	the stairs
within	the enclosure.

Here are forty-one different acceptations of the word *went*. In no other language known to me is this multiplying power exceeded, if indeed it is equalled, even in the German; while in most languages, as in Latin, in French, and in Spanish, the facility of combination is very much less.

So familiar, however, are Englishmen with the import and the application of the *uncombined adverbs*, that I have no need to go through them in detail. It may be more useful to give two or three instances of the way in which they modify the verb to which they are subjoined.

VERBS.	SUFFIXES.
Run, throw, strike, bring	back
	down
	forwards
	in, into
	along
	near
	over, on
	across
	up
	under
	out
	backwards.

Here are fifty-six words made out of four with the aid of suffixes, which being common property may enter into union with many other verbs. In Todd's edition of Dr. Johnson's Dictionary, sixty-two different applications of the verb *to cast* are given and exemplified; and this variety is owing mainly to the efficacy of the uncombined suffixes. The diversity of meaning given by these suffixes is no less remarkable. To *run up* an account is a very different matter from *running down* an enemy's vessel. By *blowing up* a citadel, a revolt may be *put down*. You may *enter into* a cave, and you may *enter into* Milton's conception of Samson Agonistes. If you have money, you may *set up* your carriage; if you are liberal, you may, at the same time, *set up* a friend; and if you have also a proper spirit, you will not fail to *set down* the impertinent. Edgar, having *run through* his fortune, enlisted as a common soldier, and *was run through* in battle. To *laugh with* one's friends is agreeable; to be *laughed at* by them is very unpleasant.

"So long as nature
Will *bear up* with this exercise, so long
I daily vow to use it."—*Shakespeare.*

"It shows a greatness of soul for persons in distress to *bear up* against the storms of fortune."—*Broome.*

"They are content to *bear with* my folly."—*Sidney.*

"With such alacrity they *bore away*."—*Dryden.*

"Whose navy like a stiff-stretched cord did shew,
Till he *bore in* and bent them into flight."—*Dryden.*

"As a lion bounding in his way
With force augmented *bears against* his prey."—*Dryden.*

"The weight of the body doth *bear* most *upon* the knee joints."—*Wilkins.*

"I doubted whether that occasion could *bear* me *out* in my confidence."—*Temple.*

"An eagle fluttereth over her young and *beareth* them on her wings." (*Deut.* xxxii. 11.)

"Do you suppose the state of this realm to be so feeble, that it cannot *bear off* a greater blow than this?"—*Hayward.*

"And *bears down* all before it with impetuous force."—*Dryden.*

"And ebbing tides *bear back* upon th' uncertain sand."—*Dryden.*

"Cæsar doth *bear* me *hard*; but he loves Brutus."—*Shakespeare.*

"Give but the word, we'll snatch his damsel up,
And *bear* her *off*."—*Cato.*

To this list nautical phrases would add, to *bear down* on an enemy, and to *bear up* against the wind; to *bear round* a headland, and *bear over* a sea; to *bear by* an island, and *bear through* a strait. What variety of meaning arises from these uncombined suffixes may be seen by taking a single thing as their object. Let the first be a river and the second a bridge.

To go near a river.	To go near a bridge.
To go along a river.	To go along a bridge.
To go into a river.	To go over a bridge.
To go through a river.	To go across a bridge.
To go over a river.	To go under a bridge.
To go under a river.	To go upon a bridge.
To go upon a river.	To go above a bridge.

On a tempestuous night a horseman fatigued with a long day's journey, in attempting to *go across* a dilapidated bridge, was *blown over* it into the river. If you *go through* the Thames you will probably be drowned; if, by means of the Tunnel, you *go under it*, you will not wet the sole of your foot. A balloon will *carry* you *over* the Thames, and you may cross the river in a wherry. I sauntered *along* the river, and at length went upon its tranquil bosom. My cousin walked *under* the bridge, while I was *above* it in the balloon, and we both saw the sheep go *into* the river.

These adverbial suffixes must not be confounded with ordinary adverbs. They are only a small portion of ordinary adverbs. Their connection with their verbs is more intimate than is the connection of ordinary adverbs, for though uncombined they form a part of the verb in each case, and are essential to its signification. The office of the ordinary adverb is not to change the import of a verb, but to denote the manner of its action. In *to bear patiently*, the adverb patiently does nothing more than mark the way in which the evil is borne; it is borne patiently, not impatiently, not peevishly, not complainingly. But to *bear through*, as "the admiral *bore through* the enemy's line," is in the primitive sense of the term not *to bear* at all, nor in the derivative sense to *endure*, but *to sail* or *direct a ship*. Besides, ordinary adverbs may be connected with these adverbial suffixes; as, for example, "the admiral *boldly bore through* the enemy's line."

UNCOMBINED SUFFIXES.

2. *Prepositions.*

I have termed the uncombined suffixes of which I have spoken *adverbs* and *adverbial suffixes*. In doing so I have, in regard to such as *into*, *through*, etc., considered them in their connection with their several verbs. Thus viewed, they in construction are taken as parts of their verbs. In consequence the verbs become compound, and in their compound state govern their objects. But *through*, *into*, and others may be viewed as prepositions. When so considered they are connected not so much with the verb as with the noun, which in that case is governed not by the verb but by the preposition; in other words, the noun is directly dependent on the preposition rather than on the verb. I may illustrate my meaning by an example of

1. *A Verb compounded with a Suffix.*	2. *A Preposition connected with a Noun.*
He went under the bridge.	He went under the bridge.
The boat sailed down the river.	The boat sailed down the river.

In the use of prepositions in connection with verbs, special regard must be paid to usage. The power of the verb is materially affected by the preposition. This fact is broadly seen in the appending of *to* or *of* to the verb *to speak*; for example, *to speak to*, *to speak of*. Besides the phrase *to speak to*, we use the phrase *to speak with*. The two meanings are nearly the same, but *to speak to* is *to address*, and *to speak with* is *to interchange remarks*, *to converse*. The usage you are to follow is present usage. In its very nature usage is a varying thing. Of old, *to lay hold on* was employed in the way of our *to lay hold of*. At present we say *dependent on*, but *independent of*, yet the two adjectives, as they differ only in the negative *in*, would naturally require the same construction; and in former days *on* was used with *independent* as well as *dependent*.

"A being of dependent nature remains independent *upon* him."—*South.*

It is a rule that verbs, compounds of the Greek, Latin, and French languages, take after them the same prepositions as those which enter into their structure; thus, we say sympathise *with*, for the *sym* of sympathise denotes *with*. In the same way we say *adhere to*; *intervene between*. Yet we say *prefer to*, instead of prefer *before* (præ, Latin, *before*). We have also conformable *with*, and conformable *to*.

"The fragments of Sappho give us a taste of her way of writing conformable *with* that character we find of her."—*Addison.*

"He gives a reason conformable to the principles."—*Arbuthnot.*

With, however, seems to denote a greater degree of resemblance or correspondence than *to*. According to the rule just enunciated, *averse* (a, *from*; and verto, *I turn*) would take *from* after it; yet we say not averse *from*, but averse *to*. Exception (ex, *out of*; and capio, *I take*) would require *out of* or *from*; yet we say, exception *to*.

"Pleads, in exception *to* all general rules,
Your taste of follies with our scorn of fools."—*Pope.*

The elegance as well as the propriety of language much depends on a correct use of the prepositions, and, consequently, I shall make them the subject of a series of exercises in English composition.

PARSING.

God made the little worm that crawleth on the ground. I saw a fly crawl up the window pane. Let us go forth into the green fields. John has gone down into the cellar. The buds come out on the trees. The cowslips hold up their heads; will the cowslips never hang their heads down? The goslings are running on the green. They are now going down into the pond. The hen sits upon her nest. When the hen has broken the shell, the chicken will come out. The sheep can scarcely stand under their wool. The butterflies flutter from bush to bush. The young animals of every kind sport about. The shepherd careth for his sheep, and bringeth them back to the fold. My son, take care of your aged mother, and sustain her in her weakness. Your mother brought you up on her knees. You lay in her bosom. She fed you with her own vital substance. Therefore, let her now, in her age, cleave to you, and, upheld by you, let her gently go down into her tomb.

EXERCISES IN COMPOSITION.

Make a simple sentence comprising the words which follow.

Words with their proper Prepositions.

Abandoned to,	F. R.* abandon,	*surrender.*
Abhorrence of,	" horre,	*stiff with fright.*
Abound in,	" und,	*wave.*
Absent from,	" ens,	*being.*
Abstain from,	" tene,	*to hold.*
Accede to,	" ced,	*to go.*
Acceptable to,	" cap,	*to take.*
Access to,	" ced,	*to go.*
Accessory to,	" ced,	*to go.*
Account of,	" computare,	*reckoned.*
Accuse of	" caus,	*cause.*
Acquaint with,	" cognose,	*to know.*
Acquiesce in,	" quies,	*rest.*
Acquit of,	" quit,	*to free.*
Adapted to,	" apt,	*to fit.*
Add to,	" do,	*to give.*
Adequate to	" æqu,	*equal.*
Adhere to,	" hære,	*to stick.*
Adjacent to,	" jace,	*to lie.*
Adjudge to,	" judec,	*a judge.*

Questions: What is the difference between accord *with*, and accord *to*? between accountable *to*, and accountable *for*? between admit, and admit of? between address, and address to?

In order that you may clearly see what I require, I give a sentence or two by way of example.

Such conduct draws upon him the abhorrence of all men. Such conduct subjects him to the wrath of God.

The former sentence is constructed on *draws upon*; the latter is constructed on *subjects to*. Suppose that I had given *absence from* and *arrival at*, as the germs of a sentence, then I perform what is demanded, thus:—

Your absence from home has given your parents much pain. John's arrival at Portsmouth has inspired all the family with hope.

* F. R. signifies Foreign Representatives, that is, the stem in the Latin, French, etc., which forms the root or substance of the word: in these stems, only the essential or radical letters are given.

to which they are usually attached. These filaments do not exist, at least do not separately exist; they are all united—*soldered*, as the French say, and it is a very good word—to the *support* of the ovary. This expression, "support of the ovary," is new to us; but if the reader looks at his dissected Passion-flower, or at our diagram in Fig. 151, he will recognise the propriety of the expression; for in this tribe the ovary is supported within the flower by means of a little stem. Now this little stem being called a *stipes*, the ovary is said to be *stipitate*. This term, the reader will remember, occurs in our list of characteristics of this natural order. Let the student now examine a little more in detail the anthers or pollen-forming heads of the stamens. These do not point towards the stigmas, but in the opposite direction, which is very unusual. Fertilisation of the ovule depends, as we need not repeat, upon contact between the pollen-dust and the stigmas; hence it would seem that the anthers should always point towards the stigmas. In most cases they do so point towards them, but in the Passion-flower tribe we find an exception to this rule.

Fig. 150 represents the transverse section of the ovary containing the seeds. The fruit, or ripened ovary, in all species of the Passion-flower is egg-shaped, differing in size according to the species. The blue Passion-flower produces a fruit about the size of a hen's egg; but in other species the fruit is much larger, and contains a delicious pulp.

Passion-flowers we have seen, are both agreeable and useful from the beauty of their flowers and the flavour of their fruits; many species are medicinal. The pulp surrounding their seeds is in some cases sweet, in others acid; the latter serve as the basis for the preparation of acidulated drinks, not only agreeable, but medicinal. One species, *Passiflora Rubra*, contains a narcotic principle which is sometimes employed as a substitute for opium. *Passiflora Quadrangularis* is cultivated for the refreshing pulp surrounding its seeds, but its root is very poisonous.

LESSONS IN SHORTHAND.—XI.

CONTRACTIONS.

178. When *P* occurs between *m* and *t*, *T* between *s* and another consonant, or *K* between *ng* and *sh*, or *ng* and *t*, the *p*, *t*, or *k* may be omitted in Phonetic Shorthand, but not in Longhand and Printing; as

P. *stamped* (from *stamp*), *cramped*, *thumped*.
T *mostly*, *restless*, *postpone*; also in *postage stamps*, *testament*, *New Testament*, *testimony*, etc.
K. *anxious*, *sanction*, *distinct*, *distinction*.

179. TICK *THE.*—*The*, the most frequent word in the English language, may be expressed by a short slanting stroke joined to the preceding word, and generally written downward; thus,

in the, *for the*, *of the*, *with the*, *to the*;

but when more convenient, it is written upward; thus, *at the*, *on the*. The first stroke of *on the* is made sloping to keep the sign distinct from *I*. (The scarce diphthong *ay* should be accompanied with the nominal consonant, thus *ay*, to prevent its being read as *on the*.) The tick *the* never BEGINS a phrase.

180. OF THE.—The connective phrase "of the," is intimated by writing the words between which it occurs NEAR TO EACH OTHER, thus showing that the one is *of the* other; thus,

love of the beautiful, *subject of the work*.

The prefix *con* or *com* (see par. 120) cannot be mistaken, in practice, for this mode of expressing *of the*.

181. A *or* AN.—*A* or *an* is joined to the preceding word by ⌊ or –; thus, *if a*, *in a*, *with a*, *at a*, *on a*. The forms *of a*, *to a*, are not recommended; the words should be written separately.

182. The pupil is recommended to be sparing in his use of contractions in the commencement of his practice. In the Reporting Style, every legible contraction may be brought into use. The advanced writer may use the following contractions. Some consist merely in joining the prefix or affix to the rest of the word. Words marked (*) are written above the line.

LIST OF CONTRACTIONS.

acknowledge	object
anything*, nothing	objection
danger	public-sh-ed
especial-ly	publication
establish-ed-ment	Phonographer
immediate	Phonographic
immediately	Phonetic Society
impossible *	Temperance Soc., [etc.
inconsistent	rather
influence-d *	represent-ed
influential *	representation
information *	representative
instruction	something
interest	Spelling Reform
knowledge	subject
language	subscription
manuscript	surprise *
messenger	together
mistake *	thankful *
more than *	transcript
natural	transgress
never	transgression (183)
nevertheless	understand-ood
next — now	whatever
notwithstanding	whenever

182. *Transaction* should be written at length because the contracted form would clash with *transgression*.

PHRASEOGRAPHY.

183. In longhand, swift writers join all the letters of a word together, and sometimes write several words without lifting the pen. In Phonography also several words may often be united. This practice, which is called Phraseography, gives great assistance to the writer in following a rapid speaker. The following examples will show how other useful phraseograms may be formed.

LIST OF PHRASEOGRAMS.

and have	it is	to be
and the *	it is not	we are
as well as *	it is said	we have
could not	it should be	we have not
had not *	it would be	we have seen
do not	may be	which cannot
has not *	of course *	you can
I am *	should be	you cannot
I do	should do	you may
I have	they will	you must
I will *	that is *	you must not
is not	this is	you will do *

184. ACCENT may be shown by writing a small cross close to the vowel of the accented syllable; thus, *arrows*, *arose*, *renew'*. It is, however, more convenient to use Phonetic Longhand when marking the accent of a word.

185. EMPHASIS is marked as in longhand, by drawing one, two, or more, lines underneath; a single line under a single word must be made wave-like, thus ~~, to distinguish it from —— *k*. In preparing manuscript for the press, a single line thus drawn underneath, (wavy for a single word, and straight for more than one,) signifies *italic*; two lines (which need not be waved) SMALL CAPITALS; and three lines LARGE CAPITALS. For *ITALIC CAPITALS* draw three lines, and write "Italic" in the margin.

186. AN INITIAL CAPITAL is marked by two short lines under the word; thus, *The Times* newspaper, *Abel*.

187. FIGURES are written as usual, or the words may be expressed in Phonography. When the figures *one* and *six* are written by themselves, they should be formed thus, *1*, *6*, that they may not be mistaken for shorthand characters.

REPORTING.

188. In the "Reporter's Companion" the reader will find further principles of abbreviation that will enable him to attain the goal of verbatim reporting. As it is almost impossible for rapid writers of Phonography, when corresponding with others less advanced, to adhere strictly to the Corresponding Style, as developed in this series of Lessons, a list of the PRINCIPAL reporting grammalogues is given, to assist in reading the Reporting Style. The figures denote the positions in which the words are written. (See par. 139.)

LIST OF REPORTING GRAMMALOGUES.

CONSONANTS.

P, 1 happy, 2 up, hope, 3 put
ps-shn, 2 possession, 3 position
ps, 1 pass, 2 hopes, 3 peace, piece
pn, 1 happen, 2 upon, open
pnt, 1 happened, point, 2 opened,
pl, 1 apply, 2 play [3 pound
pr, 2 pray, 3 principle, principal (*in phraseography* appear)
prt, 1 particular, 2 opportunity
prf, 1 approve, 3 proof, prove

B, 1 by, 2 be, 3 to be
bt, 3 about
bs, 2 base, 3 abuse
bv, 2 above
bn, 1 combine, 2 been, 3 boon
bl, 2 able, 3 belief, believe
blt, 2 able to, 3 build-ing
br, 1 liberty, 2 member, remember-ed, 3 number
brd, 1 broad, 2 bread, bred

T, 1 at, 2 it, 3 out
ts, 1 at his, 2 it is, its, 3 itself
tl, 1 at all, 2 tell, 3 till
tlt, 2 told, 3 till it
tr, 1 try, 2 truth, 3 true
trt, 1 tried, 2 toward

D, 1 had, die, 2 do, day,
dd, 3 did [3 different, difference
df, 3 difficult-y
dn, 2 done, 3 down
dnt, 1 had not, 2 do not, 3 did not
dr, 1 draw, 2 dear, 3 during

CH, 1 much, 2 which, 3 each
chs, 2 which is, 3 choose
chf, 2 which have, 3 chief
chld, 1 child
chr, 2 chair, 3 cheer

J, 1 large, joy, 2 age
js, 1 joys, 2 ages, 3 religious
jn, 1 join, 2 general-ly, 3 religion
jnt, 1 gentleman, joined, 2 gentlemen
jshn, 2 generation

K, 1 can, 2 come
kt, 1 act, 2 could
kn, 1 coin
ks, 1 cause, because, 2 case
knt, 1 cannot, kind, 3 account
kl, 1 call
kr, 1 Christian-ity, 2 care, 3 accruc
krt, 1 according, 2 court

G, 1 go, ago, 2 give-n
gd, 1 God, 2 good
gn, 1 gone, 2 again, gain
gl, 2 glory, glorify-ied
gld, 1 glad, 2 gold
grd, 2 great

F, 1 off, half, 2 if, 3 few
ft, 1 after
ftr, 2 father, 3 if there
fn, 1 often, 2 Phonography
fnd, 1 find, 2 fund, 3 found
fr, 1 offer, 2 for
frtr, 3 for there, for their
fr, 2 from, 3 free
frtr, 3 further, from their

V, 2 have, 3 view
vn, 2 heaven, 3 even
vr, 1 over, 2 ever-y
vr, 2 very, 3 however

(Light TH.)

TH, 1 thank, 2 think, 3 youth
tht, 1 thought
thr, 1 author
thr, 2 throw, 3 three, through
thrt, 2 third

(Heavy TH.)

TH, 1 though, thy, 2 them, they, 3 thee, thou
tht, 1 that, 2 without
ths, 1 those, thyself, 2 this, thus,
thss, 2 themselves, this is [3 these
thn, 1 than, thine, 2 then
thr, 1 either, 2 other
thr, 2 there, their

S circle, 1 as, has, 2 is, his
s stroke, 1 saw, 2 so, us, 3 see
skr, 1 Scripture
skrt, 3 secret

sg, 1 signify
st loop, 2 first
st (half length *s*), 1 sat, sight, 2 set, 3 sit
st (circle *s* and *t*), 2 as it, has it, 3 city, is it (*is* on the line)
str, 1 strong, 2 strength
sch, 2 such
ss large circle, 1 as is (his, *or* has), has his, 2 is as (*or* his), his is
sp, 2 special, 3 speak
sprt, 2 spread, 3 spirit
sb, 2 has (as) to be, 3 is to be
sv, 2 several, 3 conceive
snt, 1 as not, has not, sent, 2 is not
snd, 2 send, 3 sound
smt, 2 somewhat
sl, 2 soul, 3 seal

Z, 2 was, 3 whose, ease, easy
zd, 3 eased

SH, 2 shall, shalt, show, 3 she
shn, 2 shown
shr, 2 share, 3 sure
shrt, 1 short

ZH, 3 usual
zhr, 2 pleasure

M, 1 me, my, 2 him, may, 3 whom
mt, 1 might, 2 met, 3 meet-ing
md, 1 mad, 2 made, 3 mood
mtr, 1 matter, 2 mother
ms, 1 myself, 2 himself, Miss
mp, 1 important-ance, 2 improve, improved, improvement
mps, 1 impossible, 2 improvements
mn, 1 man, mine, 2 men, 3 mean
mnt, 1 mind, 2 may not, 3 amount
mr, 1 more, 2 Mr, 3 mere

N, 1 in, any, 2 no, know, 3 own
nt, 1 not, night, 2 nature
nd, 1 hand, 2 under, end
ntr, 1 neither, in there, 2 another, enter
nshn, 1 information, 2 nation
ns, 1 influence, in his, 2 knows
nn, 2 none, known
nr, 1 nor, honor, 2 near

NG, 1 English, 2 thing

L, 1 law, 2 Lord, 3 allow
lt, 1 light, 2 let
ltr, 2 latter, letter
ls, 1 laws, 2 less, 3 allows
ln, 1 line, 2 loan, 3 lean
wl, 1 while, 2 will (*verb*), well, 3 will (*noun*)

R (up), 2 are, 3 our, hour
r (down), 1 or, 2 your, 3 year
rt (down), 1 art
rtr, 2 order, or their
rd, 3 read (present tense)
rs (up), 1 rise, 2 rose, 3 ours, hours
rs (down), 2 yours, 3 years
rch, 1 arch, 2 urge

W, 2 we, way, away
wn, 1 wine, 2 one, 3 win
wns, 1 wines, 2 one's, 3 wins
wnt, 1 went, 2 wo'nt, 3 wind
wh, 1 why, 2 whether, 3 whither
whns, 2 whence

Y, 2 yea, 3 ye
yt, 2 yet

H (down), 1 high
h (up), 2 holy
hs (up), 3 house

VOWELS.

DOTS. a, an, . the, ah! . aye, eh?

DASHES. ` of, ' on, ´ and
` all, ' O, oh! owe, ´ awe, ought
` to, ' but, ´ should
` two, too, ' he, ´ who

DOUBLE LETTERS.

I, ay, ∧ how, beyond, ∩ you, with, ⊂ when, what, ⊃ would

In Phraseography *on*, *and* (written upward), *but*, are used only initially; *and*, *an*, or *a*, medial or final, is — or ⌒; *I* may be contracted to ` before *k*, *l*, *m*, *kl kr*, *bl*, etc.

189. *I* may be abbreviated by writing only the first stroke, when it will join easily to the consonant. (See *I am*, *I will*.) Most of these phrases may be vocalised; thus, *I do*, *as well as*, etc. The first word in a phrase must occupy its own position; thus, *can be*, *of your*, *you can*, *could not be*; but a logogram may be SLIGHTLY raised, or lowered, to suit the position of a following one; thus, *I had*, *I had not*, *I do not*.

190. STOPS should be written in the usual way, except the Period, for which a small cross is used; thus, , ; : × The Hyphen is written thus, *two-fold*; the Dash thus, ⟼; ! Exclamation; A smile.

HISTORIC SKETCHES.—XIII.

HOW A LONDON JURY GAVE A TRUE VERDICT, ACCORDING TO THE EVIDENCE.

JUST as there are many great men in the world who never get an opportunity of asserting themselves in it, so there are many memorable events in history which are seldom if ever mentioned. Some of these are important enough, not merely in a political but also in a social sense, and it is well not to suffer them to languish in the cold shade of oblivion. Such an event is the subject of the present sketch. It has been selected not only because of its intrinsic importance, but also as showing how great privileges may be won and rights established by very humble means.

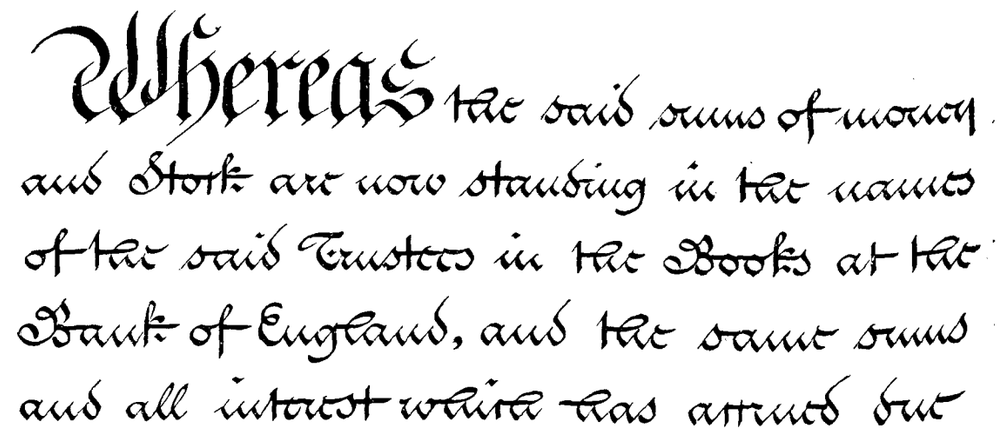
In the report books of proceedings in the law courts in 1670 is an account of a scene in which the principal actors were the Recorder of London, King Charles' Attorney-General,

LESSONS IN PENMANSHIP.—XXXI.

LEGAL HANDWRITING.—I.

We now introduce to the notice of our readers handwriting of a very different description to any that has yet been set before them, namely, an illustration of the "engrossing hand" used by law writers and law stationers in writing, or, to use the technical expression, engrossing deeds and legal documents of various kinds.

Amongst lawyers the term *engrossing* means the making of a fair copy of any document on paper or parchment in clear and distinct characters, or, in other words, to transcribe in a legible manner the rough draft of any deed that has been prepared for transcription by a lawyer or barrister. This knowledge will help us to ascertain the meaning of the word *engross*. It is derived, as a little examination is sufficient to show, from the French preposition *en*, in, and the adjective *gros*, large. The expression *to engross*, in its literal acceptation, means to make



SPECIMEN OF LEGAL ENGROSSING HAND.

large, and therefore distinct, as the larger in reason are the characters in which a document is written, the more distinct and legible they are. Hence the word *engross*, which, in its primary sense, merely means to make large, has taken a secondary meaning, namely, to copy writing in large or distinct characters; and we can also trace the force of the simple and original meaning in a third signification that has been assigned to the word, when we speak of a person who is occupied in some absorbing pursuit as being wholly engrossed in his occupation—his employment, be it what it may, having taken such a hold on him, and assumed such large proportions in his mind, that he has little or no room there, if we may be permitted to use the expression, for other thoughts.

In the specimen of legal engrossing-hand before us, we may trace the very source from whence it has sprung by an examination of the characters that are used in it. Of the letters that compose the first word of the first line, *Whereas*, there can be no doubt whatever, as they are simply characters written boldly and clearly in what is called German text, so termed from its close resemblance to the characters in which the majority of German works are printed. It must be borne in mind that German text in no way resembles the ordinary German hand-writing, which is slanting and angular, while the former is stiff and upright. The characters in which the words that form the remainder of our specimen of legal engrossing-hand are written are merely modifications of the ordinary German text, or, which is pretty much the same thing, our ordinary round-hand letters written in a stiff, upright manner, and in such a way as to impart to them the general characteristics of the letters used in German text-hand.

A little practice will enable the reader to write a very creditable engrossing-hand when he has once found out the way in which the pen ought to be held, and detected the method that is followed in the formation of the different letters. It is clear, in the first place, that the pen cannot possibly be held in the ordinary way, with the end pointing over the right shoulder in a direction from right to left, as many of the perpendicular and horizontal thick strokes that appear in the writing could not be made when the pen is held in such a position. The pen (and for engrossing a quill should be used in preference to a steel pen) is held pointing over the knuckle of the forefinger of the right hand in a direction bearing from left to right, while the nib is placed at such an angle with the paper that a thick perpendicular or horizontal stroke may be readily made, the former by turning the pen a little to the left and drawing it downwards in a straight line, and the latter by turning the pen a little to the right and drawing it in a transverse direction from left to right.

The remainder of the strokes that form the rest of the letters in our specimen are formed, for the most part, by moving the pen downwards in a semi-circular motion from left to right. The kind of stroke that is meant will be recognised on looking at the letters **m** and **n**, which are formed entirely by a repetition of the stroke, thrice for the letter **m**, and twice for the letter **n**. The small letters, **c** and **e**, which may be seen together in *since*, the second word in the sixth line, present the most striking peculiarities in engrossing-hand: the former is a short, thick, perpendicular stroke, crossed at the top by a short horizontal line slightly turned upwards towards the finish; while the **e** is the stroke of which the letters **m** and **n** are formed, with a stroke rather longer and turned up more at its completion than that with which the letter **c** is finished.

LESSONS IN BOTANY.—XX.

SECTION XXXVIII.—COMPOSITÆ, OR COMPOSITE-FLOWERED PLANTS (*continued*).

We must not omit to mention, while discussing the various means taken advantage of by Nature to promote the dissemination of *Compositæ*, a very grotesque arrangement possessed by certain species, in virtue of which animals are made the unconscious bearers of the precious vegetable charge. The bract which we have already seen competent to assume so many shapes, becomes in certain species of this natural order hooked, covering each involucre with hundreds of claw-like arms. Who has not seen this curious provision on the burdock, though, perhaps, the utility of this singular appendage has not suggested itself? The use of this hook, no doubt, is for the purpose of causing the torus to lay hold of the skins of animals or other passing objects.

The *Compositæ* being a natural order which includes so large



173. THE CORN CENTAUREA, OR CORN-FLOWER (CENTAUREA CYANEA). 174. THE COMMON MARIGOLD (CALENDULA OFFICINALIS). 175. THE DANDELION (LEONTODON TARAXACUM, OR TARAXACUM OFFICINALE).

a number of species, some kind of subordinate classification becomes necessary. Botanists are by no means agreed as to the best method of accomplishing this. Perhaps the system of Decandolle and Endlicher is most generally convenient: according to which the order *Compositæ* is divided into three series; first, *Liguliflorœ*, or strap-shaped flowers, from the Latin ligula, *a strap*; second, *Labiatiflorœ*, or lip-shaped flowers, from the Latin labium, *a lip*; third, *Tubuliflorœ*, or funnel-shaped flowers, from the Latin tubulus, *a funnel* or *small tube*. These sub-families are divided into eight tribes, which are again divided into genera, and so each species is arrived at.

There are a few natural orders which, regarded in the *tout ensemble* of their general characteristics, approach the *Compositæ*. The little family of *Calyceraceæ* presents a great analogy with them, both as regards the inflorescence and the structure of individual flowers. It differs from *Compositæ*, however, in the circumstances that the seed, instead of being erect at the base of the ovary, is suspended from the summit of the latter; that the embryo is enclosed in a fleshy albumen; that the radicle is superior; that the style, always undivided, is terminated by a capitular stigma. Next come the *Dipsaceæ*, of which the greater portion resemble the *Compositæ* by their inflorescence being that of a capitular involucrum; but which differ from the family in this respect the *Compositæ* are peculiarly unbending; neither care nor culture will generally suffice to effect a permanent reconciliation between the transported plants and their new homes; to this, however, there are many exceptions.

The immense family of *Compositæ* furnishes mankind with numerous useful products, some of which will now be rapidly enumerated. The radiated *Tubuliflorœ*, regarded in the aggregate, may be said to contain in the flower a bitter principle combined with a resin or volatile oil; associated with these there is frequently discoverable in the root a material something resembling starch, and designated chemically by the specific name *inuline*, because it is chiefly found in the elecampane (*Inula*). According to the mutual proportions in which one or another of these bodies may predominate, the various species become endowed with different medicinal properties. Some are tonics, others excitants or stimulants, others are astringents. The great genus *Artemisia*, represented throughout all the world by different species, furnishes us with various bitter aromatics, the properties of many of which have been celebrated from periods of very high antiquity. Two species, *Artemisia Absinthium*, and *Artemisia Pontica*, are indigenous. Southernwood, or *Artemisia Abrotanum*, originally from the East, is now cultivated in our gardens, and of world-wide reputation for its penetrating

and a citizen, Bushell, member of a jury. The case is called "Bushell's Case," and it is one of the most important possible, for upon it was established once and for ever the grand right of a juryman "a true verdict to give according to the evidence," without reference to whether that verdict was or was not acceptable to the court to whom it was returned. Let us look for a few minutes at "Bushell's case."

The circumstances under which Bushell, the juryman, came upon the scene were these:—Two Quakers, Penn and Mead, had thought fit to preach to the people from the steps of a house in Gracechurch Street. In the course of their address they had used language which was interpreted as conveying, and perhaps was meant to convey, animadversions upon the government. For this they were arrested, and, having been committed by a city magistrate on the charge of stirring up a riot, were put upon their trial. Like many of the charges preferred at that time by the over-zealous agents of the government, the accusation was an extravagant one, and considerable sympathy was shown by the Londoners in favour of the prisoners. If what the two men had said amounted to sedition, then, it was felt, no man could safely talk politics even in the mildest way; and it was further felt that the prosecution was a tyrannical act on the part of the government. Notwithstanding such was the case, the trial was urged, and it came on before the Recorder of London at the Old Bailey.

The following scene, illustrative of the manner in which prisoners were treated under Charles II., presented itself on the entrance of Penn and Mead into the court:—After the manner of their brethren, the two Friends kept their hats on in the presence of the judge, as they would have done in the presence of the king himself. The gaoler rudely knocked their hats off, whereupon the Recorder, not with a view of rebuking the man's roughness, but to having a preliminary fling at the prisoners, ordered him to replace them. Being put in the dock, the prisoners were thus addressed by their judge:—

RECORDER: Do you know where you are?

PENN: Yes.

RECORDER: Do you not know it is the king's court?

PENN: I know it to be a court, and I suppose it to be the king's court.

RECORDER: Do you not know there is respect due to the court?

PENN: Yes.

RECORDER: Why do you not pay it then?

PENN: I do.

RECORDER: Why do you not pull off your hat then?

PENN: Because I do not believe that to be any respect.

RECORDER: Well, the court sets forty marks apiece upon your heads, as a fine for the contempt of the court.

PENN: I desire it might be observed that we came into the court with our hats off (that is, taken off), and if they have been put on since it was by order from the bench; and therefore not we, but the bench, should be fined.

After this the prisoners, undoubtedly with much pertinacity and some show of disrespect to the court, refused to plead to the indictment, which charged them with having caused a tumultuous assembly, until the questions they raised as to the legality of it in point of form should have been answered. The Recorder and the Lord Mayor tried in vain to silence them, resorting to threats, and abuse of a very coarse description, and not succeeding, the Recorder did in effect enter a plea of "not guilty" for them, and had them put upon their trial.

Among the jury was one man, Bushell, whose character for conduct displeasing to the court was already well known, and to whom several unworthy remarks had been made at the time he was sworn. Under his guidance the jury retired, and in a short time returned into court with a verdict acquitting Mead, and saying that Penn was "guilty of speaking in Gracechurch Street." This verdict angered the court exceedingly. "Is that all?" they asked the foreman. "That is all I have in commission," was the reply. "You had as good say nothing." Being further pressed, and also told, "the law of England will not allow you to part till you have given your verdict," the jury replied, "We have given in our verdict, and we can give in no other."

The Recorder refused to take such a verdict, and sent the jury back again to reconsider it. In half an hour's time they came back into court, and handed in a written verdict to the same effect as before, and signed by all of them. Upon this being received, the Lord Mayor rated the jury in these words:—

MAYOR: What, will you be led by such a silly fellow as Bushell? An impudent, canting fellow. I warrant you, you shall come no more upon juries in haste. You are a foreman, indeed (addressing Bushell). I thought you had understood your place better.

RECORDER: Gentlemen, you shall not be dismissed till we have a verdict that the court will accept; and you shall be locked up, without meat, drink, fire, and tobacco. You shall not think thus to abuse the court. We will have a verdict by the help of God; or you shall starve for it.

The jury declined to alter their verdict, and Penn, one of the prisoners, claimed to have it recorded. "The agreement of twelve men is the verdict in law; and such a one being given by the jury, I require the clerk of the peace to record it, as he will answer at his peril. And if the jury bring in another verdict contradictory to this, I affirm they are perjured men in law;" and, looking upon the jury, he said: "You are Englishmen! Mind your privilege! Give not away your right!"

The court was adjourned till next morning at seven o'clock, the prisoners were sent back to Newgate, and the jury were ordered into the custody of those who swore to keep them without fire, food, drink, or any other accommodation till the adjourned sitting of the court.

While the jury are thus away in their retiring room, making up their minds what verdict they shall give—chafing at the manner in which they have been treated by the court, and, under the guidance of their foreman, resolving that they will not submit to dictation, but act upon the exordium delivered to them by the prisoner as they quitted their box—let us consider for a moment what right it was for which they were contending, and the way in which that right was acquired.

Trial by jury was an old-established institution in England, as old, some think, as the Anglo-Saxon laws. Something like it is certainly to be found in the history which has come down to us of those times, but the jury system, as we understand it now, was the creation of a period subsequent to the Norman Conquest, 1066. Before that date the jury which tried causes consisted of a certain number of "compurgators" as they were called, that is to say, persons who did not give their opinion upon evidence adduced before them on oath, but who merely swore that they believed what the defendant said under sanction of his oath. The form of procedure was simply this. A man accused of default, on civil or criminal process, was put on his oath if he chose to be so, and then swore he was innocent of the offence charged, or that his version of the case between him and the plaintiff was a true one. The compurgators, of whom the number varied from twelve to thirty-six, being also sworn, deposed to their belief in what the defendant had said, and, as they were commonly chosen from among the neighbours and acquaintance of the man, they were supposed to know something of the facts connected with his case, as well as to be able to form an estimate of the truth or falsehood of his statements. It can easily be imagined that such a tribunal was not one from which to expect strict justice, and the shortcomings of the system amounted in many instances to gross miscarriage of right. Nevertheless, it continued to be used with other systems till Henry II. (1154-1189) introduced the Norman form of trial by jury for civil causes, assessment of taxes and the like, and Henry III., or rather those who represented him, introduced it about 1235 on criminal process.

The Norman-English jury was not like ours of to-day. Instead of deciding upon the case according to evidence for and against, and after hearing the summing-up of the judge, the jury included all those who under our system would be witnesses, and would be rigidly excluded from the jury for the very reason that they knew most of the facts. Then it was the duty of the sheriff to summon specially on the jury all those who were, or might be supposed to be, acquainted with the material points in the case, and these persons compared notes with their fellows, but without being subjected to any cross-examination, and gave their verdict according to what then appeared to them to be right. Common rumour, repetitions of what somebody else had said, unsifted testimony of various kinds, were received by these juries, and sometimes constituted all the evidence they had to guide them. All such would be utterly rejected now, and any person who had evidence to give would be summoned as a witness—would certainly be precluded from sitting on the jury. It was not till the twenty-third year of the reign of Edward III. (1327-1377) that witnesses, though still added to the jury, were not allowed to vote as to the verdict; and it was not till the eleventh year of Henry IV. (1399-1413) that they were made to give their evidence in open court, under the scrutiny of the judge, and without being associated in any way with the jury.

Under the Angevin princes (from Henry II., 1154, to Richard II., 1399), though the grand provision in Magna Charta—that no free man should be tried by any but his peers—was constantly disregarded, it does not appear that juries as such suffered any violence; but with the Tudor princes came in this, as in other respects, quite another order of things, and that which the Tudors did the Stuarts did likewise. Juries were called to account in the most direct and personal manner for verdicts given according to their conscience (some authorities, however, say they were frequently bribed), and were frequently reprimanded by the judge or the king's council, and sometimes cited before the Court of Star Chamber, where, if they did not repent, they were heavily fined and also imprisoned. Some of the fines imposed on individual jurymen were as much as £2,000, a ruinous amount in Queen Mary's reign (1553-1558), when such a fine was actually inflicted. Whether there was or was not any ground for the interference of the Star Chamber on the score of bribery of the jurors by the parties to suits, it is evident that the offence might have been punished by more regular means, and that the means actually adopted were liable to be grossly abused. As a matter of fact they were grossly abused, and the tyrannical conduct of the Star Chamber in dealing with juries was one of the chief causes which contributed to its downfall. When the Star Chamber was abolished by Act of Parliament in 1641, with an indignant protest against its ever having existed, and a solemn declaration that nothing of the kind should be permitted in the time to come, this evil practice of threatening and punishing juries, so as to compel them to give such verdicts as the Crown wished, was abolished also. During the civil war (1642-1648), and during the protectorate of Oliver Cromwell (1648-1658), it was not heard of; jurymen were allowed to be responsible alone to God and their conscience, and gave their verdicts freely, no man making them afraid.

With the restoration of Charles II., in 1660, some of the old governmental vices were restored also. The Star Chamber men would not have back at any price, nor to please any one, but the judges took upon themselves to revive the wicked old custom of polluting the very source of justice by intimidating those who had charge of it. Two Chief Justices of England, Hyde and Keeling, were especially guilty of this crime, and made themselves so notorious that the House of Commons came to a resolution to impeach the latter for his misconduct. He was suffered to speak for himself at the bar of the House, and to go free on promise of amendment.

In the face of this, and in spite of the expressed opinions of most of the legal luminaries of the day, including Lord Chief Justice Hale, the Recorder of London, in 1670, ventured, under the circumstances stated above, to fine the jury which acquitted Penn and Mead, and to commit Mr. Bushell to prison when he refused to pay. Here was what followed when the jury remained obstinate in their simple verdict of "not guilty," after having been browbeaten, threatened, and ridiculed, both by chief magistrate and Recorder, and after having been sent back three times to consider their verdict, which indeed they did alter to a simple verdict of "not guilty" as to both prisoners.

CLERK: Are you agreed upon your verdict?

JURY: Yes.

CLERK: Who shall speak for you?

JURY: Our foreman.

CLERK: What say you? Look upon the prisoners at the bar. Is William Penn guilty of the matter whereof he stands indicted in manner and form as aforesaid, or not guilty?

FOREMAN: William Penn is guilty of speaking in Gracechurch Street.

MAYOR: To an unlawful assembly?

BUSHELL (the foreman): No, my lord, we give no other verdict than what we gave last night. We have no other verdict to give.

MAYOR: You are a factious fellow. I'll take a course with you.

SIR T. BLOODWITH (alderman): I knew Mr. Bushell would not yield.

BUSHELL: Sir Thomas, I have done according to my conscience.

MAYOR: That conscience of yours would cut my throat.

BUSHELL: No, my lord, it never shall.

MAYOR: But I will cut yours so soon as I can.

RECORDER: He has inspired the jury. He has the spirit of divination. Methinks I feel him. I will have a positive verdict, or you shall starve for it.

PENN: I desire to ask the Recorder one question. Do you allow of the verdict given of William Mead?

RECORDER: It cannot be a verdict, because you were indicted for a conspiracy, and one being found not guilty, and not the other, it could not be a verdict.

PENN: If not guilty be not a verdict, then you make of the jury and Magna Charta but a mere nose of wax.

MEAD: How! Is not guilty no verdict?

RECORDER: No, it is no verdict.

After this fine judicial dictum there were other passages between the jury and the court, and the jury being once more asked as to William Penn's guilt, said, as before, that he was guilty of speaking in Gracechurch Street.

RECORDER: What is this to the purpose? I say I will have a verdict. (And speaking to Edward Bushell, said): You are a factious fellow. I will set a mark upon you; and whilst I have anything to do in the city I will have an eye upon you.

MAYOR: Have you no more wit than to be led by such a pitiful fellow? I will cut his nose.

PENN: It is intolerable that any jury should be thus menaced. Is this according to the fundamental laws? Are not they my proper judges by the Great Charter of England? What hope is there of ever having justice done when juries are threatened, and their verdicts rejected? I am concerned to speak, and grieved to see such arbitrary proceedings. Did not the Lieutenant of the Tower render one of them worse than a felon? And do you not plainly seem to condemn such for factious fellows who answer not your ends? Unhappy are those juries who are threatened to be fined, and starved, and ruined if they give not in verdicts contrary to their consciences.

RECORDER: My lord, you must take a course with that same fellow.

MAYOR: Stop his mouth. Gaoler, bring fetters, and stake him to the ground.

PENN: Do your pleasure. I matter not your fetters.

* * * * * * *

RECORDER: Gentlemen, we shall not be at this trade always with you. You will find the next session of parliament there will be a law made that those that will not conform shall not have the protection of the law. Mr. Lee, draw up another verdict, that they may bring it in special.

LEE: I cannot tell how to do it.

JURY: We ought not to be retained, having all agreed, and set our hands to the verdict.

RECORDER: Your verdict is nothing. You play upon the court. I say you shall go together and bring in another verdict, or you shall starve, and I will have you carted about the city as in Edward the Third's time.

FOREMAN: We have given in our verdict, and all agreed to it; and if we give in another, it will be a force upon us to save our lives.

Finally the jury gave their verdict "not guilty" against both prisoners, and each one of them affirmed the same separately; whereupon the Recorder fined them forty marks each, and ordered them to be imprisoned till the fine should be paid.

Imprisoned they were accordingly in the common gaol of Newgate, a noisome, filthy den, which was a disgrace to any country calling itself civilised. From Newgate, however, the spirit which had made itself felt in opposition to the oppressive conduct of the Recorder's Court made itself heard at the Court of King's Bench. A writ of Habeas Corpus was sued out and made returnable immediately, and when the governor of Newgate brought up his prisoners it turned out that they were detained for non-payment of fines imposed upon them on account of their verdict.

Chief Justice Vaughan, in one of the most learned and masterly judgments ever delivered, went into the whole matter. What he said may be found in the sixth volume of the State Trials, and in the collected judgments of the eminent Chief

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odour. All these species of composite-flowered plants owe their properties to the presence of a bitter principle, a peculiar acid, and a volatile oil. Perhaps the most valuable product of the Composite family is a volatile oil, acrid in some species, only bitter in others. Pre-eminent in the list stands chamomile, useful in so many diseases. *Arnica montana*, a plant which grows in Germany, Switzerland, and France, also owes its medicinal qualities to the presence of a volatile oil.

The genus *Helianthus*, in which the common sunflower is included, deserves especial notice for the products which it yields. *Helianthus tuberosus*, the Jerusalem artichoke, is a perennial plant, indigenous to Brazil, though now cultivated in various European countries. Its subterraneous stem produces enormous tubercles, charged with inuline, and therefore very nutritive. Their odour is nauseous, but their taste agreeable; consequently, after being well seasoned, they may be eaten by man. They resist the attack of frost, in which respect they are different to most tubers, and consequently furnish good winter fodder for cattle. The *Helianthus annuus*, or sunflower, is familiar to most of us. Its seeds afford, by expression, large quantities of a fixed oil admirably adapted for purposes of illumination and the soap manufacture. We shall now conclude this notice of radiated *Tubuliflorœ* by mentioning the sonchodendron, a tree fifty feet in height, and the largest of the *Compositæ*. It is a native of Madagascar, in the deep valleys of which island it grows; and although it does not furnish a product useful to man, it aids him in another way. When the sonchodendron flowers, the natives know the best season has arrived for sowing their rice.

The genus *Cynara* comprehends many species, of which one, the common artichoke (*Cynara Scolymus*), is familiar to most of us. The part which we eat in this vegetable is the bracteal involucre, or rather the fleshy base of each bract, and the common receptacle. The Italians are more expert in turning the artichoke to account. They tie all the petioles together into one mass, curve the plant at right angles, and surround it with earth. In this manner, not only the capitulum, but the whole upper portion of the plant, becomes etiolated, or bleached, and forms a sort of cabbage head, eaten as a salad by the Italians.

Several individuals of the *Carthamus* tribe of *Compositæ* are conspicuous on account of the colouring matter which they yield. Of these the *Carthamus tinctorius*, or safflower plant, is the most valuable. It is an annual, indigenous to India, but now cultivated in various other parts of Asia, America, and Europe. Its florets contain two colouring principles, one of which is much more soluble in water than the other. It is this latter, however, which the dyer seeks. Although rather insoluble in water, it is easily extracted by alkaline leys, from which it admits of ready precipitation by the addition of an acid. The colouring principle thus obtained is denominated *carthamine*. The carthamine of Egypt and of Persia are most esteemed; that of Spain follows next in order; that of France, Mexico, and Germany is of less value. Unfortunately, the tint communicated by safflower, although beautiful, is very fleeting. Carthamus florets are frequently mingled with those of true saffron as an adulteration.

The common marigold (*Calendula officinalis*) is cultivated in gardens; it contains a bitter mucilaginous substance, various salts, and a small quantity of volatile oil. It was formerly celebrated in medical practice, and is now again employed by the homœopathic practitioner (Fig. 174).

The *Liguliflorœ*, or *Chicoraceæ*, contain a milky juice in their circulating vessels; also bitter, saline, resinous, and narcotic principles. Their properties vary according to the predominance attained by one over the other of these substances. The herb part of several of the *Chicoraceæ*, if cooked whilst young, before the milky fluid has become completely formed, is an agreeable article of food; but the *Chicoraceæ* are more celebrated in medicine than in dietetics. One of the most useful as well as the most common of *Chicoraceæ* is the dandelion (*Taraxacum officinale*, Fig. 175), a small perennial, having a wide distribution. Not only is it found abundantly in the British Isles, but throughout Europe, Asia, and Northern Africa. The chicory (*Cichorium Intybus*), remarkable amongst indigenous *Compositæ* for its blue flowers, is scarcely less common than the dandelion, and, perhaps, equally valuable as regards the result its yields. The root of wild chicory is employed in medicine; that of garden chicory, when dried and roasted, is the object of a considerable commerce, being employed as a substitute for, or an adulteration of, coffee. We should remark, however, that throughout Germany and France the coffee-drinking public has become so accustomed to the flavour of coffee mixed with a certain amount of chicory, that simple coffee is never by preference employed. Endive (*Cichorium Endivia*), so much employed as a salad, is also one of the *Chicoraceæ*, etiolated, or bleached, by protecting it during growth from the direct action of air and light. Two varieties of endive are known to gardeners; one with large oblong leaves, very slightly charged with the bitter principle; the other more decidedly bitter, and having leaves which are very much subdivided and crisped.

The genus *Lactuca*, or lettuce, is a very important one belonging to the sub-tribe *Chicoraceæ*. All the members of this genus are characterised by possessing a bitter acrid juice, and being strongly odorous. All the lettuces contain wax, caoutchouc or india-rubber, a resin, a bitter crystallisable matter, and a peculiar volatile principle. Most of the lettuce genus are medicinal, the predominant medical quality of each being determined by the preponderance of one principle. Even common garden lettuce, in the condition in which we eat it as a salad, is known popularly to be endowed with soporific properties; but the narcotic energy is most strongly developed in the *Lactuca virosa*, a plant not uncommon in England.

LESSONS IN LATIN.—XX.

PARADIGM OF THE VERB SUM—COMPOUNDS OF SUM.

It will be convenient here to present the verb Esse, *to be*, in full. This verb is sometimes called an *auxiliary* verb, as by its *aid* (auxilium) parts of other verbs are formed. It is also called the *substantive* verb, as in its essence it denotes *being* or *substance*.

INDICATIVE MOOD.

PRESENT.	IMPERFECT.	PERFECT.
Singular.	*Singular.*	*Singular.*
Sum, *I am.*	Eram, *I was.*	Fui, *I have been.*
Es, *thou art.*	Eras, *thou wast.*	Fuisti, *thou hast been.*
Est, *he is.*	Erat, *he was.*	Fuit, *he has been.*
Plural.	*Plural.*	*Plural.*
Sumus, *we are.*	Erāmus, *we were.*	Fuĭmus, *we have been.*
Estis, *you are.*	Erātis, *ye were.*	Fuistis, *ye have been.*
Sunt, *they are.*	Erant, *they were.*	Fuērunt, *they have been.*
PLUPERFECT.	FUTURE.	FUTURE PERFECT.
Singular.	*Singular.*	*Singular.*
Fuĕram, *I had been.*	Ĕro, *I shall be.*	Fuero, *I shall have been.*
Fuĕras, *thou hadst been.*	Eris, *thou shalt be.*	Fueris, *thou shalt have been.*
Fuĕrat, *he had been.*	Erit, *he shall be.*	Fuerit, *he shall have been.*
Plural.	*Plural.*	*Plural.*
Fuerāmus, *we had been.*	Erĭmus, *we shall be.*	Fuerimus, *we shall have been.*
Fuerātis, *ye had been.*	Erĭtis, *ye shall be.*	Fueritis, *ye shall have been.*
Fuĕrant, *they had been.*	Erunt, *they shall be.*	Fuerint, *they shall have been.*

SUBJUNCTIVE MOOD.

PRESENT.	IMPERFECT.
Sing. Sim, *I may be.*	*Sing.* Essem, *I might be.*
Sis, *thou mayest be.*	Esses, *thou mightest be.*
Sit, *he may be.*	Esset, *he might be.*
Plu. Simus, *we may be.*	*Plu.* Essemus, *we might be.*
Sitis, *ye may be.*	Essetis, *ye might be.*
Sint, *they may be.*	Essent, *they might be.*
PERFECT.	PLUPERFECT.
Sing. Fuerim, *I may have been.*	*Sing.* Fuissem, *I might have been.*
Fueris, *thou mayest have been.*	Fuisses, *thou mightest have been*
Fuerit, *he may have been.*	Fuisset, *he might have been.*
Plu. Fuerimus, *we may have been.*	*Plu.* Fuissēmus, *we might have been*
Fueritis, *ye may have been.*	Fuissētis, *ye might have been.*
Fuerint, *they may have been.*	Fuissent, *they might have been.*

IMPERATIVE MOOD.

Es or esto, *be thou.*	Este, *or* estōte, *be ye.*
Esto, *let him be.*	Sunto, *let them be.*

INFINITIVE MOOD.

Present.	Esse, *to be.*	*Future.*	Fore, *or* futūrum esse, *to be about to be.*
Perfect.	Fuisse, *to have been.*		

PARTICIPLES.

Present. Ens, *being* (not used in good Latin, but found in the compound præsens).

Future. Futūrus -a, -um, *about to be.*

The verb *esse* is made up of parts of two separate verbs; first, a verb of which *es* is the root; and secondly, of a verb, *the stem* of which is *fu* (compare fio in Latin, and *φυω*, fu'-o, in Greek). From *es* (*esum* originally for *sum*) came the present, the imperfect, and the first future tenses; from *fuo* came the perfect, the pluperfect, and second future tenses.

The verb sum has neither *gerund* nor *supine*, and is in other respects defective, as appears from the paradigm just given.

Sum takes before it certain prepositions, and is modified by them in its meaning; thus, with *ad*, adsum, it means *I am at* or *near*; with *ab*, absum, it means *I am from, away from, absent*; with *pro*, prosum, it means *I am for*, that is, *I aid* or *benefit*. In prosum, the letter *d* is inserted to prevent the hiatus which would be caused if two vowels came in succession; thus, pro-(d)-es, pronounced prodes; also prodest, proderam, prodero, prodessem.

From the root mentioned above—namely, fu, fuo—come two forms not so common as those given in the table—namely, forem and fore; forem (-es, -et; -emus, -etis, -ent) is the imperfect subjunctive, and signifies *I might be*; corresponding to essem of the table; fore is the infinitive future, *to be about to be*; corresponding with the futurum esse of the table.

VOCABULARY.

Absens, part., *being absent.*
Absum, abfui, abesse, *I am absent.*
Adsum, adfui, adesse, *I am present.*
Arma, -orum, n., *arms.*
Carōlus, -i, m., *Charles.*
Concilio, 1, *I reconcile, unite.*
Dum, conj., *while.*
Fera, -æ, f., *a wild beast* (E. R. *fierce*).
Foris, adv., *out of doors.*
Heri, *yesterday.*
Hodie, *to-day.*
Interesum, interfui, interesse (E. R. *interest*), *I am among, I am concerned, I take an interest* or *part in.*
Ita, *so.*
Longe, *far.*
Magistrātus, -ūs, m., *a magistrate* or *governor.*
Nisi, conj., *unless.*
Oratio, -ōnis, f., *a speech* (E. R. *orator*).
Pĕregre, *abroad.*
Prœsum, prœfui, prœsse, *I am before, I preside over, command*
Prosum, profui, prodesse, *I am for, I am useful, I do good to.*
Pugna, -æ, f., *a fight* (E. R. *pugilist*).
Quamdiu, *as long as, how long?*
Quum (pronounced *cum*), conj., *when, from the time when.*
Ubi, adv., *where, when.*
Ut, *as.*

Observe that these compounds of sum require their object to be in the dative case; as, prodest MIHI, *he does good* TO ME, or *he benefits* ME.

EXERCISE 73.—LATIN-ENGLISH.

1. Deus omnibus locis adest. 2. Parvi pretii (*of little avail*), sunt arma foris, nisi est consilium domi. 3. Contemnuntur ii qui nec sibi nec alteri prosunt. 4. Ut magistratibus leges, ita populo præsunt magistrātus. 5. Ratio et oratio conciliat inter se homines, neque ullā re longius absūmus a naturā ferārum. 6. Ego sum lætus, tu es tristis. 7. Si sorte vestrā contenti estis, beati estis. 8. Dum nos in scholā erāmus, sorōres nostræ in horto erant. 9. Quum Carōlus heri domi nostræ erat, ego pĕregre eram. 10. Quamdiu tu et frater tuus domi nostræ eratis, tu lætus eras, sed frater tuus erat tristis. 11. Quamdiu tu abĕras, ego eram tristis. 12. Cur heri in scholā non fuisti? 13. Quia tu abĕras, ego eram tristis. 14. Quamdiu tu et pater tuus domo abfuistis? cum patre pĕregre fui. 15. Sex menses abfuimus. 16. Cur milites nostri pugnæ non interfuērunt? 17. Quia longius abfuērunt. 18. Ubi heri fueras quum domi tuæ eram?

EXERCISE 74.—ENGLISH-LATIN.

1. I am useful to thee. 2. Thou art useful to me. 3. The boys are not useful to (their) mothers. 4. Why are the girls not useful to (their) fathers? 5. When thou wast absent, I was sad. 6. How long has your father been absent? 7. Charles took part in the fight. 8. Wast thou yesterday at my house? 9. I shall be at thy house to-day. 10. Unless thou art happy at home, thou art not joyful abroad.

VOCABULARY.

Actio, -ōnis, f., *an action, doing* (E. R. *action*).
Ætas, ætātis, f., *age, a generation.*
Amicus, -i, *friend.*
Antĕa, adv., *before.*
Atrox, -ōcis, *frightful* (E. R. *atrocious*).
Attentus, -a, -um, *attentive.*
Compos, -ŏtis, *partaking of, endued with.*
Desum, defui, deesse, *I am down, I fail.*
Demosthenes, -is, m., *Demosthenes, the celebrated Grecian orator.*
Exercitus, -ūs, m., *an army.*
Inimicus, -i, *an enemy* (E. R. *inimical*).
Initium, -i., n., *a beginning* (E. R. *initial*).
Mens, mentis, f., *mind* (E. R. *mental*).
Nunquam, *never.*
Nisi, conj., *unless, if not.*
Obsum, obfui, obesse, *I am in the way of, I oppose, I injure.*
Postĕa, *afterwards.*
Præteritus, -a, -um, *past.*
Pretium, -i, n., *a reward* (E. R. *price, precious*).
Propterĕa, *on account of*
Provideo, 2, *I see beforehand, foresee* (E. R. *provide*).
Prudens, -tis, *prudent.*
Quod, *because.*
Rectus, -a, -um, *right.*
Repĕto, 3, *I seek again, I repeat.*
Sed, *but.*
Solum, *alone.*
Studeo, 2, *I endeavour.*
Voluntas, -ātis, f., *will* (E. R. *voluntary.*)

EXERCISE 75.—LATIN-ENGLISH.

1. Quamdiu felix eris, multi tibi erunt amici. 2. Pugna fuit atrocissima, propterea quod utriusque exercitūs milites fortissimi fuērunt. 3. Ante belli initium in urbe fuerāmus. 4. Demosthenis ætate multi oratores magni et clari fuērunt, et antea fuerant, nec postea defuērunt. 5. Hæc res non profuit nobis sed obfuit. 6. Si quis virtūtis compos erit, semper beātus erit. 7. Quamdiu sorte mea contentus ero, ero felix. 8. Actio recta non erit, nisi recta fuerit voluntas. 9. Si probi fuerimus, non deerit hominum laus. 10. Attenti este, discipuli. 11. Homines mortis memores sunto. 12. Contenti estote sorte vestrā! 13. Mi fili, semper virtutis præceptorum memor esto! 14. Vir prudens non solum præsentia curat, sed etiam præterita mente repetit, et futura ex præteritis providet. 15. Boni bonis prodesse student.

EXERCISE 76.—ENGLISH-LATIN.

1. Our soldiers were very brave in the fight. 2. Why were our soldiers braver than yours in the fight? 3. So long as you are happy, friends will not fail you. 4. Friends fail the wretched. 5. Before the beginning of the fight, I was in the city. 6. The brave will always be useful to the brave. 7. My enemies injure me. 8. If you are partakers of virtue, you will be happy. 9. So long as I am content with my lot, I shall be happy. 10. O scholars, you ought to be attentive in school! 11. They endeavour to be very brave. 12. Be brave, my son. 13. Prudent men foresee the future (pl.) from the past.

VOCABULARY.

Et—et, *and*—*and* (*and*—*also*), *both.*
In, *towards.*
Nescio, *I know not.*
Nescius, -a, -um, *ignorant.*
Non sum nescius, *I am aware of.*
Prius, adv., *before.*
Qualis, -e, *of what kind* (E. R. *quality*).
Quā mente sis, *of what disposition you are, what your feeling is.*
Quantum, *how much.*
Quantus, -a, -um, *how great* (E. R. *quantity*).
Scio, 4, *I know* (E. R. *science*).
Tum, *then.*

Observe that in indirect questions the dependent verb must be in the subjunctive (or dependent) mood; as, for example, narra mihi ubi fueris, *tell me where you have been.* Such a form is called an indirect question. The direct question would stand thus—ubi fuisti? narra mihi, *where hast thou been? tell me.* In the latter case the question is direct, and the verb, as not being dependent, is in the indicative mood; but put narra mihi first, and then your question is implied rather than stated; it is, therefore, an indirect question. In both direct and indirect questions the English is in the indicative; consequently, in putting the dependent verb into English, you must in English use the indicative mood; but in putting the dependent verb into Latin, you must in Latin use the subjunctive mood. Compare what is said of the sequence of tenses, and similar and dissimilar tenses, in the last lesson.

EXERCISE 77.—LATIN-ENGLISH.

1. Non sum nescius quā mente tu in nos sis. 2. Scio quā mente tu in nos semper fueris. 3. Non sum nescius quā mente tu et prius in nos fueris et nunc sis. 4. Non eram nescius quā mente tu in nos esses. 5. Scio quam sint incerti animi hominum. 6. Cogita quam brevis sit vita! 7. Qualis sit animus, ipse animus nescit. 8. Cogita quantum nobis bona exempla prosint. 9. Incertus sum ubi frater meus nunc sit. 10. Incertus sum ubi amicus meus et fuerit et nunc sit. 11. Incertus eram ubi heri esses. 12. Narra nobis ubi heri fueritis.

EXERCISE 78.—ENGLISH-LATIN.

1. Tell me where thou art. 2. Tell me where thy father and mother are. 3. I know not where my sister is. 4. Dost thou know how much good boys do good (*prosum*) to their parents? 5. I know where my son is. 6. My son, where art thou? 7. I knew where my son was. 8. I am uncertain where the enemies are. 9. Is the general ignorant where the army is? 10. I know of what mind thou art toward the king.

LESSONS IN GEOMETRY.—XX.

THERE is a curious connection between the proportions of the sides of a hexagon and a heptagon inscribed in the same circle, and that is, that the length of the side of the heptagon is equal to the perpendicular let fall from the centre of the circle on any side of the hexagon. This may be seen from the following problem:—

PROBLEM LII.—*To inscribe a heptagon in a given circle.*

Let A C E (Fig. 74) be the given circle in which it is required to describe a heptagon. Draw any diameter A K, passing through L, the centre of the given circle A C E; and from one of its extremities A as centre, with the distance A L, describe the arc B L M, cutting the circumference of the circle A C E in the points B and M. Join B M, cutting A K at right angles in the

Justice. The studious who have opportunity will do well to seek the judgment there; but we have all an interest in the gist of what he said, and that can be reproduced without such careful search. He laid it down as law that the fines were illegal, and that the imprisonment consequent on them was necessarily illegal also. But he went on still further, and declared in effect that the Recorder had improperly refused to receive the verdict of the jury, and that the jury had an unquestionable right to give what verdict they pleased, the remedy for a stupid verdict being in the discretion of a judge to order a new trial on the ground of the verdict being contrary to the evidence; and for a corrupt verdict, in the power of any one to prosecute a juryman for perjury if committed wilfully in the course of his duty as a juryman.

As the law was thus settled it has remained ever since, few occasions having arisen in which the rights of juries have been imperilled. To Edward Bushell and his fellow-citizens we are directly indebted for the establishment of the law upon this most satisfactory footing; and the occasion seemed to us so full of interest, and the principle gained so full of importance, that we have thought fit to make them the subject of this number of our Historic Sketches.

Synopsis of Events in the Life and Reign of Charles II.

Charles II., the second son of Charles I. and Henrietta Maria of France, was the twenty-sixth king of England after the Norman Conquest, and the third of the Stuart Dynasty. He married a Portuguese princess, Catherine of Braganza, who brought him as her dower Tangier, in Morocco; Bombay, in Hindostan or India; and £300,000 in money. The first-named town was abandoned, in 1683, as a place not worth the expense of holding by an armed force; while the second, now the capital of one of the five presidencies of British India, was handed over to the East India Company for a small annual quit-rent.

Born at St. James's Palace,	May 29, 1630	Declaration of Indulgence in favour of the Papists . .	1672
Crowned at Scone	1651	Test Act passed . March,	1673
Obliged to retire to Holland after the Battle of Worcester	1651	Marriage of Mary, daughter of the Duke of York (afterwards James II.) to William of Orange	1677
Returns to England May 29,	1660	Treaty of Nimeguen . . .	1678
Trial of the Regicides, etc. .	1660	Supposed Conspiracy of the Papists to assassinate the king and restore the Roman Catholic religion Aug. 12,	1678
Revision of the Common Prayer Book	1661	Murder of Sir Edmondsbury Godfrey . . . Oct. 15,	1678
Act of Uniformity passed .	1662	Murder of Archbishop Sharpe May 3,	1669
Bombay and Tangier added to the British dominions .	1662	The Habeas Corpus Act passed . . . May 27,	1679
Dunkirk sold to Louis XIV. of France for £500,000 Oct. 17,	1662	Battle of Bothwell Bridge June 22,	1679
War with the United Provinces of the Netherlands.	1664	Meal Tub Plot . . Oct. 23,	1679
The Great Plague	1665	Persecution of the Covenanters in Scotland . .	1680
The Great Fire of London .	1666	Charter of the City of London declared to be forfeited	1682
Ships in the Medway burnt by the Dutch.	1667	Rye House Plot . June 12,	1683
Peace of Breda.	1667	Execution of Algernon Sydney and Lord William Russell	1683
"Triple Alliance" of England, Holland, and Sweden against France Jan. 28,	1668	Death of Charles II. Feb. 6,	1685
Peace of Aix-la-Chapelle. .	1668		
War with Holland. . . .	1672		
Dutch defeated in the Battle of Solebay or Southwold Bay . . . . May 28,	1672		

LESSONS IN GERMAN.—XXV.

SECTION XLVII.—ADJECTIVES REQUIRING THE GENITIVE.

ADJECTIVES in German that require the *genitive*, generally answer to our adjectives *followed* by the preposition "of" (§ 124), as:—Ich bin der Sache gewiß, I am sure *of* the matter. Er ist seiner Pflicht eingedenk, he is mindful *of* his duty. Sie sind deiner Freundschaft unwürdig, they are unworthy *of* thy friendship. They are sometimes best rendered by adjectives followed by the preposition "with" or "to," as:—Er ist des Weges kundig, he is acquainted *with* (has knowledge of) the road. Es ist nicht der Mühe werth, it is not worth the trouble.

Some of these adjectives are also used with the accusative (§ 124. 2. *Obs.*), as:—Ich bin das Gehen nicht gewohnt, I am not accustomed to walking. Er ist es müde, he is tired of it.

Vocabulary.

Ack'erbau, *m.* agriculture.	Fromm, devout, pious.	Schuld, *f.* fault, guilt.
An'klagen, to accuse.	Geizig, covetous.	Schuldig, guilty.
Bär, *m.* bear.	Geschwätz', *n.* gossip.	Summe, *f.* sum.
Bedürf'tig, wanting, needy.	Geständ'ig, confessing.	That, *f.* deed.
Begleit'en, to accompany, guide.	Handwerk, *n.* handicraft, trade.	Thron, *m.* throne.
Benö'thigt, in want of.	Haut, *f.* skin, hide.	Tüchtig, well qualified.
Beute, *f.* booty, prey.	Helfen, to help.	Ue'berdrüssig, weary, disgusted.
Bevor', before.	Kundig (sein), (to be) acquainted (with).	Un'gewohnt, unaccustomed.
Bewußt', conscious (of).	Landgut, *n.* farm, estate.	Un'kundig, unacquainted with.
Boden, *m.* ground, soil.	Land'leben, *n.* country life.	Un'werth, unworthy.
Böse, *m.* wicked (person).	Nächste, *m.* neighbour.	Verdäch'tig, suspected.
Dienst, *m.* assistance, service.	Niemals, never, at no time.	Vertrin'ken, to spend (for drink).
Freundschaft, *f.* friendship.	Richter, *m.* judge.	Verü'ben, to commit.
	Schießen, to shoot.	Werth, worthy.
		Zukunft, *f.* future.

Résumé of Examples.

Die der Ketzerei' an'geklagten Perso'nen mußten in der Vorzeit den Feu'certod erlei'den.	The persons accused of heresy were compelled in (the) former times to suffer death by fire.
Der Arme, der einer Sache bedürf'tig ist, ist gewöhn'lich auch einer andern benö'thigt.	The poor (man) who is destitute of one thing is commonly also (needy) in want of another.
Wenn das Pferd sich seiner Stärke bewußt' wäre, könnte es Niemand bändigen.	If the horse were conscious of his strength, none could control him.
Nur der'jenige, welcher tüchtig in seinem Beruf' ist, kann seines Lebens froh werden.	Only he (the one) who is well qualified for his calling can (be glad of) enjoy his life.
Ich bin meiner Sache gewiß' und des Weges kundig.	I am sure of my cause, and acquainted with the road.
An das Fahren gewöhnt', werde ich bald des Gehens müde.	Accustomed to ride, I soon become tired of walking.
Schuldig oder nicht schuldig eines Verbrech'ens, jeder wurde verur'theilt.	Guilty or not guilty of a crime, every one was condemned.
Der Jäger ist seines Zieles sicher.	The hunter is sure of his aim.
Ich bin jetzt meines Lebens ü'berdrüssig.	I am now weary of my life.
Der Dieb ist des Diebstahls, der Mörder des Mordes, und in einem despo'tischen Lande, eine frei'heitsliebende Seele des Hoch'verraths schuldig.	A thief is guilty of (the) theft, a murderer of (the) murder, and, in a despotic country, a liberty-loving soul of high treason.
Mancher Mensch verbringt' sein Leben un'eingedenk seiner e'wigen Bestim'mung.	Many a man wastes his life unmindful of his eternal destiny.
Wenn er nur seiner Schuld geständ'dig wäre, ich wollte ihm gern verzei'hen.	If he would only confess (were confessing, etc.) his guilt, I would gladly pardon him.

Exercise 90.

1. Ich bin einer solchen Arbeit ungewohnt und würde sie nicht thun, wenn ich nicht des Geldes bedürftig wäre. 2. Ich bin einer großen Summe Geldes benöthigt; helfen Sie mir, ich bin Ihrer Hülfe gewiß nicht unwerth. 3. Wenn er eingedenk meiner Wohlthaten wäre, würde er nicht so handeln. Glauben Sie, daß ein Geiziger seines Lebens froh sein kann? 6. Ich will ja gern meiner That geständig sein, laß mich nur laufen! 7. Der Jäger war schossen hatte. 8. Laß mich jetzt gehen, ich bin deines Geschwätzes herzlich müde. 9. Gut, wenn Sie meiner überdrüssig sind, werde ich gehen. 10. *Niemals* werde ich mich einer That schuldig machen, welche mich Ihrer Freundschaft unwürdig machen würde. 11. Ich besitze ein Landgut, aber ungewohnt der Arbeit, und unkundig des Ackerbaues, bin ich desselben überdrüssig. 12. Einer ist des Andern werth, aber auch oft Einer des Andern unwerth. 13. Ein König, der das Volk nicht liebt, ist des Thrones unwürdig. 14. Wenn du mich auch der That verdächtig hältst, kann ich dieselbe doch nicht eingestehen, da ich sie nicht verübt habe. 15. Wenn die Menschen immer des Todes eingedenk wären, würden sie sich nicht so oft schlechter Thaten schuldig machen. 16. Hilf deinem Nächsten und frage nicht, ob er deiner Hülfe würdig ist, wenn er derselben bedarf. 17. Ich will Sie begleiten, denn ich bin des Weges kundig und sehe, daß Sie der Gegend ganz unkundig sind. 18. Ich danke Ihnen, mein Herr! ich bin Ihres Dienstes nicht benöthigt; denn da ich des Gehens müde, und des Fahrens überdrüssig bin, werde ich hier bleiben. 19. Was thut ein Mann in Amerika, der an keine Arbeit gewöhnt ist? 20. Er muß der Arbeit gewohnt werden und des Sprichtworts eingedenk sein, wer nicht arbeitet, soll nicht essen.

Exercise 91.

1. America has a golden soil for him who is acquainted with a trade. 2. The covetous man is insensible to the misery of others. 3. The Italians who rose in some provinces against Austrian oppression were unmindful of their weakness. 4. I became tired of hearing such a long speech. 5. Everybody is sure of death, but no one is always mindful of it. 6. If thou wert so accustomed to country life as I am, thou wouldst not stay in town. 7. Never will I make myself guilty of a deed which will make me unworthy of your friendship. 8. The man who has led a conscientious life, and followed the dictates of his conscience, has no fear of dying; but the wicked man, unmindful of his actions and conscious of his crimes, is afraid of death and the future. 9. Many a one who stands accused of a crime before his judges is conscious of less offence than those who judge him.

SECTION XLVIII.—ADJECTIVES REQUIRING THE DATIVE.

Adjectives in German that require the *dative* usually answer to our adjectives followed by the preposition "to," as:—Es ist mir angenehm, it is agreeable *to* me. Er ist seinem Vater ähnlich, he is similar *to* (resembles) his father. Er ist seinem Herrn ergeben, he is devoted *to* his master. Das Geschäft ist ihm lästig, the business is disagreeable *to* him. (§ 131.)

Vocabulary.

Ab'geneigt, disinclined	Gefähr'lich, dangerous	Stark, strong.
Abhold, averse.	Gefäl'lig, obliging.	Theu'erung, *f.* dearth.
Aehnlich, similar, resembling.	Gehor'sam, obedient.	Ueberle'gen, superior.
An'gehörig, belonging to.	Genehm', agreeable.	Uh'ähnlich, dissimilar.
An'gelegen, important, of consequence.	Geneig't, inclined.	Ungleich, unlike.
An'hängig, adherent, attached to.	Gewo'gen, favourable.	Un'günstig, unfavourable.
An'ständig, becoming.	Gleich'gesinnt, like-minded.	Unlieb, disagreeable.
An'stellung, *f.* situation.	Gleich'gültig, indifferent.	Unterneh'men, to undertake.
Behülf'lich, serviceable.	Grundsatz, *m.* principle, axiom.	Un'terschied, *m.* distinction.
Bemerk'bar, observable.	Günstig, favourable.	Un'terthä'nig, submissive.
Durchaus', throughout, entirely.	Hin'derlich, hindering.	Untreu, faithless.
Erge'ben, devoted.	Leg'terer, latter.	Unvergeß'lich, not to be forgotten.
Erhitz'en, to heat, inflame.	Lob, *n.* praise.	Verbun'den, obliged.
Erin'nerlich, coming to mind.	Neigung, *f.* inclination.	Verspro'chen, promised
Er'sterer, former.	Ob'rigkeit, *f.* authority.	Wan'derer, *m.* traveller (on foot).
Ewig, eternally.	Pfad, *m.* path.	Wanze, *f.* bug.
Feind, hostile.	Rauchen, to smoke.	Wild, wild, savage.
	Schädlich, injurious.	Wille, *m.* mind, will, design.
	Schmei'chelhaft, flattering.	Wohl'gefällig, well-pleasing.
	Schwach, weak, infirm.	
	Spiel, *n.* play.	

Résumé of Examples.

Jeder recht'liche Mann ist dem Guten geneigt' und dem Bösen ab'geneigt.	Every honest man is inclined to (loves) good, and disinclined to (hates) evil.
Mir ist nichts mehr an'gelegen, als meinen Freunden behülf'lich zu sein, wo ich kann.	There is nothing more (so) important to me than to be serviceable to my friends where I can.
Der Hund ist seinem Herrn gehor'sam und dankbar; warum will der Mensch ihm nicht gleich sein?	The dog is obedient to his master, and thankful; why will man not resemble him?
Dem Schiffer sind die'jenigen Klippen die gefähr'lichsten, welche ihm nicht bemerk'bar sind.	To the sailor, those rocks (cliffs) are the most dangerous which are not perceptible to him.
Sei deinen Freunden erge'ben, und deinen Feinden gefäl'lig.	Be devoted to thy friends, and obliging to thy enemies.
Was dem Einen nützlich ist, ist oft dem Andern schädlich.	What is useful to one is often injurious to another.
Ich bin Ihnen für Ihre Güte sehr verbunden.	I am very much obliged to you for your kindness.
Manche Menschen sind den stillen Wassern gleich, an'genehm dem Auge, aber untreu dem'jenigen, der sich ihnen an'vertraut.	Many men are like the quiet waters, agreeable to the eye, but unfaithful to him who entrusts himself to them.
Ich werde mir diese Sache auch ohne deine Ermah'nungen an'gelegen sein lassen.	I shall take this matter to heart (let it be important to me), even without your exhortations.

Exercise 92.

1. Angenehm wäre es mir, wenn ich einmal einen Mann fände, der mir anhängig wäre. 2. Wenn Sie mir auch verwandt sind, so scheint mir doch Ihr Betragen durchaus nicht anständig, und ich dächte, es wäre Ihnen selbst bemerkbar, daß Leute, denen Ihr Betragen bekannt ist, Ihnen nicht gewogen sind. 3. Meinem Vater ist die letzte Theuerung noch sehr erinnerlich. 4. Gefährlich ist dem Wanderer jener Pfad. 5. Sei gefällig deinem Nächsten, gehorsam deiner Obrigkeit, dann wird dir diese geneigt und jener gewogen sein. 6. Ist Ihnen das versprochene Geld gewiß? 7. Daß der Fürst dem Volke nicht gleichgesinnt, und das Volk dem Fürsten gleichgültig ist, macht dem Erstern das Regieren schwer, und ist dem Letztern hinderlich an seinem Glücke. 8. Die Sterne sind mir günstig, leicht wird mir mein Unternehmen sein. 9. Wenn die Wanzen dem Menschen auch nicht schädlich sind, so sind sie ihm doch lästig. 10. Mir ist es sehr lieb, daß ich dir in dieser Sache nützlich sein kann. 11. Meinem Freunde war Ihr Lob sehr schmeichelhaft. 12. Gut zu werden, ist dem Lasterhaften schwer, denn er bleibt gewöhnlich seinen Neigungen treu. 13. Mancher Schwache ist dem Starken an Geist überlegen. 14. Welch ein Unterschied ist zwischen: ein Mensch ist dem andern ungleich, und ein Mensch ist dem andern unähnlich? 15. Wie steht das Spiel? 16. Mir sehr ungünstig. 17. So unlieb es mir ist, muß ich dir erklären, daß mir dein Geschwätz unleidlich ist. 18. Wer möchte wohl den Grundsatz glauben: „wer seinem König nicht unterthänig, ist untreu seinem Vaterlande?" 19. Es ist mir ewig unvergeßlich, wie sehr ich dir verbunden bin. 20. Nicht jeder, der mir verwandt ist, ist mir auch wohlgefällig. 21. Was mir angehörig ist, lasse ich mir auch angelegen sein.

Exercise 93.

1. Who can be hostile to a child? 2. Is it agreeable to you to take a walk? 3. This is injurious to your business. 4. Everybody has been favourable to him. 5. A benevolent action is well-pleasing to God. 6. You are very similar to your father in your habits, for he was disinclined to smoking and averse to drinking. 7. What belongs to me, that I shall also take to heart. 8. To every thinking man it is observable, that it is not easy for a prince to make the people devoted to him. 9. With pleasure will I be serviceable to you, in obtaining a situation. 10. Be obliging to thy parents, obedient to their authority; then will they be inclined to thee, and favourable to thy prosperity. 11. To drink cold water is injurious to a heated body. 12. The horse is a docile animal, and obedient to his master. 13. If it be agreeable to you, come to my house tomorrow, at noon. 14. The dog is submissive and faithful to his owner. 15. He was inclined to make himself disagreeable to his friends.

KEY TO EXERCISES IN LESSONS IN GERMAN.

Exercise 10 (Vol. I., page 67).

1. Is this young man the captain's son? 2. No, he is the old weaver's son. 3. Who has this little girl's pincushion? 4. This little child of the good friend has it. 5. Who has the good uncle's beautiful horse? 6. The young goldsmith has it. 7. Who has the hunter's great black dog? 8. The merchant's young brother has it. 9. Has the little child the good brother's sharp knife? 10. No, it has the good girl's new comb. 11. Has the old watchmaker's young friend the old servant's beautiful horse? 12. No, he has the rich English man's horse. 13. Have you the good tailor's dress-coat? 14. No, I have this new dress-coat from the good tailor. 15. Have you this poor weaver's cloth? 16. No, I have cloth from the weaver. 17. Is all old wine strong? 18. No, and not all new wine is weak. 19. The new dress coat is of black cloth.

point N. From the point B as centre, with the distance B N, draw arcs cutting the circumference of the circle A C E in C and H. Join C B, B H. These straight lines are sides of a heptagon inscribed in the circle A C E, and the heptagon itself may be completed by applying the compasses, with an opening equal to B N or N M, round the circumference of the circle A C E, as may be needful. The triangle A B L is an equilateral triangle (see Problem XVII., Vol. I., page 209), and A B is the side of a hexagon that may be inscribed in the circle A C E, in which the heptagon B C D E F G H has already been inscribed.

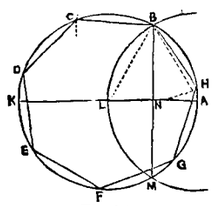


Fig. 74.

PROBLEM LIII.—*To construct a heptagon on any given straight line.*

Let A B (Fig. 75) be the given straight line on which it is required to construct a heptagon. Produce A B indefinitely both ways to X and Y. Bisect A B in C, and again bisect C B in D. From B along the straight line B Y set off B E equal to five times B D, and from A along the straight line A F set off A X equal to B E, or five times B D. Then from the points A and B as centres, with the distances A E, B F respectively, describe the arcs E G, F G, cutting one another in the point G; and from G as centre, with a radius equal to A B, describe the arc H K, cutting the arcs F G, E G, in the points H and K. Join G H and G K, and bisect them respectively in the points, L, M; and join A M, B L, intersecting each other in the point N, which is the centre of the circle circumscribing the required heptagon. From the centre N, at the distance N A or N B, describe the circle A B K G H. Bisect the arcs A H, B K, in the points O, P, and join H O, O A, B P, P K. The figure A B P K G H O is a heptagon, and it is described on the given straight line A B, as required.

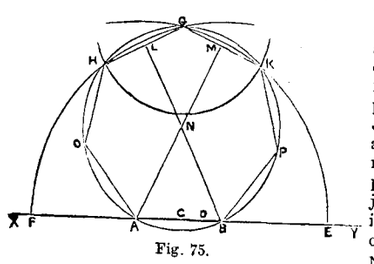


Fig. 75.

PROBLEM LIV.—*To construct an octagon on a given straight line.*

As it has been remarked in a former lesson (see page 192), it is easy to inscribe a hexagon in a given circle when we can place an equilateral triangle within it, as the process is merely to bisect the arcs intercepted between the ends of the sides of the triangle, and to form the hexagon by joining the six points thus obtained in the circumference of the circle. By a similar process of bisection, an octagon may be inscribed in a given circle when we have once placed a square within it; while the bisection of the arcs intercepted between the ends of the sides of a pentagon and hexagon will similarly produce a decagon and a dodecagon. There are, however, one or two processes of constructing an octagon on a given straight line which we give here, as they may be of use to the learner in cutting out an octagon in timber, or an octagonal flower-bed in turf. First, let A B (Fig. 76) be the given straight line on which it is required to construct an octagon. Produce A B indefinitely both ways to X and Y, and at the points A and B draw the straight lines A O, B P, perpendicular to A B or X Y. From A as centre, with the distance A B, describe the arc B C D, cutting A O in C, and X Y in D; and from B, as centre, with the distance B A, describe the arc A E F, cutting B P in E, and X Y in F. Join C D, E F, and bisect them in G and H respectively. Join A G, B H, and produce A G to meet the arc B C D in K, and B H to meet the arc A E F in L. Through the points K, L draw the straight lines K M, L N, parallel to A O or B P, and along K M set off K Q, equal to A B, and along L N set off L R, also equal to A B. Then from the points Q and R as centres, with a radius equal to A B, draw arcs cutting the perpendiculars A O, B P, in S and T. Join Q S, S T, T R. The figure A B L R T S Q K is an octagon, and it is described on the given straight line A B as required.

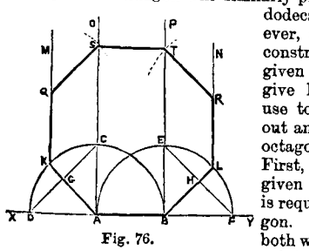


Fig. 76.

Next, let A B (Fig. 77) be the given straight line on which it is required to construct an octagon. Produce A B indefinitely both ways to X and Y, and through the points A and B draw the straight lines A O, B P, perpendicular to A B or X Y, and set off along A O and B P the straight lines A C, B D, each equal to A B. Join A D, B C, and produce them indefinitely to Q and R respectively; and along D Q, C R, set off D E, C F, each equal to A B. Through E and F draw the straight lines E G, F H, meeting X Y in G and H; and along E G, F H, set off E L and F K, each equal to A B. Through K draw K M parallel to A Q, and cutting B P in M; and through L draw L N parallel to B R, and cutting A O in N. Join A K, B L, E M, M N, N F. The figure A B L E M N F K is an octagon, and it is described on the given straight line A B, as required. If it be required to cut off the corners of a square piece of wood or pasteboard as A B C D in Fig. 78, so as to form an octagon, first draw the diagonals A C, B D, intersecting each other at right angles in E, and then from the points A, B, C, D in succession, with the distances A E, B E, C E, D E, describe the arcs F E G, H E K, L E M, and N E O, having their terminations in the sides of the square. Then join O H, G L, K N, and M F. The figure M F O H G L K N is an octagon.

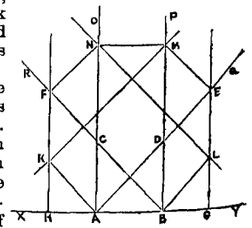


Fig. 77.

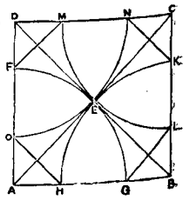


Fig. 78.

PROBLEM LV.—*To inscribe a nonagon in a given circle.*

Let A B C (Fig. 79) be the given circle in which it is required to inscribe a nonagon. Draw any diameter, C E passing through the centre D of the circle A B C, and produce it indefinitely towards F. From the point E as centre, with the distance E D, describe the arc A D B, cutting the circumference of the circle A B C in the points A and B. Join A B, and produce it indefinitely both ways towards G and H, and let it cut C F at right angles in the point K. Then from K as centre, with a radius equal to D E, describe the semicircle L M N, having its terminations L, N, in the straight line G H; and from L and N as centres, with the radii L K, N K respectively, describe the arcs K O, K P, meeting the semicircle L M N in the points O, P. Join D O, D P, cutting the circumference of the circle A B C in the points Q, R. Join A Q, Q R, R B. These three straight lines are the sides of a nonagon inscribed in the circle A B C, which may be completed by following the same process with the arcs A C, C B, or, applying the compasses round the circumference of the circle with an opening equal to A Q, Q R, or R B, and joining the points thus obtained. The straight line A B is manifestly the side of an equilateral triangle inscribed in the circle A B C, and the process which has been gone through is simply the trisection of the arc A B, or, what is virtually the same thing, the trisection of the angle A D B.

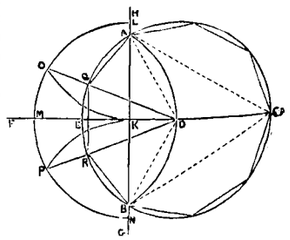


Fig. 79.

PROBLEM LVI.—*To construct a nonagon on any given straight line.*

Let A B (Fig. 80) be the given straight line on which it is required to construct a nonagon. Produce A B indefinitely both ways to X and Y, and on the straight line X Y, with

the points A and B as centres, and the radii A B and B A respectively, describe the semicircles A C D, B C E, intersecting each other in the point C. Bisect A B in F, and through the point C draw F G perpendicular to A B or X Y. Next trisect the arc A C in the points H and K, and the arc B C in the points L and M; and from the point A, through the points M, L, and C in the arc B C, draw the straight lines A N, A O, A P of indefinite length; and from B, through the points H, K, and C, in the arc A C, draw the straight lines B S, B R, and B Q, also of indefinite length. From the points A and B draw the straight lines A T, B U to the points, T, U, in which the straight lines B S, A N cut the semicircles B C E, A C D; bisect A T, B U in the points V and W respectively, and through the points V and W draw the perpendicular lines V I, W Z of indefinite length, intersecting each other and the straight line F G in the point *a*. This point is the centre of a circle circumscribing the required nonagon. From the point *a* as centre, with the distance *a* A or *a* B, describe the circle A *d* B. This circle passes through the extremities of the given straight line A B, the points T and U in which the straight lines B S, A N respectively intersect the semicircles B C E, A C D, and the points *c* and *e* in which the straight lines B Q, W Z and A P, V I intersect each other: it also cuts the straight lines B R, F G, and A O in the points *b*, *d*, and *f*. Join T *b*, *b c*, *c d*, *d e*, *e f*, and *f* U: the figure A T *b c d e f* U B is a nonagon, and it is described, as required, upon the given straight line A B.

The construction of the uneven-sided polygons, the heptagon and nonagon, by the aid of the ruler and compasses, have been given to show the learner that there is no regular polygon of any number of sides that could not be constructed without having recourse to the measurement of the angle of the polygon or the angle at the centre of the circumscribing circle. The construction of the decagon and dodecagon on any given line by the ruler and compasses alone we do not give, because either figure may be constructed by learners, if they will exercise a little thought, and it will afford them two useful exercises to do so. We shall therefore conclude our problems on the construction of the regular polygons with the method of constructing an undecagon or eleven-sided figure on a given straight line, and then bring our Lessons on Geometry to an end with a brief description of the methods used for drawing the ellipse, parabola, and hyperbola, curves made by the section of a right cone in particular directions; the mode of tracing a spiral; and one or two other things, such as the connection of two curves by a straight line, etc., which may be of practical use to our students.

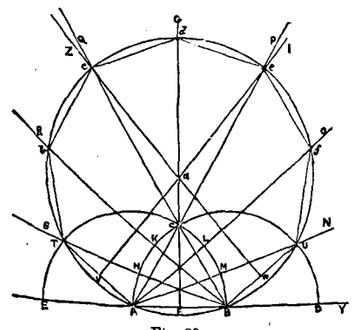


Fig. 80.

PROBLEM LVII.—*To construct an undecagon on any given straight line.*

Let A B (Fig. 81) be the given straight line on which it is required to construct an undecagon. First bisect A B in C, and produce A B indefinitely both ways to X and Y. Then along C X set off a line, C D, equal to three times A B, or six times C A, and along C Y set off a line, C E, equal to C D. From the point A as centre, with the distance A E, describe the arc E T, and from the point B as centre, with the distance B D, describe the arc D Z, and let the arcs E T, D Z intersect each other in the point F. This point is the apex of the undecagon, the straight line A B on which it is constructed being considered as its base. From the point F as centre, with a radius equal to A B, draw small arcs cutting the larger arcs D Z, E T in G and H, and draw the chords F G, F H. Join C F: the straight line drawn from C, through F, is perpendicular to A B, and the centre of the circle circumscribing the required undecagon will be in C F. To find the centre, bisect F G, F H in the points K and L, and join A L, B K. The straight lines A L, B K intersect each other and the straight line C F in the point M, which is the centre of the circumscribing circle. From the point M as centre, with the distance M A or M B, describe the circle A B F. This circle passes through A, B, F, G, H, the extremities of three sides of the required undecagon that have been already determined, and the vertices of the remaining angles of the polygon will be found in its circumference. To

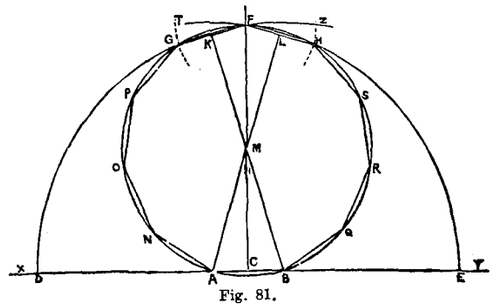


Fig. 81.

determine them, with an opening of the compasses equal to A B, set off from A, along the arc A G, the arcs A N, N O, O P, and along the arc B H, from B, set off the arcs B Q, Q R, R S. Join the chords A N, N O, O P, P G, B Q, Q R, R S, S H. The figure A B Q R S H F G P O N is an undecagon, and it is described on the given straight line A B, as required.

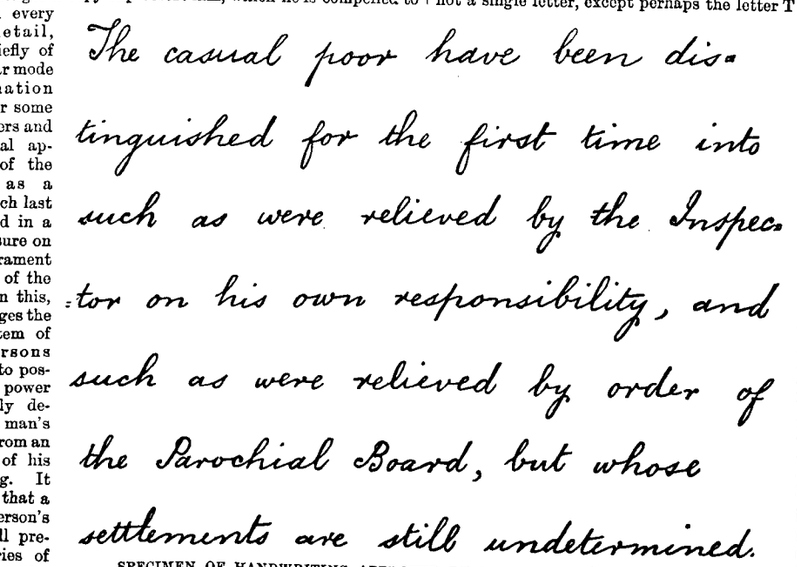
The reader will have noticed, doubtless, that the method of constructing an undecagon on a given straight line by a purely geometrical process, as given above, is similar in all essential details to the process used for constructing a heptagon on a given straight line, and it is based in both cases on the numerical relation of the straight line on which either is to be constructed, to the sides of an isosceles triangle whose vertex is the apex of the polygon, and whose base is the given straight line. In the case of the heptagon, the proportion of the base to the sides of the isosceles, whose vertex is the apex of the polygon, is as 1 to $2\frac{1}{4}$ or 2·25; and to construct a heptagon on any given straight line, we have only to produce it indefinitely both ways, and find points on either side of each extremity at a distance equal to $1\frac{1}{4}$ of the given line, or to bisect the given line and set off on either side of the perpendicular section straight lines equal to $1\frac{3}{8}$ of the given line. In the case of the undecagon, the proportion of the base to the side of the isosceles triangle, whose apex is the vertex of the polygon, is as 1 to $3\frac{1}{2}$ or 3·5; and to construct an undecagon on any given straight line, we have only to produce the given straight line indefinitely both ways, and set off from either extremity lines equal to $2\frac{1}{2}$ of the given straight line, or to bisect the given line, and from the point of bisection to set off on either side of it, along the given line produced indefinitely, lines equal to 3 times the given straight line. We have added these remarks on the geometrical constructions that we have given of the heptagon and undecagon, in the hope that they may give the student a clue to other geometrical constructions of a similar character. We also recommend to his notice the geometrical construction of the nonagon, based on the preliminary construction of an equilateral triangle on the given straight line on which it is required to construct the nonagon, and the trisection of the angles on either side of the base, or the arcs that are described opposite to them by drawing semicircles from either extremity of the base as centres, with a radius equal to the base.

In drawing figures to exhibit the methods of constructing the different polygons, from the pentagon to the undecagon, that have been given in detail in this and preceding lessons, the student is advised, for the sake of accuracy, to make them on a large scale; as, if he attempt to construct his figures in the limited space in which are drawn the figures that are used to illustrate our Lessons in Geometry, he may fail to complete them to his satisfaction, in consequence of not being able to draw the straight lines and arcs, of which the figures are composed, of suitable fineness, and to subdivide the arcs, whenever it is necessary to do so, with sufficient accuracy. In all cases, for the sake of good practice, the straight line on which a polygon is to be constructed, should never be taken less than an inch in length.

LESSONS IN PENMANSHIP.—XXVIII.

OFFICIAL HANDWRITING.—II.

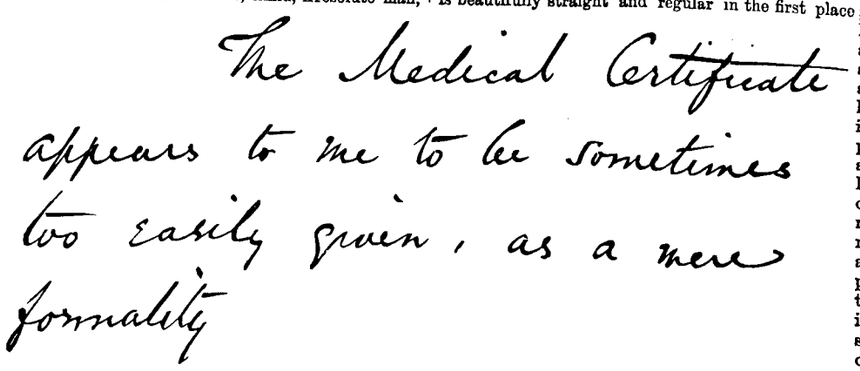
In our last lesson we spoke of peculiarities that lend a distinctive character to handwriting, and which combine to form what may be properly termed a writer's peculiar style of writing. These peculiarities into which every one instinctively falls when he has no longer a copy-slip before him, which he is compelled to imitate in every minor detail, consist chiefly of the peculiar mode of formation adopted for some of the letters and the general appearance of the writing as a whole, which last will depend in a great measure on the temperament and habits of the writer. On this, indeed, hinges the whole system of those persons who seem to possess the power of minutely delineating a man's character from an inspection of his handwriting. It is unlikely that a slovenly person's writing will present a series of clear and neatly-formed letters; or, *vice versâ*, that any one who is neat in his person and precise in his habits will write a coarse, sprawling hand, stretching across the page in an irregular line of thick and heavy up-strokes and down-strokes. The writing of a steady, resolute, self-reliant man will, in nine cases out of ten, show the character of the writer by the firmness of the down-stroke, and the sharp, clean manner in which each letter is defined; while a nervous, timid, irresolute man, who is always ready to be led by others instead of taking the lead, generally betrays his constitutional failings by the irregularity of his writing, which, however, must not be confounded with the irregularity caused by impetuosity of temper or rapidity of thought, either of which will make a man write at such speed that his letters seem to run into one another, and are jumbled together in an almost indistinguishable mass.



SPECIMEN OF HANDWRITING APPROVED BY HER MAJESTY'S CIVIL SERVICE COMMISSIONERS.—NO. 3.

We place before our readers, in the present lesson, two more specimens of official handwriting approved by Her Majesty's Civil Service Commissioners, and an inspection of these may enable us to point out examples of what we have already spoken of as peculiarities in the formation of certain letters—peculiarities so called, because they differ from the ordinary method adopted for forming the letters in question.

Of the four specimens of approved official handwriting that we have given, these peculiarities are least noticeable in Specimens No. 2 (page 33) and No. 3, and most conspicuous in Specimens No. 1 (page 33) and No. 4. In Specimen No. 3 there is not a single letter, except perhaps the letter T at the commencement, which departs from the normal form of the letters of the writing alphabet. In Specimen No. 2 the chief departures from the usual form are found in the letter *k* in the word *acknowledge*, and the letter *p* in the word *receipt*. In Specimen No. 1, the letter *g* in the words *give* and *large* shows a considerable departure from the usual mode of making this letter, while the letter *s*, thrice repeated in the word *successful*, in each case looks more like the symbol *ſ* in writing than the letter it is intended to represent. In Specimen No. 4, in the word *easily*, the letters *e* and *y* present differences of formation, as well as the *g* in *given* and the *y* in *formality*.



SPECIMEN OF HANDWRITING APPROVED BY HER MAJESTY'S CIVIL SERVICE COMMISSIONERS.—NO. 4.

From what we have pointed out, it will be readily seen how these peculiarities combine to give a distinctive character to handwriting. On a further inspection of the specimens before us, especially Specimen No. 3, it will be noticed that the writing is beautifully straight and regular in the first place; that the letters are well shaped and clearly defined in the next place; and, thirdly, that compactness and neatness are imparted to the writing by the shortness of the loops and the tails of the letters that extend above or below the body of the letters in the centre of each line. In these three points lie the principal requisites that the Civil Service, and our readers may rest assured that no candidate who, in forming his handwriting and acquiring a style peculiarly his own, has succeeded in making it *compact*, *clear*, *and legible*, need entertain the slightest fear of rejection as far as his writing is concerned.

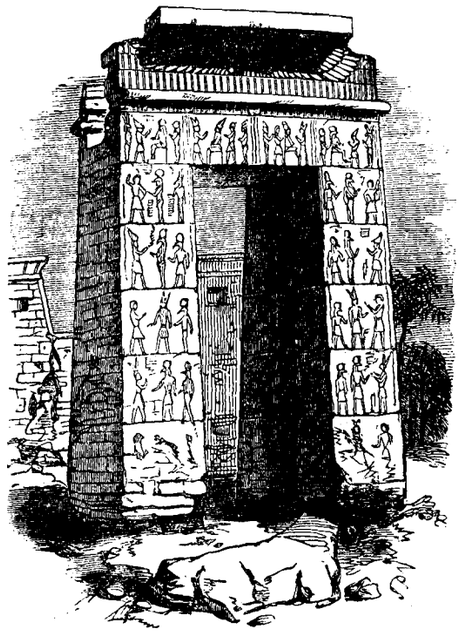
LESSONS IN ARCHITECTURE.—IV.

PROGRESS OF ARCHITECTURE IN EGYPT AND INDIA—THE COLUMN.

After the rude style of building practised in early times had spread itself in various forms over the ancient world, true art at last made its appearance. The great nations of antiquity, as they advanced in civilisation, created a national architecture, each with a feeling and expression peculiarly its own. As soon as the stones used in buildings began to assume a cubical, prismatic, or cylindrical form, and the square and compasses gave a new direction to stone-cutting, architects gave wing to their imagination, because they now had the means of realising its creations. Symmetry was studied in the ground-plan of their edifices; their architraves were raised upon pillars and columns; and experience ere long taught them the strength of every stone, and the proper height of every part of a building. Hence arose that harmony and proportion which elevated architecture into an art. We shall not attempt to decide the question whether pillars and columns were first formed in excavations, or in separate constructions; but it is evident that they were the first elements of a regular architecture—that is to say, of the orders which constituted the first basis of architectural harmony. To the pyramidal constructions of Egypt and of Asia speedily succeeded the erection of palaces and other edifices, in which square and cylindrical pillars formed a most essential part: the great weight of the materials employed requiring that they should be supported at short distances for the formation of internal and external galleries. These single pillars could only be connected at the top by architraves of such dimensions as combined the ratio of their breadth with the proportions of the supporting power of the columns. Upon these architraves were placed platforms or ceilings of flat stones, which, by their thickness, formed a new dimension above the former; and upon these platforms were formed terraces or flat roofs, which were surrounded by another row of stones forming a border, and having an outward projection which preserved the façade from the effects of the rain. These were the origin of cornices and entablatures. The column, in preference to the square pillar, became the type of architectural proportion. Simple at first, it presented nothing but a cylindrical shaft, without ornament, and only expressing the purpose for which it was originally intended. The oldest specimens in Egypt are of this description; Asia presents similar specimens; and Greece, with the whole of the West, follows the same track: thus proving that everywhere there is an invariable similarity in the origin of the arts. The simplicity, elegance, and utility of the column engaged the attention of architects, and concentrated all the efforts of their imagination. Thus it became their architectural type or model, and formed the nucleus of the different characteristic styles of building that were adopted by the great nations of antiquity.







SCULPTURED GATEWAY AT KARNAC.

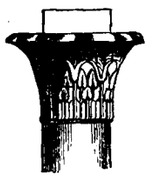




The most ancient monuments of Egypt ornamented with columns are situated in the Heptanomis, an old division of the country which corresponded pretty nearly with the district called Middle Egypt by modern geographers, and which was situated between the Delta and the Thebaid, extending from 24° N. lat. to 30° N. lat. These monuments exhibit specimens of the greatest simplicity, and strongly analogous to those of the Doric order. The monuments of India excavated in the rock present the same principles of these primitive orders. In these two countries, which are the cradles of architecture, artists at first decorated their columns and their capitals with ornaments of which the ideas were taken from the local vegetation, to which were sometimes added others borrowed from animal nature. Thus in Egypt, after having set up the simple cylindrical shaft for their column, they sculptured upon it branches of the lotus, meeting each other and fastened together by fillets. The capital which crowned the column was at first composed of the bud of the same flower. This first idea was afterwards developed in the application of vegetation of every kind to the ornamentation of the columns of the temples and of the great public edifices. Among the six examples of Egyptian capitals given in this page there is one composed of the leaves of the palm-tree.



Egypt, thus adorned with orders of architecture, had its national style. The numerous works upon the history and antiquities of Egypt published during the last half-century have made us acquainted with its archæological treasures, such as the temples and palaces of Thebes, the Isle of Philæ, Karnac, Abousambul, Edfou, Memphis, and others; and large public buildings, decorated with numerous columns, immense pillars, obelisks, and sphinxes, which give to this style a peculiar character of antiquity and grandeur, of which mere verbal description would fail to convey any idea to the reader.



In India, as in Egypt, isolated columns and pillars appear to have had their origin in subterranean excavations for architectural purposes; of these numerous examples are seen at Ellora, in the palace or temple of Indra. These pillars are much shorter than those of Egypt, their bases and capitals occupying a considerable portion of the height of the column, and the entablature, or rather the corona, is less accurately traced. In cases where the Indians cut out the rock for the purposes of decoration, and sculptured it over with various ornaments, the column assumes a lighter appearance, and the principle of an order of architecture can be traced.

The excavated temples of India are numerous and extensive; the principal ones are those of Elephanta, Salsette, and Vellore, or Ellora. Elephanta is situated near Bombay, on a small island of the same name, which received this appellation from the figure of an elephant being cut out upon the rocks on the southern shore. The grand temple is 120 feet square, and is supported by four rows of pillars; along the side of the cavern are fifty colossal statues from twelve to fifteen feet

READING AND ELOCUTION.—XX.

PROMISCUOUS EXERCISES (*continued*).

II.—THE PURITANS.

[*Marked for Inflections.*]

THE Puritans were men whose minds had derived a peculiar character from the daily contemplation of supèrior bèings and etérnal interests. Not content with acknowledging, in general terms, an overrùling Próvidence, they habitually ascribed évery evènt to the will of the Great Being, for whose pòwer nothing was too vást, for whose inspéction nothing was too minùte. To knòw Him, to sèrve Him, to enjóy Him, was with them the gréat énd of existence. Théy rejected with contèmpt the ceremonious homage which other sects substituted for the pùre wórship of the sóul. Instead of catching occasional glímpses of the Deity through an obscùring véil, they aspired to gaze fúll on the intólerable brightness, and to commune with Him fáce to fàce. Hence originated their contempt for terréstrial distinctions. The difference between the gréatest and méanest of mankind seemed to vànish, when compared with the boundless interval which separated the whòle ràce from Him on whom their òwn eyes were cónstantly fixed. They recognised no title to superiority but His fàvour; and, cónfident of that favour, they despised all the accòmplishments and all the dignities of the wòrld. If they were unacquainted with the works of philosophers and pòets, they were dèeply réad in the óracles of Gòd. If their names were not found in the règisters of héralds, they felt assured that they were recorded in the Bóok of Life. If their steps were not accompanied by a splendid train of ménials, legions of ministering àngels had charge over them. Their pálaces were houses not made with hànds; their diadems, crowns of glory which should never fade awày!

On the rich and the èloquent, on nòbles and príests, they looked down with contèmpt; for they esteemed themselves rich in a more précious trèasure, and eloquent in a more sublime lànguage; nobles by the right of an èarlier creátion, and priests by the imposition of a mightier hànd. The very méanest of them was a being to whose fate a mystérious and térrible impòrtance belonged,—on whose slightest áction the spirits of light and dárkness looked with ánxious interest; who had been destined, before heaven and earth were creàted, to enjoy a felicity which should continue, when heaven and earth should have passed awày.

Events which shortsighted politicians ascribed to éarthly causes, had been ordained on his account. For his sake, èmpires had risen, and flóurished, and decàyed. For his sake, the Almighty had proclaimed his will by the pèn of the evángelist and the hárp of the pròphet. He had been rescued by nó còmmon deliverer, from the grasp of nò cómmon fòe. He had been ransomed by the sweat of nó vùlgar ágony, by the blood of nò éarthly sácrifice. It was for him that the sùn had been dárkened,* that the ròcks had been rènt, that the dèad had arisen, that áll nàture had shuddered at the sufferings of her expíring Gòd.

Thus the Puritan was made up of twò different mèn, the one all self-abàsement, pènitence, grátitude, pássion; the other pròud, càlm, inflèxible, sagácious. He próstrated himself in the dùst before his Máker; but he set his fóot on the néck of the kìng. In his devòtional retírement, he prayed with convùlsions, and gróans, and tèars. He was half-màddened by glòrious or térrible illúsions. He heard the ly'res of ángels, or the témpting whispers of fiènds. He caught a gleam of the beátific vision, or woke scrèaming from dreams of everlásting fire. Like Váne, he thought himself entrusted with the scèptre of the millénnial yèar. Like Fleetwood, he cried in the bitterness of his sóul, that Gòd had híd his fàce from him. But when he took his sèat in the còuncil, or girt on his swòrd for wàr, these tempestuous workings of the soul had left nò percéptible tràce behind them. People who saw nothing of the godly but their uncóuth visages, and heard nothing from them but their gròans and their hy'mns, might laugh at them. But those had little rèason to laugh, who encountered them in the hàll of debáte, or in the fíeld of bàttle.

The Puritans brought to civil and military affairs a cóolness of judgment, and an immutability of púrpose, which some writers have thought inconsistent with their religious zéal, but which were in fact the nécessary effècts of it. The intensity of their feelings on óne subject made them tránquil on évery òther. One overpówering sèntiment had subjected to itself pity and hátred, ambition and fèar. Dèath had lòst its térrors, and pleásure its chàrms. They had their smiles and their téars, their ráptures and their sòrrows, but nòt for the things of this world. Enthúsiasm had made them stòics, had cleared their minds from every vùlgar pàssion and préjudice, and raised them abòve the influence of dánger and of corrùption.—*Macaulay.*

III.—POPE AND DRYDEN.

[*This piece is marked in application of the rules of Inflection.*]

Pope professed to have learnt his poetry from Dry'den, whom, whenever an opportunity was presented, he praised through his whole life with unvaried liberàlity; and, perhaps, his character may receive some illustration, if he be compared with his màster.

Integrity of understànding, and nicety of discérnment, were not allótted in a less proportion to Dry'den than to Pòpe. The rectitude of Dryden's mind was sufficiently shown by the dismission of his poetical préjudices, and the rejection of unnatural thoughts and rugged nùmbers. But Dryden never desired to apply áll the judgment that he had. He wrote, and professed to write, merely for the pèople; and when he pleased óthers, he contented himsèlf. He spent no time in struggles to rouse latent pòwers; he never attempted to make that bètter which was already gòod, nor often to ménd what he must have known to be fàulty. He wrote, as he tells us, with very little considerátion: when occasion or necessity called upon him, he poured out what the present moment happened to supply, and, when once it had passed the préss, ejected it from his mind; for when he had no pecuniary interest, he had no further solicitude.

Pope was not content to sátisfy; he desired to excél, and therefore always endeavoured to do his bèst; he did not court the cándour, but dared the judgment of his reader, and, expecting no indulgence from óthers, he showed none to himsèlf. He examined lines and words with minute and punctilious observátion, and retouched every part with indefatigable diligence, till he had left nothing to be'forgiven.

For this reason he kept his pieces very long in his hánds, while he considered and rèconsidered them. The only poems which can be supposed to have been written with such regard to the times as might hasten their publicátion, were the two satires of *Thirty-èight:* of which Dodsley told me, that they were brought to him by the áuthor, that they might be fairly cópied. "Every line," said he, "was then written twice òver; I gave him a clean tránscript, which he sent sometime afterwards to me for the préss, with every line written twice over a sècond time."

His decláration, that his care for his works ceased at their publicátion, was not strictly trùe. His parental attention nèver abandoned them; what he found amiss in the first edition, he silently corrected in those that followed. He appears to have revised the *Iliad,* and freed it from some of its imperfèctions; and the *Essay on Criticism* received many improvements, after its first appearance. It will seldom be found that he áltered without adding clèarness, élegance, or vigour. Pope had, perhaps, the judgment of Dry'den; but Dryden certainly wanted the diligence of Pòpe.

In acquíred knowledge, the superiority must be allowed to Dry'den, whose education was more scholástic, and who, before he became an áuthor, had been allowed more time for stúdy, with better means of informátion. His mind has a larger ráuge, and he collects his images and illustrations from a more extensive circumference of science. Dryden knew more of man in his general náture, and Pope in his local mànners. The notions of Dryden were formed by comprehensive speculátion, and those of Pope by minute attèntion. There is more dignity in the knowledge of Dry'den, and more cértainty in that of Pòpe.

Póetry was not the sole praise of èither: for both excelled likewise in pròse: but Pope did not borrow his prose from his prédecessor. The style of Dryden is capricious and váried; that of Pope is cáutious and ùniform. Dryden obeys the motions of his own mínd; Pope constrains his mind to his own rules of composition. Dryden is sometimes vèhement and rápid; Pope is always smòoth, úniform, and gèntle. Dryden's page is a natural field, rising into inequálities, and diversified by the varied exuberance of abundant vegetátion; Pope's is a velvet lawn, shaven by the scy'the and levelled by the ròller.

Of génius, that power which constitutes a póet; that quality without which judgment is cóld, and knowledge is inért; that energy which collècts, combìnes, àmplifies, and ánimates; the superiority must, with some hesitation, be allowed to Dry'den. It is not to be inferred, that of this poetical vigour Pope had only a little, because Dryden had móre; for every óther writer since Milton must give place to Pòpe; and even of Dry'den it must be said, that if he has brighter páragraphs, he has not better pòems. Dryden's performances were always hàsty, either excited by some external occásion, or extorted by domestic necèssity; he composed without considerátion, and published without corrèction. What his mind could supply at càll, or gather in one excúrsion, was all that he sóught, and all that he gàve. The dilatory caution of Pope enabled him to condénse his sèntiments, to múltiply his images, and to accùmulate all that stùdy might produce, or chánce might supply. If the flights of Dryden, therefore, are higher, Pope continues longer on the wíng. If of Dryden's fire the blaze is brighter, of Pope's the heat is more régular and cònstant. Dry'den often surpásses expectation, and Pópe never falls belòw it. Dry'den is read with frèquent astónishment, and Pope with perpétual delight.—*Johnson.*

IV.—UNIVERSAL DECAY.

[*Marked for Rhetorical Pauses, Emphasis, and Inflections.*]*

We receive such repeated intimations of *decay* ‖ in the world through which we are passing;—*decline* | and *change* | and *loss, follow* ' *decline* | and *change* | and *loss* ‖ in such *rapid* succession, that we can almost catch the *sound* of *universal wàsting,* and *hear* the work of *desolátion* ' going on *busily* ' aròund us. "The *mountain* | falling ‖ cometh to nòught, and the *rock* | is *removed* out of his *plàce.* The *waters* | *wear* the stònes, the things which grow out of the *dust* of the *earth* ‖ are *washed* awáy, and the *hope* of *man* | is *destròyed.*" *Conscious* ' of our own *instabílity,* we look about ' for something to *rèst* on; but we look ' in *vàin.* The heavens ' and the earth | had a *beginning,* and they will have an *èn̄d.* The *face* of the *world* | is *chànging, dáily* and *hòurly. All* ' *animated things* ‖ grow *óld* and *die.* The *rocks* | *crùmble,* the *trees* | *fáll,* the *leaves* | *fáde,* and the *grass* | *withers.* The *clouds* | are *flying,* and the *waters* | are *flowing awày* from us.

The *firmest works* of *mèn,* too, are *gradually giving wày:* the *ivy* | clings to the *mouldering tòwer,* the *brier* | hangs *out* from the *shattered* wíndow, and the *wall-flower* | springs from the *disjointed stònes.* The *fòunders* | of these perishable works ‖ have shared the *sàme fáte* | *long agò.* If we look back to the days of our *ancestors,* to the *mèn* | as well as the *dwellings* | of former times, they become immediately *assòciated* in our imaginations, and only make the feeling of instability *strònger* and *dèeper* than *before.* In the spacious domes, which once held our *fáthers,* the *serpent* | *hisses,* and the *wild bird* | *scrèams.* The *halls,* which once were crowded ' *with all* that *tàste* | and *science* | and *lábour* | could *procure,*—which *resounded* with *mèlody,* and were *lighted up* with *bèauty,* are *buried* | by their *own rùins, mocked* | by their *own desòlation.* The voice of *merriment, and of wailing, the steps of the bùsy* ' and the *idle* ‖ have *ceased* in the *deserted còurts,* and the *weeds* | *choke* the *éntrances,* and the *long grass* ‖ *waves* upon the *hèarth-stone.* The *works* of *árt,* the *forming hànd,* the *tòmbs,* the very *áshes* they contained, are *all gòne.*

While we thus walk ' among the ruins of the *pást,* a sad feeling of *insecúrity* | comes over us; and that feeling ' is by no means *diminished* ‖ when we arrive at *hòme.* If we turn to our *friends,* we can hardly *spèak* to them ‖ before they bid us *farewèll.* We see them for a few *móments,* ' and in a few moments *more* their *countenances* ' are *chànged,* and they are *sent awày.* It matters not ' how *néar* ' and *dèar* they are. The ties which bind us together ‖ are never too *clóse* ' to be *pàrted,* or too *stróng* ' to be *bròken. Tears* ' were never known to move the *king* of *tèrrors;* neither is it enough ' that we are compelled to surrender *óne,* or *twó,* or *mànу* of those we lòve; for though the *price* is so great, we buy no *fávour* with it, and our hold ' on those who remain | is as *slight* as *èver.* The *shadows* ‖ *all* | *elude* our *grásp,* and follow one another ' down the vàlley. We gain *no confidence,* then, *no* feeling of *security,* by turning to our *contémporaries* and *kindred.* We know ' that the forms which are breathing *aróund* us, are as *shortlived* ' and *fleeting* ' as *those* were, which have been *dúst* ' for *cénturies.* The sensation of *vànity, uncèrtainty,* and *rúin,* is equally stròng, whether we muse on what has long been *pròstrate,* or *gaze* on what is falling *nów,* or *will fall* ' so sòon.

If everything | which comes under our notice ‖ has endured for so *short* a *time,* and ' in so short a time | will be *no móre, we cannot say* | that we receive the *lèast assùrance* ‖ by thinking on *oursèlves.* When a *few* more friends | have *lóft,* a *few more* hopes | *decéived,* and a *few more changes* | *mócked* us, "we shall be brought to the *gràve,* and shall remain in the *tòmb:* the clods of the *valley* shall be *swèet* unto us, and *every* man ' shall *fóllow* us, as there are *innumerable* ' *before* us." *All power* ' will have *forsaken* the *stròngest,* and the *loftiest* ' will be *laid lòw,* and every *eye* ' will be *clòsed,* and *every voice* ' *hùshed,* and *every heart* ' will have *ceased* its *bèating.* And when we have gone ' *oursélves,* even our *mèmories* ' will not stay behind us *lóng.* A *few* of the near and dear ‖ will bear our likeness ' in their *bosoms,* till *they* ' *too* ' have arrived ' at the *end* of their *jóurney,* and entered the *dark dwelling of unconsciousness.* In the thoughts of *óthers* ‖ we shall live ' only till the last sound of the bell, which informs them of our *depárture,* has *ceased* to *vibrate* in their *èars. A stòne,* perhaps, *may tell some wanderer where we lie, when we cáme here,* and *when we went awày;* but ' even *thát* | will soon *refuse* to bear us *récord; "time's effacing fingers"* | will be busy on its *súrface,* and | at length ' will *wear* it *smòoth;* and then | the stone itself | will *sínk,* or *crùmble,* and the wanderer of *anóther* age | will pass, *without* a *síngle càll* ' upon his *sy'mpathy,* over our *unheeded gràves.—Greenwood.*

COMPARATIVE ANATOMY.—VI.

ECHINODERMATA (HEDGEHOG-SKINNED ANIMALS.)

FROM the earliest times, before Aristotle wrote of animals, the great similarity in outward appearance between the hedgehog, when rolled up in self-defence, and the sea-egg, or echinus, has been so recognised as to cause them to be called by the same name. In Greek, echinus (ἐχῖνος) means both the one and the other. In English, we have expanded this superficial association to include the young of our own species when they have arrived at that age when they are always in mischief, and when, according to the notions of a past generation, they were always to be cuffed, because, if they did not deserve it at the time of the infliction, they soon would do so.

With regard to the English association not much is to be said, because, while the human urchin is actively mischievous, and often made to smart for it, passively, the other urchins are very harmless except in passive self-defence. The other resemblance, though misleading anatomically, is very marked, on account of the dense covering of sharp spines sticking out in all directions, matted and crossing one another like the spines of the thistle leaf; and also on account of the globular form, which, though temporary in the land urchin, is permanent in the echinus.

The shell of a typical echinus, upon which the spines are set, is a round box of very complex and beautiful structure. It consists of plates of carbonate of lime so closely and accurately fitted together, that, even after the spines have been stripped off, it requires minute examination to discover the lines of division between them. The box has the form of a more or less depressed sphere, varying from the shape of a true globe to that of a Turkish turban. At the two poles of the box are two holes: that which opens on the under side of the animal is the mouth, while that which is found at the centre of the top side is the other end of the food canal. A further examination reveals that the shell is made up of five similar radial divisions, which stretch from pole to pole, and may be thus described:—The central zigzag line, running from mouth to anus, has on either side of it a row of small plates alternating with one another; and on the outer side of each of these rows of plates is a row of small holes. There are six of these holes in each plate. Externally to these perforated plates are situated two other rows of larger plates, one on each side, and these are united at their external edges to the next radial division of the box by a zigzag line. The outer side of both the perforated plates and the plates without holes are covered with bosses, each of which has a more prominent rounded knob projecting from the top of it, which knob has a pit in its centre. These knobs bear the spines. They are of various sizes, but so arranged as to form a beautifully regular pattern; for each plate has at its centre a large boss, and, as the plates are regularly placed one above the other, there are, on the whole shell, twenty rows of these tubercles running from top to bottom, set on lines which correspond to the meridians of a globe. Yet, if the reader has followed the description, he will see that these rows are not all at equal distances from one another, for those on the smaller perforated plates are approximated, while those of the larger plates are removed from one another; nor are the tubercles of the several rows all at the same distance from each other. Besides these tubercles, a great many others of very various sizes lie between the rows. The whole effect of the pattern is very beautiful, and shows that symmetry without sameness, that unity in variety, with which all the works of God abound, and which the architect and the designer are so perpetually striving after, but to which they so seldom attain.

The ten perforated tracts which, being arranged in pairs, form five double bands or courses, converge towards the mouth and anus. The regularity of these tracts, converging at both ends and leaving between them a solid tract, has suggested a fanciful analogy. They were thought to resemble the gravel walks of our gardens, with their borders or avenues of trees on each side, and so were called ambulacra; ambulacrum being a post-classical Latin word, meaning a garden walk. At the point where the two converging perforated tracts unite, is a single six-sided solid plate, which has at its side nearest the ambulacra a hole from which the ambulacral holes seem to diverge. The five perforated hexagonal plates which thus stand at the end of the ambulacral avenues, are separated from one another and from the top opening by five other irregularly eight-sided plates which surround the small movable scales which cover in the anus. As far as our previous description has gone, the reader will perceive that all the parts are perfectly radial. The five segments are absolutely alike; but one of the eight-sided plates has, between the large pore and the anus, a space which is full of a great multitude of holes, and in this respect it differs from all the other five plates of the series, and is called the madreporic plate. At the other pole of the body there is a large opening covered by a leathery membrane, in the centre of which is the mouth. Placing the animal with its mouth downwards, which is the position it usually occupies, and looking at it from above, let us enumerate the perforations which we have described, beginning from the centre at top, and proceeding outward and

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* When an emphatic series causes, thus, a succession of falling inflections, the second one in each clause falls lower than the first.

* The learner having been conducted through the application of the rules for Pauses, Emphasis, and Inflections separately, will now be prepared to study and apply them in conjunction.

high. The face of the great bust is five feet long, and the breadth across the shoulders twenty feet. At the west end of this pagoda, or temple, is a dark recess twenty feet square, without ornament; the altar is in the centre, and there are two gigantic statues at each of the four doors by which it is entered. On entering Elephanta, there is a piazza extending sixty feet from east to west, and having a breadth of sixteen feet; indeed, the body of the cavern is surrounded on every side by similar piazzas. The caves of Kenneri, on the larger island of Salsette, in the same vicinity, and those of Carli, on the opposite shore of the continent, are equally remarkable. The mountain of Kenneri appears to have had a city hewn out of its rocky sides, capable of containing many thousand inhabitants. The front is hewn into four floors or galleries, in which there are 300 apartments; these have generally an interior recess or sanctuary, and a small tank for ablution. The grand pagoda is forty feet high to the soffit of the arch or dome; it is eighty-four feet long, and forty-six broad. The columns of the portico are finely decorated with bases and capitals; and at the entrance are two colossal statues, each twenty-seven feet high. Thirty-five pillars of an octagonal form, about five feet in diameter, support the arched roof of the temple; their bases and capitals are composed of elephants, horses, and tigers, carved with great exactness. Round the walls are placed two rows of cavities for receiving lamps. At the farther end is an altar of a convex shape, twenty-seven feet high, and twenty feet in diameter; round this are also cavities for lamps; and directly over it is a large concave dome cut out of the rock. It is said that about this grand pagoda there are ninety figures or idols, and not less than 600 of these figures within the precincts of the excavations. The cave-temple at Carli is on a greater scale than that which we now describe. The temples of Ellora, near Dowlatabad, are reckoned the most surprising and extensive monuments of ancient Hindoo architecture. They consist of an entire hill excavated into a range of highly-sculptured and ornamented temples. The number and magnificence of these subterranean edifices, the extent and the loftiness of some, the endless diversity of the sculpture of others, the variety of curious foliage of minute tracery, the highly-wrought pillars, rich mythological designs, sacred shrines and colossal statues, all both astonish and distract the mind of the beholder. It appears truly wonderful that such prodigious efforts of labour and skill should remain, from times certainly not barbarous, without a trace to tell us the hand by which they were designed, or the populous and powerful nation by which they were produced. The courts of Indra, of Juggernaut, of Parasu Rama, and the Doomar Leyna or nuptial palace, are the names given to several of these great excavations. The greatest admiration has been excited by the one called Keylas, or Paradise, consisting of a conical edifice, separated from the rest, and hewn out of the solid rock, 100 feet high, and upwards of 300 feet in circumference, entirely covered with mythological sculptures.

Besides the excavated temples of India, there are several others of different forms which may here be noticed. First, those composed of square or oblong enclosures; secondly, temples in the form of a cross; and thirdly, temples of a circular form.

Of temples of the first kind, the largest one remaining is that of Seringham, near Trichinopoly. The outward wall is said to be nearly four miles in circumference. The whole edifice consists of seven square enclosures, the walls being 350 feet distant from each other. In the innermost square are the chapels. In the middle of each side of each enclosure wall there is a gateway under a lofty tower; that in the outward wall, which faces the south, is ornamented with pillars of precious stones, thirty-three feet long, and five feet in diameter.

Of temples of the second kind—namely, those in the form of a cross—the most remarkable is the great temple in the city of Benares, on the banks of the Ganges, which has been devoted to the religion and science of the Hindoos from the earliest periods of their history. The form of the temple is that of a great cross with a cupola in the centre, which towards the top becomes pyramidal. At the extremity of each branch of the cross, all of which are of equal length, there is a tower with balconies, to which the access is from the outside.

Of temples of circular form, the temple of Juggernaut is considered the most ancient in India; the Brahmins attribute its foundation to the first king on the coast of Orissa, who lived, according to their chronology, 4,800 years ago. The image of Juggernaut, or Mahadeo, stands in the centre of the building, upon an elevated altar. The idol is described as being an irregular pyramidal black stone, and the temple lit up only with lamps.

In the ancient Hindoo writings, another kind of temple is described, of which now no vestige is to be found. The Ayeen Akberry relates that near to Juggernaut is the temple of the sun, in the erection of which the whole revenue of the province of Orissa, for twelve years, was entirely expended; that the wall which surrounded the whole was 150 cubits high, and nineteen cubits thick; that there were three entrances: at the eastern gate were two elephants, each with a man on its trunk; on the west, two figures of horsemen completely armed; and over the northern gate, two tigers sitting over two dead elephants. In front of the gate was a pillar of black stone, of an octagonal form, fifty cubits high; and after ascending nine flights of steps, the visitor arrived at an extensive enclosure with a large cupola constructed of stone, and decorated with sculpture. Such are the ancient monuments of which India can boast, long before architecture had reached that proud eminence which it attained in ancient Greece. In our next lesson we shall glance at the great buildings of Persia.

LESSONS IN GREEK.—III.

GENERAL REMARKS ON THE NOUN, THE ADJECTIVE, AND THE PREPOSITIONS.—THE DEFINITE ARTICLE.

GENDER.

NOUNS or Substantives are names of objects or things which exist in space or in the mind. There are, in Greek, three genders; the masculine, to denote the male sex; the feminine, to denote the female sex; and the neuter (Latin neuter, *neither*), to denote objects which are neither male nor female. The genders are distinguished partly by the sense and partly by the terminations of the nouns. There are terminations, for instance, which denote the feminine gender, as η; there are other terminations which denote the masculine gender, as ας in the first declension; and, again, there are others which denote the neuter gender, as ον. This is a peculiarity to which we have nothing similar in English adjectives. Those who have studied Latin are already familiar with it. In regard to gender as denoted by the meaning, let the ensuing rules be committed to memory.

1. Of the *masculine gender* are the names of male beings, of winds, of months, and of most rivers, as:—Πλατων, Plato; Ζεφυρος, the west wind; Εκατομβαιων, the month Hecatombæon; Ευρωτας, the river Eurotas.

2. Of the *feminine gender* are the names of female beings, of trees, of lands, of islands, and of most cities, as:—Κορη, a girl; δρυς, an oak; Αρκαδια, Arcadia; Λεσβος, Lesbos; Κολοφων, Colophon.

3. Of the *neuter gender* are the names of fruits, the diminutive in ον (except the female proper name ἡ Λεοντιον), the names of the letters of the alphabet, the infinitives, all words not declinable in the singular and the plural, and every word used merely as the sign of a sound.

4. Of the *common gender* are personal nouns which, like our *child*, may be applied to male or female; thus, Θεος may be sometimes used of a male or female divinity, and so be rendered either *god* or *goddess*.

This "common gender" is a grammatical phrase used to denote such nouns as are common to both males and females; that is, are sometimes masculine and sometimes feminine.

In Greek grammar it is usual to employ the definite article, in order to indicate the gender. The definite article, nominative singular, is ὁ, ἡ, το, *the*; ὁ is masculine, ἡ feminine, and το neuter; ὁ, therefore, put before a noun, intimates that the noun is of the masculine gender; ἡ, that the noun is of the feminine gender; and το, that it is of the neuter gender. If both ὁ and ἡ are put before a noun, it is done to show that the noun is of the common gender: thus, ὁ ανηρ, *the man*; ἡ γυνη, *the woman*; το εργον, *the work*; ὁ, ἡ, θεος, *the* (male or female) *divinity*; ὁ, ἡ, παις, *the child*, whether boy or girl.

NUMBER.

Number is a distinction of nouns founded on the circumstance whether they denote one or more. If a noun denotes one object, it is in the singular number; if a noun denotes more objects than one, it is in the plural number. The Greek tongue has a third number, called the dual (Latin duo, *two*), which denotes two objects; thus, λογος is *a word* (singular); λογοι, *words* (plural); λογω, *two words* (dual); where ος is the singular termination, οι the plural termination, and ω the dual termination.

CASE.

These terminations, ος, οι, ω, undergo changes according to the relation in which they stand to a verb, to another noun, or to a preposition. Thus ος may become ον, and οι may become ους. Any word which is changed in form, to express a corresponding change in sense, is said to be inflected. Such inflexions or variations in the endings of nouns are termed cases. There are in Greek five cases, namely—

1. *The Nominative*, the case of the subject; as, ὁ πατηρ γραφει, *the father* writes.

2. *The Genitive*, the case indicative of origin, *whence*; as, ὁ του πατρος υἱος, the *father's* son.

3. *The Dative*, the case indicative of place, *where*, and of the manner, and instrument; as, τῳ του πατρος υἱῳ, to the father's *son*.

4. *The Accusative*, the case of the object, or *whither*; as, ὁ πατηρ τον υἱον αγαπα, the father loves *the son*.

5. *The Vocative*, the case of invocation, or direct address; as, αγαπα, πατερ, τον υἱον, *father*, love thy son.

In Greek there is no ablative case; the functions of the ablative case are discharged, partly by the dative, and partly by the genitive. The nominative and the vocative are called *recti, direct*; the other cases are called *obliqui, indirect*.

Substantives and adjectives of the neuter gender have the nominative, the accusative, and the vocative alike, in the singular, the plural, and the dual.

The dual has only two case-endings; one for the nominative, accusative, and vocative, the other for the genitive and dative.

DECLENSION.

Declension is the classification of nouns and adjectives agreeably to the variations of their case-endings. There are, in Greek, three declensions; called severally, the first, the second, and the third declension. The learner will do well in regard to every noun and adjective, to ask himself, What is its nominative? What is its case? What is its number? What is its gender? What is its declension? For instance, τραπεζαις is from the nominative τραπεζα, *a table*, is in the plural number, dative case, feminine gender, and of the first declension. In order to practise and examine himself fully, he should also form or "go through" every noun, adjective, tense, mood, and indeed every word capable of declension or conjugation, according to the several models or paradigms given in the successive lessons.

THE ADJECTIVE.

An adjective denotes a quality. This quality may be considered as being connected with, or as being in an object, as "the red rose;" or as ascribed to an object, as "the rose is *red*." In both cases the adjective in Greek, as in Latin, is made to agree in form, as well as in sense, with its noun. A change takes place in the adjective, conformably to the change in the signification, thus, *a good man* is αγαθος ανηρ, but *a good woman* is αγαθη γυνη. Observe the ος of the masculine is for the feminine ης. Not only in gender, but in number and in case does the adjective in Greek, as in Latin, conform to its noun changed into η. Not only in gender, but in number and in case: e.g., ὁ αγαθος ανθρωπος, Latin, *bonus* homo, *the good man*; ὁ ανθρωπος εστιν αγαθος, homo *bonus* est, *the man is good*; ἡ καλη Μουσα, *pulchra* Musa, *the beautiful Muse*; ἡ Μουσα εστι καλη, Musa *pulchra* est, *the Muse is beautiful*; το καλον εαρ, *pulchrum* ver, *the beautiful spring*; το εαρ εστι καλον, ver *pulchrum* est, *the spring is beautiful*.

The adjective, then, like the substantive, has a threefold gender—the masculine, the feminine, and the neuter. But many adjectives, such as *compound* and *derivative*, have only two terminations; one for the masculine and feminine, and another for the neuter; *e.g.*:—

Masculine.	*Feminine.*	*Neuter.*
ὁ ἡσυχος ανηρ,	ἡ ἡσυχος γυνη,	το ἡσυχον τεκνον,
the quiet man.	*the quiet woman.*	*the quiet child.*

Here ἡσυχος remains the same with ανηρ, *man*, and γυνη, *woman*, being changed into ἡσυχον before the neuter τεκνον, *child*. An adjective of three terminations may be seen in this example:—

Masculine.	*Feminine.*	*Neuter.*
ὁ αγαθος ανηρ,	ἡ αγαθη γυνη,	το αγαθον τεκνον,
the good man.	*the good woman.*	*the good child.*

Some adjectives have only one termination, as μακροχειρ, *long-handed*; απατωρ, *without a father*. In declension, adjectives, with a few exceptions, follow the forms of the substantives.

PREPOSITIONS.

Prepositions are words which go before nouns, and show the relation which the nouns bear to the affirmation or negation made in the sentence, or the member of the sentence in which they stand. Of prepositions I shall treat in full hereafter. At present some knowledge of them must be communicated, in order to prepare the beginner for the following instructions. In the words

πορευομαι	προς	τον	πατερα,
I go	TO	*the*	*father*,

the word προς, *to*, is a preposition.

In Greek, prepositions govern either one case, two cases, or three cases, and may accordingly be classified thus:—

PREPOSITIONS GOVERNING

One Case.	*Two Cases.*	*Three Cases.*
	Genitive.	
Αντι, in presence of, instead of.	Δια, through.	Αμφι, about.
Απο, from.	Κατα, down.	Επι, upon.
Εκ, out of.	Ὑπερ, for.	Μετα, with.
Ενεκα, on account of.		Παρα, from.
Προ, before, for the good of.		Περι, concerning.
		Προς, with *or* from.
		Ὑπο, by.
	Dative.	
Εν, in.		Αμφι, around.
Συν, with.		Επι, on.
		Μετα, amidst.
		Παρα, by, near (of rest).
		Περι, around.
		Προς, at (of rest).
		Ὑπο, under (of rest).
	Accusative.	
Ανα, up.	Δια, because of.	Αμφι and Περι, about
Εις, into.	Κατα, down, through.	Επι, to.
Ὡς, toward.	Ὑπερ, over.	Μετα, after.
		Παρα, by the side of.
		Προς, to (*of motion*).
		Ὑπο, under (of motion).

A glance at this table will show that the case which in any example a preposition is connected with, has much to do in modifying its signification. Only by constant practice can the exact meaning and application of the several prepositions be known. The Latin student will, in this list, recognise words with which he is familiar; thus εκ is the Latin *ex*; εν is the Latin *in*; προ is the Latin *pro*; απο is the Latin *ab*; ὑπερ is the Latin *super*; and ὑπο is the Latin *sub*.

Before I treat of the declension of nouns, I must give the definite article, as it is so intimately connected with nouns that the latter cannot well be set forth without the former; and as the article is often used as indicative of the gender of the noun.

THE DEFINITE ARTICLE, ὁ, ἡ, το, *the*.

Singular.

	Mas.	*Fem.*	*Neut.*	*English.*
Nom.	ὁ	ἡ	το	the.
Gen.	του	της	του	of the.
Dat.	τῳ	τῃ	τῳ	to *or* by the.
Acc.	τον	την	το	the.
		Plural.		
Nom.	οἱ	αἱ	τα	the.
Gen.	των	των	των	of the.
Dat.	τοις	ταις	τοις	to *or* by the.
Acc.	τους	τας	τα	the.

downward, so that all confusion may be avoided. We have the following different series:—

1. The central round opening, which is covered by small movable calcareous pieces, called the apical hole.

2. On one side of this are the minute crowded holes of the madreporic plate.

3. In the five plates which surround the apical hole are the five holes, each of which occupies the external angle of its plate; these are called the generative pores.

4. In the five plates which are intermediate to and outside these the ocular holes are seen.

5. Stretching away in five double tracts are the ambulacral holes.

6. The large opening below for the mouth and its membrane.

We are now in a position to indicate the relation of the soft parts of the animal to this protective box. All the above-named perforations have their uses; and a study of these will teach us almost the whole anatomy of the animal.

The alimentary canal connects the two largest holes which lie in the vertical axis of the body. The entrance, or mouth, is in the centre of the wide orifice in the under side, which is covered in by a leathery membrane, with the exception of where the pointed teeth project. The curious beak, composed of five sharp teeth, forms a very effective instrument wherewith the animal can scrape away the soft, calcareous rocks in which so many worms and sea-animalcules bore and hide themselves. It is supposed that the animal swallows chalk and animals together, and lives on the nutritive, organic substances, while the chalk, etc., are passed out again, just as in the case of the earth-worm, great quantities of soft vegetable mould are swallowed for the sake of the nutriment it contains in the shape of particles of leaves, etc. The protruded part of the beak, however, gives no idea of the very complex machinery by which these teeth are worked from within. If the leathery membrane be cut round close to the shell and pulled out, it brings with it, or allows to be abstracted, a large and complicated hard framework in the form of a five-sided pyramid, with its base upward, and its apex formed by the teeth. This pyramid consists of five jaws, each of which is a frame which sustains the tooth, and has attached to it the muscles which move this tooth in all required directions. The jaw being hollow allows the tooth to enter at its upper broader side, and to pass down in a groove which becomes closely applied to the tooth on all sides at the lower end, and so holds it in a kind of socket, in which, however, it can move downward, as the tooth is worn away below, and is supplied from above. The tooth consists of a curved and flattened bar, ending in a point, and having on its inner side a flange to strengthen it, which flange stands out at right angles to the flattened inner surface of the tooth. The tip of the tooth is of enamel-like hardness, but as you trace it up through the jaw, it becomes softer and softer, until it is found to be quite without hard deposit at the part where it protrudes above the jaw. This shows that there is a process of continual renewal, the tooth being laid down as a gelatinous substance in which more and more hard, earthy salts are deposited as it is pushed forward, until it consists almost wholly of these, and is fitted to cope with the hard material to the rasping of which the animal applies it.

Round the base of the pyramid runs a pentangular muscle, which binds the jaws together. From the outer side of the base of each jaw run muscles to the shell at the sides of the orifice of the mouth. These, when contracted, protrude the teeth all together from the mouth. Other muscles unite the sides of the jaws to one another, and these, when contracted, bring the teeth together. A series of long pieces attached to the centre of the base of the pyramid, gives attachment to muscles, which, running to the shell, have the function of approximating the tips of the teeth. In order to retract the whole apparatus when acting together, or to pull away each separate tooth from the rest when acting separately, a number of muscles (two for each tooth) run from the lower end of the jaw to some calcareous loops or arches, which, standing on the sides of the oral hole, rise up within the shell.

The jaws, however, are not solely devoted to the sustaining and wielding of the teeth, but are themselves employed to triturate the food, for on the sides of each jaw which are opposed to the sides of the next jaws on either hand, are found parallel grooves which transform the surfaces into fine files, while the ridges between the grooves, stretching further inward than the furrows, form saw-like edges, so that after the food, mixed with hard particles, has passed the tips of the teeth, it can be ground down to a fine pulp by these triturating edges and surfaces.

The food canal does not run in a straight line from mouth to anus, but, after proceeding a short way as a contracted throat, opens sideways into a wider canal, which, after winding once round the inside of the shell, is bent on itself, and winds round back again, and then delivers at the apical hole. This winding enables the food to undergo a more thorough digestion, while the nutritive parts of the food are dissolved, and either pass into the blood-vessels, which are found in the walls of the intestines, or into the surrounding cavity. It must not be supposed that this long alimentary canal is loose in the box, only attached by its two extremities. If so, it would be liable to become entangled. It is attached by a membrane which lines the inner surface of the shell, and then passes off from this round the alimentary tube, so as to hold it in a loop, or rather fold. This arrangement is very general, not only in these, but in the higher animals.

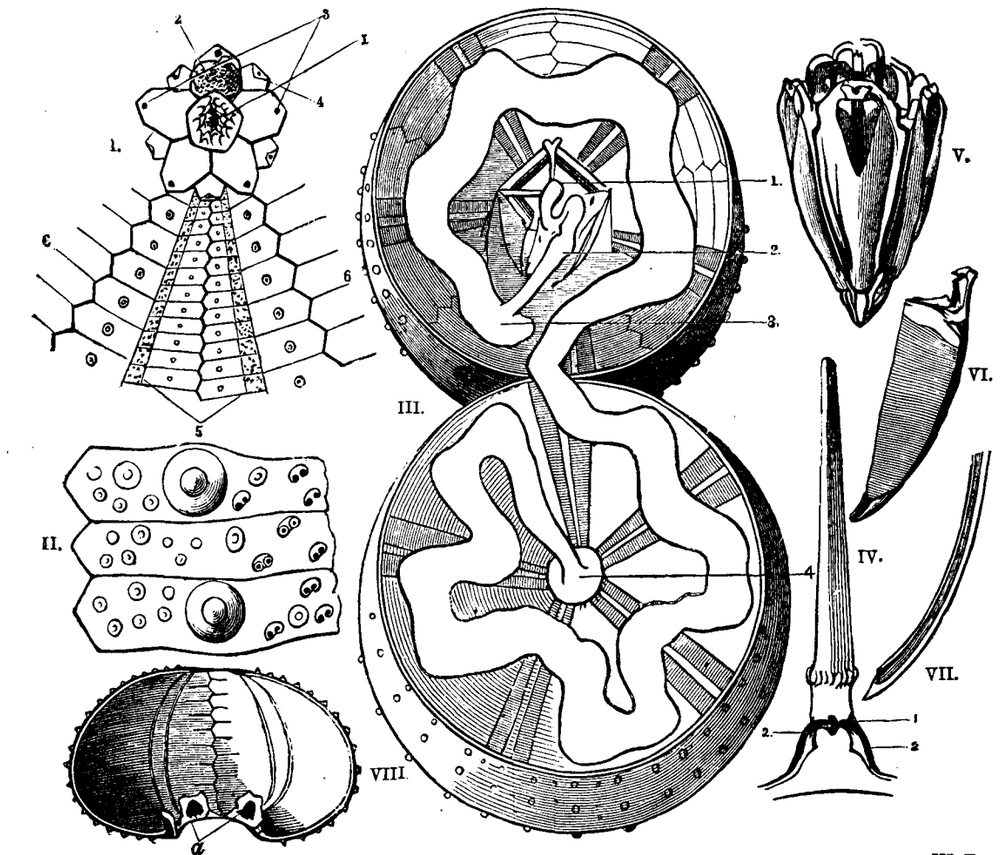
The holes in the five larger plates surrounding the anal opening are those through which the eggs are extruded (in the case of the female) into the sea-water, so to renew the round of life. They furnish the exits for five separate organs situated just below them. The holes in the alternate plates are called ocular holes, because, through them, a nerve passes to an organ, supposed to be an eye. The ambulacral holes and the madreporic holes need a further explanation, which will lead to a description of the locomotive organs of the animal. The locomotive organs of the echinus are of two kinds—the soft for pulling, and the hard for pushing. The hard-pushing organs are the spines. These are, no doubt, defensive organs, but they also unite with this function that of locomotion. The spines are, as we have said, set upon the knobs of the outside of the shell. They are, however, movable upon these, so that they can be turned in all directions. To effect this movement without destroying the solidity of their attachment, there is a curious contrivance. At the centre of the concave base of the spine, there is (at least in the purple-tipped sea-urchin) a pit corresponding to the pit in the centre of the tubercle on which it is set. A ligament runs from one pit to the other, and so prevents the spine from slipping off its support, while from the edges of the base of the spine muscular fibres run to the membrane which clothes the shell. It will be seen from this that the shell is not naked, but covered with irritable and live membrane, which membrane passes down between each plate, and, no doubt, subserves the function of secreting fresh matter round the edges of these plates as the animal grows. How far the spines may aid the animal in progression may be a matter of question; but those who have observed its motion believe they are concerned in it. By far the most efficient organs of locomotion are the little tubular feet ending in discs, which are protruded through the ambulacral holes. These feet act like suckers, when applied to the rock on which the animal moves. The coatings of circular and longitudinal muscles which enclose the hollow tubes are sufficient to move the animal when a multitude of these discs have been extended and attached; but the question arises, how are they protruded? This is done by a curious contrivance. Each little tube, after traversing the shell and arriving at the interior, expands into a muscular bag. Both bag and tube contain liquid. All the little bags, set on each line of ambulacra, communicate with a vessel, which stretches from mouth to anus, and these ten vessels all communicate with a ring round the mouth, which ring has, opening into it, some larger bladders to contain a reservoir of water, and it also communicates with the madreporic holes by a tube, which is filled with fine sand. The method of protruding the tubular feet is supposed to be the following: sea-water is filtered through the madreporic plate and sand canal to the ring round the mouth. When the animal is in a lively state and inclined for locomotion, the bladders force the water into the rows of little bags, and these being muscular, can, by contracting, force out any or all of the sucking feet at pleasure. When, on the other hand, the animal wishes to retract all its feet, the bags, distended by receiving all the water which was in the tubes when extended, would be in an awkward state of tension, unless the fluid were allowed to pass back into the ring and bladders.

There is, besides this ambulacral or water-vascular system, a blood system, with both heart and vessels. Also, the liquid contained in the box external to the food canal is supposed to be organised. These points of structure need further study.

It will be seen that almost all the parts of the echinus are radially disposed, yet the individuals are separate and locomotive. We have, therefore, the radial structure, which is best suited to a fixed condition, and a vegetative habit, united with habits such as characterise the higher animals, for the echinus does not float or move hap-hazard, as the free-swimming hydrozoon does, but evidently searches for food, and has a definite object in locomotion. We might, therefore, expect that in this class we should find different grades, leading from a fixed condition, with its radial symmetry, up to the more perfect method of locomotion which accompanies an elongated form and a two-sided arrangement.

We might expect that a radiated animal was a fixed, flower-like animal fallen off from its stalk. This we found to be the case with the Medusæ, and we could trace the transformation in the life-history of the animal. In the class Echinodermata, we may also find it is so, only we have to look not simply to the life-history of one animal, but to trace up the development of the different groups throughout the class. The connecting links between the Cœlenterata and the Echinodermata are found in the stone-lilies. These animals were very numerous in geologic times, and the hard joints of their long stalks afforded no small puzzle to geologists. The problem was solved by the discovery both of the whole fossil hard parts of the animal united, and also of some existing representatives of the order in tropical regions. The Crinoids, as they are called, grow like plants in the seas of the tropics. A stem of gelatinous matter encloses the closely-applied hard joints, and bears on its summit a cup, walled in by more hard pieces, around whose edges long arms are developed. Their shape is too complicated for description here, but it suffices to say that the cup corresponds to the box of the echinus. It is satisfactory to find that an animal, found in our seas, and long considered to be a free brittle star, commences life like a stone-lily, and absolutely falls off its stem at a certain stage to commence a new locomotive life.

The star-fish represents the next higher grade, and although its general form is so different from that of the echinus, it is not difficult to show how the one may be derived from the other. If we suppose the echinus to be quartered, as we quarter an orange, by dividing it along the zigzag lines between the larger plates, and then each division opened, bent down, and flattened out, while the intermediate membrane is supposed to be indefinitely elastic, so as to stretch and cover in the upper part of the animal, we should have a star-fish. All the ambulacra would be



I. Diagram showing the plates and holes on the upper side of an Echinus Shell. II. Ambulacral Plates enlarged. III. Echinus divided in the equatorial region to show Alimentary Canal. IV. Spine, with section of its Tubercle. V. Jaws and Teeth which, united, are called the "Lantern of Aristotle." VI. Side View of a Single Jaw. VII. Its Tooth. VIII. Inside of the Purple-tipped Sea-Urchin, showing the Calcareous Loops (a).

Refs. to Nos. in Figs. (I.) 1, anal hole; 2, madreporic plate; 3, genital plates with their pores; 4, ocular plates and pores; 5, ambulacral tracts and holes; 6, interambulacral or imperforate plates. (III.) 1, base of jaws; 2, gullet; 3, commencement of stomach; 4, anus. (IV.) 1, pit ligament; 2, annular muscle.

Dual.

Nom. Acc.	τω	τα	τω	the.
Gen. Dat.	τοιν	ταιν	τοιν	of *or* to the.

There is no form for the vocative; ω, which is commonly used, is an interjection. The way to learn the article (as well as the adjective) is to repeat the parts first perpendicularly, ὁ, του, τῳ, τον, etc., and then horizontally, as ὁ, ἡ, το, until you are perfectly familiar with the whole. When you think you have mastered the task, examine yourself by asking, What is the accusative singular, feminine gender? What is the nominative plural, masculine gender? etc.; and when you have given an answer from memory alone, consult the book, to ascertain whether you are correct. Finally, write out the article in full from memory. Indeed, spare no pains to make yourself master of the article. There is a special reason for this advice, since the terminations of the article are, in the main, the same as the terminations of the noun and the adjective.

KEY TO EXERCISES IN LESSONS IN GREEK.—II.

Exercise 1.—Greek-English.

1. Always be true. 2. Rejoice ye (χαιρω, I rejoice). 3. Follow. 4. Do not complain. 5. I live pleasantly. 6. I am well educated. 7. Thou writest beautifully. 8. If thou writest ill, thou art blamed. 9. He hastens. 10. He fights bravely. 11. If you flatter, you are not true. 12. If thou flatterest, thou art not believed. 13. We flee. 14. If we flee, we are pursued. 15. You flee badly (like cowards). 16. If you are idle, you are blamed. 17. If you fight bravely, you are admired. 18. If they flatter, they are not true. 19. It is not well to flee. 20. It is well to fight bravely. 21. If thou art pursued, do not flee. 22. Fight bravely. 23. If they are idle, they are blamed. 24. If thou speakest the truth, thou art believed. 25. Always excel. 26. Eat and drink, and play, moderately.

Exercise 2.—English-Greek.

1. Αληθευω. 2. Αληθευεις. 3. Αληθευει. 4. Αληθευομεν. 5. Αληθευετε. 6. Αληθευουσι. 7. Ει αληθευω πιστευομαι. 8. Μη μαχεσθε. 9. Μαχονται. 10. Ἑπεσθε. 11. Ἑπῃ. 12. Ἑπεσθε. 13. Παιζει. 14. Φευγουσι. 15. Ει φευγουσι διωκονται. 16. Θαυμαζομαι. 17. Θαυμαζονται. 18. Ει βλακευουσιν ου θαυμαζονται. 19. Ευ εχει ανδρειως μαχεσθαι. 20. Μετριως εσθιε και πινε. 21. Ου σπευδουσι. 22. Ει κολακευεις ου θαυμαζῃ. 23. Καλως γραφει. 24. Γραφουσ. κακως. 25. Ευ εχει αει αριστευειν. 26. Μετριως βιοτευετε. 27. Αγαν εσθιουσι.

LESSONS IN SHORTHAND.—XII.

191. The following statement of the advantages which a knowledge of Phonography confers on the writer, will be found written, or rather engraved, in shorthand in Mr Pitman's "Manual of Phonography." The only way in which we could exhibit it here would be by having the characters engraved on wood, or metal, in relief, like the specimens of Phonography which we exhibited in Lessons VI. and VII. As this style of printing does not represent Phonography to advantage, nor even fairly,—for Phonography when well written is eminently beautiful, graceful, and flowing,—we must refer the reader to Mr Pitman's book, or to a page of one of the many phonographic periodicals, for a pattern that he may safely imitate in his writing. We can thoroughly recommend Mr. Pitman's book.

ADVANTAGES OF SHORTHAND.

192. The advantage of a practical acquaintance with the stenographic art, to individuals in all situations of life, but more particularly to literary men, is strikingly shown in the career of some who have, for a course of years, used the "winged words" of stenography, either in reporting for the press, or in their ordinary writing, and who have thereby attained a mental elevation far beyond what would have been possible in any other circumstances. Edmund Burke, Judge Talfourd, Charles Dickens, and many other eminent writers, may be fairly considered as having been indebted to their engagements with the periodical press as reporters, in early life, for no inconsiderable portion of their distinction in the literary world. It may, perhaps, not be inappropriate to observe that Phonography, with all the intellectual and social benefits that follow in its train, has resulted from the seemingly trifling circumstance that the author, at the age of seventeen, learned Taylor's system of shorthand from Harding's edition, and that he was incited to the study chiefly by the perusal of the following eloquent enumeration of some of the advantages arising from the practice of the art, from the pen of Mr. Gawtress, the publisher of an improved edition of Byrom's system:—

"Shorthand is capable of imparting so many advantages to persons in almost every situation of life, and is of such extensive utility to society, that it is justly a matter of surprise that it has not attracted a greater share of attention, and been more generally practised.

"In England, at least, this art may be considered a National Blessing, and thousands who look with the utmost indifference upon it, are daily reaping the fruits of its cultivation. It is scarcely necessary to mention how indispensable it is in taking minutes of public proceedings. If all the feelings of a patriot glow in our bosoms on a perusal of those eloquent speeches which are delivered in the Senate, or in those public assemblies where the people are frequently convened to exercise the birthright of Britons—we owe it to shorthand. If new fervor be added to our devotion, and an additional stimulus be imparted to our exertions as Christians, by the eloquent appeals and encouraging statements made at the anniversaries of our various religious Societies—we owe it to shorthand. If we have an opportunity, in interesting judicial cases, of examining the evidence, and learning the proceedings with as much certainty, and nearly as much minuteness, as if we had been present on the occasion—we owe it to shorthand. In short, all those brilliant and spirit-stirring effusions which the circumstances of the present times combine to draw forth, and which the press transmits to us with such astonishing celerity, warm from the lips and instinct with the soul of the speaker, would have been entirely lost to posterity, and comparatively little known to ourselves, had it not been for the facilities afforded to their preservation by shorthand. Were the operations of those who are professionally engaged in exercising this art, to be suspended but for a single week, a blank would be left in the political and judicial history of our country, an impulse would be wanting to the public mind, and the nation would be taught to feel and acknowledge the important purposes it answers in the great business of life.

"A practical acquaintance with this art is highly favorable to the improvement of the mind, invigorating all its faculties, and drawing forth all its resources. The close attention requisite in following the voice of the speaker, induces habits of patience, perseverance, and watchfulness, which will gradually extend themselves to other pursuits and avocations, and at length inure the writer to exercise them on every occasion in life. When writing in public, it will also be absolutely necessary to distinguish and adhere to the train of thought which runs through the discourse, and to observe the modes of its connection. This will naturally have a tendency to endue the mind with quickness of apprehension, and will impart an habitual readiness and distinctness of perception, as well as a methodical simplicity of arrangement, which cannot fail to conduce greatly to mental superiority. The judgment will be strengthened, and the taste refined; and the practitioner will, by degrees, become habituated to seize the original and leading parts of a discourse or harangue, and to reject whatever is common-place, trivial, or uninteresting.

"The *memory* is also improved by the practice of stenography. The obligation the writer is under to retain in his mind the last sentence of the speaker, at the same time that he is carefully attending to the following one, must be highly beneficial to that faculty, which, more than any other, owes its improvement to exercise. And so much are the powers of retention strengthened and expanded by this exertion, that a practical stenographer will frequently recollect more without writing, than a person unacquainted with the art could copy in the time by the use of common-hand.

"It has been justly observed, 'this science draws out all the powers of the mind;—it excites invention, improves the ingenuity, matures the judgment, and endows the retentive faculty with the superior advantages of precision, vigilance, and perseverance.'

"The *facility it affords to the acquisition of learning* ought to render it an indispensable branch in the education of youth. To be enabled to treasure up for future study the substance of lectures, sermons, etc., is an accomplishment attended with so many evident advantages that it stands in no need of recommendation. Nor is it a matter of small importance, that by this art the youthful student is furnished with an easy means of making a number of valuable extracts in the moments of leisure, and of thus laying up a stock of knowledge for his future occasions. The pursuit of this art materially contributes to improve the student in the principles of grammar and composition. While tracing the various forms of expression by which the same sentiment can be conveyed; and while endeavoring to represent, by modes of contraction, the dependence of one word upon another, he is insensibly initiated in the science of universal language, and particularly in the knowledge of his native tongue.

"The rapidity with which it enables a person to commit his own thoughts to the safety of manuscript, also renders it an object peculiarly worthy of regard. By this means many ideas which daily strike us may be snatched from destruction, and preserved till mature deliberation can ripen and perfect them.

"In addition to these great advantages, Science and Religion are indebted to this inestimable art for the preservation of many valuable lectures and sermons, which would otherwise have been irrecoverably lost. Among the latter may be instanced those of Whitfield, whose astonishing powers could move even infidelity itself, and extort admiration from a Chesterfield and a Hume, but whose name would have floated down the stream of time, had not Shorthand rescued a portion of his labours from oblivion. With so many vouchers for the truth of the remark, we can have no hesitation in stating that since the invention of printing, no cause has contributed more to the diffusion of knowledge, and the progress of refinement, we might also add, to the triumphs of liberty and the interests of religion, than the revival and improvement of this long-neglected art.

"Such are the blessings which Shorthand bestows indiscriminately on the world at large. But it has additional and peculiar favours in store for those who are so far convinced of its utility as personally to engage in its pursuit. The advantages resulting from the exercise of this art, are not, as is the case with many others, confined to a particular class of society; for though it may seem more immediately calculated for those whose business it is to record the eloquence of public men, and the proceedings of popular assemblies; yet it offers its assistance to persons of every rank and station in life—to the man of business as well as the man of science—for the purpose of private convenience as well as of general information."

Dr. Johnson says, "Shorthand, on account of its great and general utility, merits a much higher rank among the arts and sciences than is generally allotted to it. Its usefulness is not confined to any particular science, but is universal: it is therefore by no means unworthy the attention and study of men of genius and erudition."

HISTORY OF SHORTHAND.

193. There are three principal epochs in the improvement and dissemination of the art of Shorthand in modern times, ending respectively at the publication of the matured systems of Mason (1682), of Taylor (1786), and of the first edition of Phonography (1837); and each may be assigned to some specific cause, or peculiar feature of the time. The Shorthand of the Romans, as practised by Tiro, (the freedman of Cicero), Ennius, and others, was an abbreviated longhand, both as to the forms of the letters, and the orthography.

194. In the 16th and 17th centuries, the principles of the Reformation were extensively promulgated in this country from the pulpit. A desire to preserve for future private reading the discourses of the principal preachers of that day, led to the cultivation of the newly invented art of shorthand writing. Teachers and systems increased rapidly; and by a comparison of one mode with another, and by experimenting with various series of alphabetical signs, Mason, at length, produced a system far superior to any that had preceded it. The progress of the art, from the publication in 1588 of Bright's system of arbitrary characters for words (or rather from the publication of the first shorthand alphabet by John Willis, in 1602), to the appearance of Mason's system in 1682, may therefore be considered as resulting from the dawn of religious freedom. Mason's system was published by Thomas Gurney, in 1751, and it is used by members of his family, as reporters to the Government, to the present time.

195. No other marked advance was made till the middle of the next century. "It is singular," observes Mr. Bradley, in his shorthand treatise, "that although Stenography was introduced into this country at a very early period, yet that our forefathers should never, until a very recent date, have thought of adapting it to that which is now its primary, although by no means its only, use—we mean the transcript of addresses delivered to the public, or in which the community at large are interested. The example of Cicero ought to have incited them to this pursuit, even had not the obvious nature of the art done so. However, the use to which it has been since so successfully applied, seems not to have been considered by them; for, up to 1780, public proceedings, or rather miserably abridged sketches of them, were taken down in the ordinary writing for the London journals. Dr Johnson was one of the earliest reporters of the debates in Parliament, and the Doctor boasted that he took care the Whig dogs should not have the best of the argument—a course which he could well adopt; for, instead of *reporting* the speeches of noble lords and honourable members, he *composed* them; and it is recorded that he made them all speak in the same pompous and grammatical style in which he was himself accustomed to write. In 1780, Mr. Perry, then proprietor of the *Morning Chronicle*, organised a corps of reporters. From that time Stenography was studied for professional purposes, and though there are some reporters on the daily papers who even yet use condensed longhand, the majority practise the equally simple and far more expeditious system of Shorthand." The publication of the parliamentary debates caused a demand for reporters, and for a system equal to their wants. Mason's, adopted by Gurney, was found insufficient. Its lengthy outlines could not be traced fast enough to enable the reporter to keep pace with the flow of eloquence that he often had to record; and the numerous arbitrary signs, and contractions of words, were too cumbersome for the memory. Byrom's system (privately taught by himself for several years) was made public in 1767, soon after his death. It was much practised in private circles, but was not brief enough for the reporter. Mavor's appeared in 1780, and Taylor's in 1786. These two valuable systems, with many others far inferior, were the fruits of this increased demand for the means of reporting the proceedings of the legislature, and their appearance marks the close of the second epoch, and the dawn of political freedom.

196. The practice of shorthand writing having been found so favourable to the development of the mental powers of those who used it (as shown, first, in reporting the sermons of the Reformers, and then in taking down the discussions of our legislative assemblies); and the experience of above two hundred years having proved the utility of the art; and, by the establishment of cheap schools, the ability to read and write having been acquired by nearly all who were able to afford the expense of learning these arts through the medium of the old alphabet;—a somewhat extensive desire was shown, chiefly by young persons, to add to their other means of acquiring knowledge the use of shorthand writing. Treatises on the art had hitherto been sold at high prices, seldom at less than half-a-guinea, and were thus beyond the reach of many who were desirous of learning. To meet this want, William Harding, a bookseller in Paternoster Row, published, in 1823, a neat edition of Taylor's system, with some slight improvements, at the reduced price of 3s. 6d. The book sold extensively, and in a few years other booksellers supplied, at a much cheaper rate, not only Taylor, but also Byrom and Mavor. The last publication of Taylor's shorthand was by Odell. An attempt to improve upon Taylor's system, by marking the long and short sounds of the vowels, with the intention of issuing a cheap edition for general use in National and British schools, led the writer of this sketch of the history of the art to the invention of Phonography. This occurred in 1837. Phonography is, however, so different in all its details from Taylor's system, that its origin could never be discovered from the work itself. Founded, as it is, on the "alphabet of nature," and already extensively practised throughout Great Britain and the United States of America, its publication may, perhaps, without presumption, be called the third epoch in the development of the art of Shorthand. The immediate cause of the present extended practice of this kind of writing, was the diffusion of knowledge among the middle classes of society. It has yet to be extended to the lowest classes, and this will be the mission of Phonography combined with Phonetic Printing.

197. That Phonography is likely to fulfil this mission, may be inferred from one or two characteristics which distinguish it from all other systems of Shorthand. The first is, that it is founded on a strictly phonetic analysis of the English language, and may, consequently, be used with facility by those who are unable to spell in accordance with the usual unsystematic orthography. The second is, that Phonography is not adapted to the wants of the reporter alone, but is especially well suited for letter-writing and general composition, as it may be written in a form as legible in every respect as common longhand, with, at the lowest computation, one-sixth of the trouble; that is, in one-third of the time, and with half the fatigue. The existence of two distinct styles of Phonography, one adapted for letter-writing, and the other for reporting,—the second being only an extension of the first, and not a new system in itself,—is the basis of the popularity of Phonetic Shorthand. The consequences of these happy arrangements are, that letter-writing is extensively cultivated among phonographers, and that a nearer approach to the introduction of one uniform system of shorthand writing,—which all disciples of the art have looked upon as likely to be productive of such great benefits,—has already been made in the short period that Phonography has been before the world, than was made in the two hundred years during which Shorthand was previously employed in England. That these effects will continue and increase, there is every reason to believe, on account of the uniformly increasing demand for phono-

on the under side of the animal. The so-called eyes would be at the ends of the rays, the madreporic plate being the only element left near its original position. This arrangement is exactly that found in the star-fish, or asterias.

The asterias, however, presents many points of dissimilarity from the echinus, especially in relation to its alimentary canal. Canal it is not in the proper sense, for it has only one opening, through which the food is both received and ejected. Ten organs —two lying in each ray—empty themselves into the sides of the stomach, but whether these are only radial extensions of the stomach, or represent a liver, is a matter of speculation. The most singular thing is, that the star-fish, although so nearly allied to the echinus, presents not a trace of the singularly complicated apparatus of jaws and teeth, which we have described, as found in the latter animal. We have described the sea-urchin, because it is the typical animal of the class, and therefore occupies a central position in this arrangement of orders. Above the echini come the sea-cucumbers, which resemble the echini in having avenues of tubular feet to walk with, but differ from them in having soft elongated muscular integuments, by the contractions of which they move. Sometimes the avenues of suckers in these animals are all brought together to one side, on which the creature crawls. We have thus an approach to the two-sided arrangement found in the snail. These animals have a curious system for effecting the function of respiration. This is not done by exposing the juices of the body to the influence of the oxygen of the water by protrusions of their membranes externally, but the water is forced into two organs which run up into the body, and which are so branched as to be called the respiratory trees. The water is forced into the branches of these trees by means of a muscular bulb at the end of the alimentary canal, into which the sea-water is received from behind by a wide opening, and then injected into the organs. This arrangement is the aquatic representative of the tracheal system in insects. In a yet higher order the tubular feet entirely disappear, and the body is constructed at intervals so as to form rings, and this, combined with the worm-like motion of the animal, suggests that it is a connecting link between the echinoderms and the annelids.

We have no space left to dwell upon the nervous system of these animals, or on the curious development of many of them from larval forms quite unlike in shape from the mature animals, and which forms, contrary to what we might have expected, present a perfect two-sided symmetry.

The orders into which the class is divided, and which we have cursorily described, are thus named :—

1. Crinoideæ = stone-lilies.	4. Echinidæ = sea-urchins.
2. Ophiuridæ = brittle-stars.	5. Holothuridæ = sea-cucumbers.
3. Asteriadæ = star-fish.	6. Sipunculidæ.

HISTORIC SKETCHES.—XX.

CHARLES EDWARD STUART AND THE REBELLION OF 1745.

It is difficult to realise the idea of disloyalty in Scotland to the royal family of Great Britain, and still more difficult to realise the idea of a claimant to the crown finding favour in any part of the kingdom. Happily, the time has long since gone by when a disputed succession, and the numerous disorders to which it gave rise, compelled the people of these kingdoms not only to realise such ideas, but to feel the effect of realisation every day of their lives. The time has gone by—let us hope, never to return—and we find it hard to recall, with any distinctness, so much as the memory of it. Yet there are many now living whose grandfathers might have fought at Culloden, might have been in the squadron which brought Charles Edward Stuart to Lochaber, or have been among the spectators when the heads of Lord Lovat, Lord Balmerino, and Lord Kilmarnock fell on the scaffold for the part they had had in armed rebellion against the Government.

England has suffered pretty severely at one time and another from disputed successions. The three immediate successors of William the Conqueror, including two of his own sons, were usurpers, and maintained their position, more or less, by the strong hand. Richard II. was deposed and supplanted by a prince of the House of Lancaster, whose bad title to the crown in presence of heirs of the House of York was the fruitful source of long and bitter trouble to England, which was not ended till the completion of those matrimonial alliances which were made after the Battle of Bosworth Field by Henry VII., in whose reign two cheats succeeded only too well in disturbing the peace of the country, which was not again broken by pretenders to the throne till after the death of Edward VI., when Lady Jane Grey asserted, through her husband and father-in-law, the right to be Queen of England which the late king had given her by his will. This claim having been drowned in the blood of those who advanced it, no other question arose about the right to reign till the few adherents of Lady Arabella Stuart ventured to put forward her title in bar of James I.'s succession. But this claim was almost bloodlessly set aside, and the land had peace from the like of it till those circumstances presented themselves which induced the English nation to drive away from their throne the line of Stuart princes who had proved themselves so unworthy to fill it. Those circumstances, and the last public events to which they gave rise, will be the subject of the present historic sketch.

Whatever wrong had been done by the English nation to Charles I. (the nation, be it remembered, had only striven to bind him to his duty by constitutional means; it was Cromwell, with the army, who put him to death), had been amply compensated by its restoration of Charles II. That prince, by his consummate indifference to the national honour, by his reckless extravagance, his inordinate self-indulgence, and the contemptible condition to which he reduced the nation that a few years before had been second to none in Europe, almost convinced the people of the impossibility of allowing the Stuarts to remain on the throne; but it was reserved to his brother, James II., to convince them thoroughly, and to compel them to act upon their convictions.

James II., who had come to the throne with strong prejudices against him in the popular mind, proceeded to set those prejudices at defiance, and to conduct himself according to those maxims of government which had proved fatal to his father—the maxims which looked upon the kingdom as the private property of the king, held by an indefeasible right from God himself, and in the administration of which he had but to consult his own fancies. He had no notion of an obligation binding upon him as king, correlative with the allegiance which he demanded of the people; and the people, who had never before the advent of the house of Stuart seen such a flagrant disregard of this moral obligation in their kings, were compelled to change the moral obligation into a legal one before they admitted another king to reign over them. James ran counter to the national wish, and through the declaration he had voluntarily made, in restoring the State use of the Roman Catholic religion, his popularity suffered mortally in the matter of the Duke of Monmouth's rebellion (see Vol. II., p. 85); while his despotic encroachments upon the liberties of the Church of England, and his assumption of independence on the national will as represented by Parliament, completed the measure of the national wrath. The leaders of parties in England treated secretly with the king's son-in-law, William of Orange, who agreed to come over and help them.

William issued a proclamation containing an elaborate account of all the illegal acts done by the king, declared that he should bring with him only such a force as he deemed necessary to guard him against the king's evil counsellors, and that his sole object in coming was to restore the rights and liberties of the country by means of a free Parliament, and to inquire duly into the claims of the Prince of Wales to be what he was represented to be—the king's son. For a rumour had got about that the heir-apparent was a changeling, or, at all events, not the son of the king and queen. The rumour sprang, no doubt, from the ready malice of the king's many enemies; and there is every reason to believe, at this distance of time, that it was entirely false and unfounded. Many, however, at that time accepted it as true, and gladly believed what they heartily wished for. There was a genuine doubt in the mind of the people whether the Prince of Wales had any right to be so called, still more whether he had any prospective right to the nation's allegiance as their lawful sovereign. This doubt William declared, in his manifesto, he would clear up.

On the 5th of November, 1688, William landed at Brixham, in Torbay, with his small army of Dutch troops, and marched to Exeter, where, after a short delay, for the people remembered the

Bloody Assize, he was joined by most of the West-country gentlemen. James got as far as Salisbury with an army, when many of his officers and whole regiments of soldiers deserted to the prince, and then he withdrew to London. From London he fled, no one knew whither, on the defection of the ministers and the nobility becoming general. Lord Halifax, with some other peers and public men, formed a provisional government, and the Prince of Orange was invited to come to town. Suddenly the king reappeared in London, having been detected when about to escape at Faversham, in Kent; but finding, after a few day's sojourn, that the glory had really departed from him, he stole away again, on the 23rd of December, and made his way to the French king at St. Germain's, whither his queen and son had preceded him. The Prince of Orange took possession of London, and a Convention, or monster Parliament, summoned specially for the occasion, asked him to be King of England. It had previously been resolved by both Houses, after long and anxious deliberation and discussion, "That King James II., having endeavoured to subvert the constitution of the kingdom, *by breaking the original contract between king and people*, and having, by the advice of Jesuits and other wicked persons, violated the fundamental laws, and withdrawn himself out of the kingdom, has abdicated the government, and that the throne is thereby vacant." The Bill of Rights, to which the sworn assent of the new king and queen was required, contained a list of those rights which had been most frequently invaded of late years; and it remains to this day one of the strongest bulwarks of the free English constitution.

James II. never made any attempt, after his overthrow at the Boyne, to regain the crown; but he did all he could to foment the disorders which cropped up in England, and he procured his son, the Prince of Wales, to be recognised by the French king and some other Continental princes, as his successor to the English throne; and when he died, in 1700, that son was recognised and treated as a king. The English nation had formally taken away from this prince the right to succeed, and had limited the succession to members of the House of Hanover, failing the continuance of heirs of William and Mary and Anne. They had conferred a Parliamentary title upon the new line, and rudely shaken "the right divine of kings to govern wrong"—a right which the House of Stuart put forward. It was quite natural that they should put forward what they reckoned to be an indefeasable right. A Parliamentary title was a new commodity in English politics; for though Henry IV. had reigned by virtue of one, it had not been able to stand abidingly against the claim derived from birth, and had to be sustained in the end by a marriage union with the claimant by descent. Many people disbelieved in the power of the nation to decide who should be its king; many were attached to the old order of things, and therefore to the old line of princes; many more were disgusted with the new order of things; and some, especially in Scotland, were animated by sentiments of personal loyalty, the whole making up a large though disconnected following, upon whom the exiled house of Stuart might reasonably rely for assistance when called upon to give it. It was no small matter to exchange the royal state and dignity of Great Britain for the position of a dependant on the bounty of a foreign prince, and quietly to step from the throne of a long line of kings to take the part of a private gentleman. Then there was a feeling of revenge, however carefully kept out of sight, which urged the exiles to special exertion; a desire to pay off old scores, at least to a few, and to be in a position to humble those who had hit them when they were down. There was also the insult as to the birth of King James's son to be wiped out in some signal way. All these motives stirred the hearts of the banished, and they were aided, at least in the case of Prince Charles Edward, by a personal courage which won for him the admiration of foreigners, and even of many of his quondam subjects.

James II., as has been said, never made any attempt to regain his throne. He contented himself, in return for the annual pension of £2,800 which he received secretly from his daughter Mary, with plotting against the life of his son-in-law, her husband. His son, however, whose origin was questioned—the Old Pretender, as he was called—did once, in 1715, make an effort, such as it was, to "enjoy his own again." It was said that Queen Anne had, for some time before her death, been anxious for the restoration of her father's son to the throne. It is certain a large number of the English, including some of the leading statesmen, were in favour of such a plan; and it is said that arrangements were actually made for putting the prince in military possession of the capital at the moment of his sister's decease. William and Mary had died childless; Anne, who was appointed their successor by Act of Parliament, had survived her children, and the nation saw about to happen that which it certainly had contemplated as possible, though it had hardly supposed it probable—the advent of a purely un-English prince to the throne, one utterly as untried as the Pretender himself, without English proclivities, English ideas, without so much as a knowledge of the English language. There were very many who were willing to set aside the Act of Settlement by which the House of Hanover was appointed to succeed, and to try a prince of the old line, who, having been schooled in adversity, they thought would be the less likely (they forgot the precedent set by Charles II.) to kick over the traces. Only by the prompt and energetic action of the leading Whig statesmen was the plot to shut out the House of Hanover frustrated on the death of Queen Anne; but so confident were the intimate advisers of the exiled prince in the efficacy and soundness of the Jacobite fervour, that when the dream they had indulged in was rudely broken, and George I. quietly, and for that matter deliberately, ascended the throne, they insisted that the prince had but to show himself to kindle the enthusiasm of his followers into a flame. The King of France (Louis XIV.) was appealed to for help. His vanity was flattered, and his political instincts were touched with the notion of creating a diversion in England, and of being able to claim friendship from the future king by having placed him on the throne. All that was wanted from him was a vessel, a few officers, and a little money.

A vessel was granted, the officers were granted, but Louis had not the money to lend. He wrote, however, to his grandson, the King of Spain, who lent 400,000 crowns to further the enterprise. With one ship, with a few officers, and with the Spanish king's money, the Pretender sailed, reached the coast of Scotland, disembarked, was warmly welcomed by a considerable party, and was defeated by the English army King George sent against him. He escaped back to France, his adherents were captured and put to death, and the hopes of the Jacobites were for a time destroyed. This was in 1715.

For thirty years there was a cessation in the activity of the Stuarts and their friends. The "Young Pretender," as he was called, the grandson of James II., grew up in banishment, and learned those principles which are always advocated by the desperate, who are ever the companions of exiled princes. He learned that it was the one object of his life, the reason almost for his existence, that he should seek to recover by fair means or foul the throne which had belonged to his fathers. The French people had grown indifferent to the king-errant, who never tried to win his own. The French king was deterred by political considerations from even countenancing his presence, and it behoved the Young Pretender, if he wished not to lose himself utterly, to make an attempt after so long an interval as thirty years. It was also represented to him by those who should have known, that the opportunity was a favourable one for an invasion, that the clans were ready to rise as soon as ever he appeared, and that the old feeling against the House of Hanover, and in favour of "the king over the water," had increased with the lapse of time.

So it was that at length on the 12th of June, 1745, Charles Edward Stuart embarked on board a private vessel of eighteen guns, with seven of his own friends, 1,800 sabres, 1,200 muskets, and £1,920 in French money. These, besides the crew of the vessel, who were only enough to work her, constituted the sum total of the means upon which the prince relied for an invasion of Great Britain. Soon after leaving port he was joined by a French man-of-war of sixty-four guns, which had been hired of the French Government, according to the custom of the time, by a merchant of Dunkirk. This vessel was totally disabled by a British ship which fell in with her, and only by good fortune escaped capture. Charles Edward went on his way, and in a few days arrived off the Scotch coast. He landed, disembarked his arms, swords, and money, and then sent his vessel back to the Continent to apprise the French and Spanish kings of his doings.

graphic books. On these grounds Phonography may, in some respects, be said to afford the writer facilities of the same nature as those which the invention of printing opened out to the reader.*

PHONETIC PRINTING.

198. Closely allied with Phonography, as a mode of representing the English language *as it is pronounced*, by a series of shorthand characters, is a corresponding system of printing, called Phonotypy, the alphabet of which answers to the simple shorthand alphabet, letter by letter. The order of the letters in the Phonotypic Alphabet is as follows:—

p b, t d, ç j, k g; f v, ϑ ð, s z, ʃ ʒ; m, n, ŋ; l, r; w, y; h.

a ɑ, e ɛ, i i; o o, ɒ ɔ, u ɯ: j, ɤ, ɥ.

The Roman, Italic, and Script forms of the sixteen new letters are:—

Ç ç, Ŋ ŋ, Ð ð, Θ ϑ, Ʃ ʃ, Ʒ ʒ, Ɣ ɣ.

Ç ç, Ŋ ŋ, Ð ð, Θ ϑ, Ʃ ʃ, Ʒ ʒ, Ɣ ɣ.

𝒞 𝒸, 𝒩 𝓃, 𝒟 𝒹, 𝒯 𝓉, 𝒮 𝓈, 𝒵 𝓏, 𝒴 𝓎.

Ą ɑ, Ɛ ɛ, Ł i; Ǫ o, Ɔ ɔ, Ų ɯ; Ų ɒ: ɟ j, Ɣ ɤ, Ų ɥ.

Ą ɑ, Ɛ ɛ, Ł i; Ǫ o, Ɔ ɔ, Ų ɯ; Ų ɒ: ɟ j, Ɣ ɤ, Ų ɥ.

𝒜 𝒶, ℰ ℯ, ℒ ℓ, 𝒪 𝑜, 𝒰 𝓊, 𝒱 𝓋, 𝒥 𝒿, 𝒴 𝓎, 𝒰 𝓊.

199. This alphabet has been employed in the Exercises given in this course of Shorthand Lessons, to aid the pupil in writing shorthand. It now only remains for us to give a specimen of Phonotypy, or the style of printing in which the pronunciation of the language is represented to the eye, and a concluding sketch of Phonographic literature, and we shall then have finished our course of Shorthand Lessons. We select for our present subject the Constitution of the Phonetic Society, as bearing immediately upon the subject of this series of Lessons. The title of the Society is "The Phonetic Society for the promotion of a Reading, Writing, and Spelling Reform." It was established 1st March, 1843, by Mr. Isaac Pitman, Bath, who acted as Secretary. The President of the Society was Sir Walter C. Trevelyan, Wallington, near Newcastle-on-Tyne.

ðE FƟNETIK SƟSIETI.

Objekts ov ðe Sɔsjeti.—1. Tu ekstend ðe art ov Fɔnografi, or Fɔnetik Ɔorthand, bj fri tiçiŋ ðru ðe pɔst, and pɒderwjz, and tu promɔt ðe intelektyal improɯvment ov ðe memberz ov ðe Sɔsjeti.

2. Tu introdɥs an improɯvd meɬod ov tiçiŋ tu rid buks printed in de prezent alfabet, bj a kɔrs ov instrukʃon in fɔnetik ridiŋ.

3. Tu reform ðe orɔografi ov ðe Iŋgliʃ laŋgwej, bj de ɥs, in ritiŋ and printiŋ, ov a Fɔnetik Alfabet ðat kontenz a leter for içdistinkt sɔnd in de laŋgwej.

Klasez ov Memberz.—*Klas* 1. Rjt Fɔnetik Ɔorthand, and engçj tu korekt ðe Eksersizez ov Stɥdents, ðru ðe pɔst, gratɥitɔsli.

Klas 2. Rjt Fɔnetik Ɔorthand, bɒt dɯ not korekt Eksersizez ðru ðe pɔst.

Klas 3. Lernerz ov Fɔnografi.

Klas 4. Memberz hu apruv ov ðe Objekts ov ðe Sɔsjeti, bɒt dɯ not rjt Fɔnetik Ɔorthand.

Sɒbskripʃon.—Entrans fi, 6*d*. Anɥal sɒbskripʃon, not les ðan 6*d*., peabel 1st Janɥari, or at eni tim ðɥriŋ ðe monθ. A blaŋk form ov aplikeʃon for memberʃip me bi obtend from ðe Sekretari bj forwardiŋ a pɔstej stamp.

Direkʃonz for preperiŋ Ɔorthand Eksersizez.—Rjt in Fɔnografi, on ɹuld peper, a fɥ versez ov Skriptɥr, or a ʃort ekstrakt from a nɥzpeper, liviŋ everi alternet lin for korekʃonz and remarks, and send ðe Eksersiz (wid ðe printed slip ov ðe nɥzpeper, if sɔ bi emploid) tu eni member in ðe printed List, in Klas 1, enklɔziŋ an envelɔp, stampt and adrest, for its retɔrn.

Fɔnograferz, and ɔl hu apruv ov eni ov ðe Objekts ov ðe Sɔsjeti, ar respektfuli rekwested tu join wɒn ov its Klasez, and ðɔs tu asist in ekstendiŋ edɥkeʃon. Aplikeʃonz for memberʃip ʃud bi riten in Ɔorthand for ðe ferst tɯ Klasez. ðe nemz ov nɥ Memberz apir in ðe *Fɔnetik Jɔrnal*, pɒbliʃt wikli, priz 3*d*., and ar repited in an Anɥal List, pɒbliʃt 1st Març, priz 2*d*. Memberz hu kan rit 100 wɒrdz per minit ar distiŋgwiʃt bj ðe onorari mark (*) prifikst tu ðer nemz, wid an adiʃonal (*) for everi adiʃonal 50 wɒrdz.

200. Reader, *Practise and Persevere.*

* From Pitman's *History of Shorthand*, originally published in the *Phonotypic Journal* for 1847, and subsequently in a separate volume, in *Phonetic Shorthand*. Subsequent editions have been issued.

LESSONS IN ENGLISH.—XVI.

SUFFIXES (*continued*).

"THERE is nothing that will help more to form an English heart in ourselves and in others than the study of the English language. We could scarcely receive a single lesson on the growth of our English tongue, we could scarcely follow up one of its significant words, without having unawares a lesson in English history as well; without not merely falling on some curious fact illustrative of our national life, but learning also how the great heart which is beating at the centre of that life was gradually shaped and moulded. We should thus grow, too, in our feeling of connection with the past, of gratitude and reverence to it; we should estimate more truly, and therefore more highly, what it has done for us, all that it has bequeathed us, all that it has made ready to our hands. It was something for the children of Israel when they came into Canaan to enter upon the wells which they digged not, and vineyards which they had not planted, fields which they had not sowed, and houses which they had not built; but how much greater a boon, how much more glorious a prerogative, for any one generation to enter upon the inheritance of a language which other generations by their truth and toil have made already a receptacle of choicest treasures, a storehouse of so much unconscious wisdom, a fit organ for expressing the most subtle distinctions, the most tender sentiments, the largest thoughts, and the loftiest imaginations, which at any time the heart of man can conceive."†

Such is the opinion of one of the greatest authorities on this subject. We purposely insert them at the beginning of this lesson, in order that the reader may not be disposed to allow his energies to flag while pursuing the study of his native language, or be inclined to undervalue these lessons because they deal with individual words.

With this preliminary warning we continue the list of suffixes from our last lesson.

Ery, erie; compare together coop (*a barrel*), cooper, coopery; brew, brewer, brewery; smite, smith, smithy; and you see that the terminations *ery, ry*, or *y*, denote a place where a certain trade, etc., is carried on. Similar is the force of the ending *ary* and *ory*; as, aviary (Latin, avis, *a bird*), *a bird-room*; dormitory (Latin, dormio, *I sleep*), *a sleeping-room*; granary, *a place for grain*. Compare *ary*.

"I can look at him (a national tiger) with an easy curiosity, as a prisoner within bars, in the menagerie of the Tower."—*Burke, "Regicide Peace."*

Menagerie comes from the French *menage*, which is the origin of our *manage*, and both are from the Latin manu, *with the hand*, and ago, *I drive*, signifying *to tame, to keep in order*.

Es or *s* is a suffix by which is formed the third person singular or verbs, and the plural of nouns; as, I read, he reads; ship, ships; box, boxes. When an apostrophe precedes the *s*, as in man's, the genitive case is intended—*e.g.*, man's book; God's word.

Esque, a termination derived from the Latin *iscus*, through the Italian *esco*, and the French *esque*, is found in grotesque and picturesque. Grotesque means *distorted, unnatural*, and *heterogeneous*; from the strange and extravagant figures which were painted in the *grottos* or crypts of the ancient Romans.

"An hideous figure of their foes they drew,
Nor lines, nor looks, nor shades, nor colours true,
And this *grotesque* design exposed to public view."

Dryden.

Picturesque is *that which makes a picture*, or may enter into a picture.

"*Picturesque* properly means what is done in the style and with the spirit of a painter."—*Stewart, "Philosophical Essays."*

Ess, derived from the Latin *or*, the feminine of *or*; as adjutor, *a helper*; adjutrix, *a female helper*, converts masculine nouns into feminine—*e.g.*, abbot, abbess; actor, actress; prince, princess.

Est, a verbal suffix, forming the second person singular of the present tense; as read, readest. It finds corresponding termination in the *s* of the Latin, as legis, *thou readest*; and the *st* of the Saxon, as bærnst, *thou burnest*. This suffix is rapidly becoming obsolete, since the second person singular of the verb is

† Trench "On the Study of Words," pp. 25, 26.

now rarely used; and in the cases in which it is chiefly used—namely, by the poets, and by the Society of Friends—the *est* is for the most part dropped. Indeed, but for its constant employment in the public prayers of Christian churches, it would now probably be wholly out of use. Nor would the language suffer by its discontinuance; for, as the person is marked by the noun *thou*, there is no occasion for any inflection of the verb, and such inflection abates the euphony, and diminishes the adaptability of our verbs.

Et, as in turret (Latin, turris, *a tower*), is a diminutive, *a small tower*; coming to us from the Italian torretta.

"Now like a maiden queen she will behold,
From her high *turrets*, hourly suitors come;
The east with incense, and the west with gold,
Will stand like suppliants to receive her doom.

Dryden.

Eth, the old termination of the third person singular of the present tense of the English verb; as eateth, found in part in the Latin legit, and found in full in the Anglo-Saxon bærneth, *he burneth*.

"He that *goeth* forth and weepeth."—Ps. cxxvi. 6.

Ette, of French origin, is found in words taken from the French; as, coquette, etiquette. *Coquette* is, with us, applied to a female who employs her personal attractions to gain attention from males. In French there is the word coquet, *a male coquette*. Coquet seems to come from coq, *a cock*, a showy and uxorious animal; and accordingly, it signifies a man who resembles a cock in his attention to woman. By a natural step in the progress of language, the term was applied to females.

"*Coquet* and coy at once her air,
Both studied, though both seem neglected;
Careless she is with artful care,
Affecting to seem unaffected."—*Congreve.*

Etiquette is the same word as our *ticket*, and originally denoted the short inscriptions, or tickets, put on packages of goods to point out what they contained. But similar etiquettes or tickets were employed to declare certain observances required in a public assembly; and so the word came to signify *forms* and *formalities*, a strict regard to custom; and in general, social conventionalism, particularly in relation to deportment.

Eur, a French termination, from the Latin *or*: thus vendeur (a seller) is from the Latin venditor; proditeur, *a betrayer*, from the Latin proditor. It is similar in import to our ending *er*, and denotes an actor: for example, producteur, Fr. *a producer*. Of old many English words, now terminating in *or*, terminated in *eur*; as autheur for author. The termination is still retained in certain nouns denoting abstract qualities: for instance, grandeur (Latin, grandis, *great*); hauteur (French, haut, *high*), derived immediately from the French. The notion of the actor is retained in the French douceur (from the French doux, *sweet*), *a sweetener*; *a fee*, or *bribe*.

Ever, connected in origin with the Latin ævum, *age*; and the Greek αιων (i'-own), *age*, comes to us directly from the Anglo-Saxon æfre, and signifies *always*, an enduring reality, either in time past (Ps. xxv. 6; xc. 2), time present (Ps. cxix. 98), or time to come (Ps. cxi. 5). *Ever*, as a suffix, strengthens the word to which it is appended: thus, "whatever you do" has more force than "what you do." *Ever* is found in other compounds; for example, whoever, however, wherever, whenever. Additional force is given by the insertion of the particle *so*; as whosoever, whencesoever, whithersoever. This *so* used to stand where *ever* is now placed; as, whoso, howso, whatso.

"Her cursed tongue (full sharp and short)
Appeared like aspis' sting, that closely kills,
Or cruelly doth wound *whomso* she wills."
Spenser, "Faerie Queene."

Full, of Saxon origin, obviously the same as the adjective *full*, gives an instance of the origin of these particles in words which originally had a definite form and signification. According to its root-meaning, *full* (now in combination written *ful*) denotes a large portion of the quality indicated by the word to which it is affixed; as, hate, hateful; thank, thankful; grateful, delightful. *Full* has for its opposite *less*; for example, merciful, merciless. In the employment of words, you cannot follow analogy alone, but must consult authority: thus, you may say penniless, but you cannot say penniful; yet pitiful is as good as pitiless.

"How oft, my slice of pocket store consumed,
Still hungering, *pennyless*, and far from home,
I fed on scarlet hips and stony haws."—*Cowper, "Task."*

Fy is from the Latin facio, *I make*. *Facio*, in combination, becomes *ficio*, as in efficio. The *fi* in this word, written *fy*, is the particle under consideration. It is seen in fructify, literally, *to make fruit*; that is, *to make fruitful*.

"Calling drunkenness, good-fellowship; pride, comeliness; rage, valour; bribery, *gratification*."—*Bishop Morton.*

Head or *hood*, from the Saxon had, *head*, in composition, denotes the *essence* of any person or thing; its essential condition, viewed as a whole: thus, in Anglo-Saxon and English, manhad, *manhood*; wifhad, *wifehood*, or *womanhood*; cildhad, *childhood*; brotherhad, *brotherhood*; preosthad, *priesthood*.

"Canst thou, by reason, more of *godhead* know,
Than Plutarch, Seneca, or Cicero?"
Dryden, "Religio Laici."

Head is sometimes employed with a more direct reference to the meaning which it has in current use; as in wrong*head* and wrong*headed*, etc.

"Much do I suffer, much to keep in peace,
This jealous, waspish, *wrongheaded*, rhyming race."—*Pope.*

"Whether we [the Irish] can propose to thrive so long as we entertain a *wrongheaded* distrust of England."—*Bishop Berkeley.*

After a similar manner we use both *heart* and *head*, in faint*hearted*, light*hearted*, hot*headed*, light*headed*.

Ible, see *able*, formerly explained under *suffixes*.

Ic, ick, ich, have counterparts in the Latin termination *icus*, and the German *ich, isch*; as soporific*us* (Latin, sopor, *sleepiness*), soporific, rustic*us* (Latin, rus, *the country*), rustic, cildisc in Anglo-Saxon, childish in English; book*ish*.

"The sweet showers of heaven that fell into the sea are turned into its *brackish* taste."—*Bates.*

Ical, an adjective-ending, from the Latin *icalis*: for example, amic*alis*, amic*al* (friendly), grammatic*alis*, grammatic*al*; so critic*al* (Greek, κριτικ, pronounced kri'-tic, *I judge*), which passes into a noun by dropping *al*, as critic; so music*al*, music, mystic*al*, mystic.

"Fool, thou didst not understand
The *mystic* language of the eye nor hand."—*Donne.*

Ile, from the Latin adjective termination *ilis*, to be seen in docilis (Latin, doceo, *I teach*), *docile, teachable*; fragilis (Latin, frango, *I break*), *fragile, easily broken*. Some Latin adjectives in *ilis* are represented by adjectives in *ful* in our tongue, as utilis, use*ful*.

In, ine is from the Latin termination *inus*, which denotes sometimes a name, as Tarentine, an inhabitant of Tarentum, but in English more often a quality, as genuine, from the Latin genuinus, which is derived in its turn from genus, *a kind* or *race*—that is, that which possesses the qualities belonging to its kind, in opposition to spurious, which, in its Latin meaning, signifies a *bastard*.

"We use
No foreign gums, nor essence fetched from far,
No volatile spirits, nor compounds that are
Adulterate; but at Nature's cheap expence
With far more genuine sweets refresh the sense."—*Carew.*

Ing, in Anglo-Saxon, signifies son, as Edgar Athel*ing*; that is, *Edgar the son of Athel*, or *Edgar of noble blood*. In English, *ing* forms the ending of our active participles, as sing*ing*, from *to sing*; also a very large class of nouns; thus, sing*ing* itself may be employed as a noun, as *the singing was good*. These nouns, as might be expected from the meaning of the Saxon *ing*, denote existence; thus, to sing is a verb, but sing*ing* is the active of the verb in actual being. When these words in *ing* are used as nouns they should have the government of nouns; thus, *the singing of the birds was delightful*. Almost every English verb may be made into a noun by the suffix *ing*; to eat, the eat*ing*; to diminish, the diminish*ing*; to run, the runn*ing*. Observe that the idea of activity is connected with nouns ending in *ing*; as, the seeing; the hearing; the dancing; the report*ing*—that is, the act, the process of dancing, report*ing*, etc.—wherein those nouns differ from other nouns which express the result of an action; as *sight*, the result of the act of see*ing*; *report*, the result of the act of report*ing*. The former have been called active, the latter class passive nouns, from the analogy they bear to active and passive verbs.

LESSONS IN BOOKKEEPING.—XL

SUBSIDIARY BOOKS—CASH BOOK—BILL BOOK.

IN the present lesson in Bookkeeping we give our readers a continuation of the example of the method of keeping the CASH BOOK, one of the most necessary and important of the subsidiary books that are to be found in the offices of all mercantile men, whether they be wholesale merchants or retail traders. The learner should compare the entries in the Cash Book with cash entries in the *Memoranda of Transactions*.

CASH BOOK.

(2) DR. CASH ACCOUNT. CR. (2)

1881.		Receipts.	Bank Col.			Cash Col.			1881.		Payments.	Bank Col.			Cash Col.		
April	1	To Balance of Cash				1746	13	9	April	1	By Balance of Deposits	1735	0	0			
,,	13	,, Spencer and Co.				160	13	7	,,	14	,, East India Company				330	16	0
,,	14	,, London and Westminster Bank	180	0	0				,,	15	,, Petty Cash				20	0	0
,,	18	,, London and Westminster Bank	190	0	0				,,	18	,, Osmond and Co.				183	4	3
,,	24	,, London and Westminster Bank	290	0	0				,,	24	,, Bills Payable, No. 1				288	3	4
,,	25	,, London and Westminster Bank	330	0	0				,,	25	,, East India Company				330	16	0
,,	30	,, Balance of Deposits	745	0	0				,,	30	,, Private Account				9	0	0
									,,	,,	,, Balance of Cash				745	7	9
			£1735	0	0	1907	7	4				£1735	0	0	1907	7	4
May	1	To Balance of Cash				745	7	9	May	1	By Balance of Deposits	745	0	0			
,,	3	,, London and Westminster Bank	340	0	0				,,	3	,, Bills Payable, No. 2				327	5	0
,,	10	,, Bills Receivable, No. 4				190	10	6	,,	11	,, Petty Cash				10	0	0
,,	15	,, Bills Receivable, No. 2				120	10	0	,,	,,	,, London and Westminster Bank	180	0	0			
,,	20	,, London and Westminster Bank	210	0	0				,,	15	,, London and Westminster Bank	120	0	0			
,,	25	,, Bills Receivable, No. 3				102	19	10	,,	20	,, Perkins and Co., paid Stevenson and Co.				212	6	8
,,	,,	,, Bills Receivable, No. 8				217	18	10	,,	25	,, Interest, Discount on Bills				1	2	3
,,	,,	,, Bills Receivable, No. 9				300	0	0	,,	,,	,, Perkins and Co., paid Stewart and Co.				610	19	4
,,	27	,, Brown and Smith				97	8	0	,,	29	,, London and Westminster Bank	100	0	0			
,,	29	,, Bills Receivable, No. 7				100	0	0	,,	30	,, London and Westminster Bank	100	0	0			
,,	31	,, Balance of Deposits	695	0	0				,,	31	,, Balance of Cash				713	1	8
			£1245	0	0	1874	14	11				£1245	0	0	1874	14	11
June	1	To Balance of Cash				713	1	8	June	1	By Balance of Deposits	695	0	0			
,,	3	,, Bills Receivable, No. 5				36	0	10	,,	3	,, Bills Payable, No. 3				135	18	9
,,	,,	,, London and Westminster Bank	100	0	0				,,	5	,, Petty Cash				10	0	0
,,	6	,, Bills Receivable, No. 6				113	1	0	,,	6	,, London and Westminster Bank	100	0	0			
,,	7	,, Bills Receivable, No. 15				200	0	0	,,	7	,, London and Westminster Bank	200	0	0			
,,	10	,, Bills Receivable, No. 16				200	0	0	,,	10	,, London and Westminster Bank	200	0	0			
,,	12	,, Bills Receivable, No. 11				200	0	0	,,	12	,, London and Westminster Bank	200	0	0			
,,	15	,, Bills Receivable, No. 17				375	10	0	,,	15	,, Private Account				20	0	0
,,	16	,, Bills Receivable, No. 1				150	0	6	,,	,,	,, London and Westminster Bank	360	0	0			
,,	18	,, Bills Receivable, No. 10				37	0	8	,,	16	,, London and Westminster Bank	150	0	0			
,,	21	,, Bills Receivable, No. 12				41	5	2	,,	18	,, London and Westminster Bank	40	0	0			
,,	26	,, Bills Receivable, No. 13				100	0	0	,,	21	,, London and Westminster Bank	50	0	0			
,,	28	,, Bills Receivable, No. 18				47	16	0	,,	26	,, London and Westminster Bank	100	0	0			
,,	30	,, Bills Receivable, No. 14				199	17	2	,,	30	,, London and Westminster Bank	250	0	0			
,,	,,	,, Balance of Deposits	2245	0	0				,,	,,	,, Balance of Cash				2247	14	3
			£2345	0	0	2413	13	0				£2345	0	0	2413	13	0

The next of the subsidary books that demands the learner's notice is the BILL BOOK. *The following is the form of this book, which we have adopted, in order to give our students the simplest possible idea of the nature of such a book in business. The first part consists of the Bills Receivable Book, and the second part of the Bills Payable Book. A greater number of columns are frequently introduced into both books for the convenience of the merchant, and the accuracy which is required in many Bill transactions; but what we have given will be found sufficient for the learner at the outset, as more would tend only to confuse his mind, without imparting any real benefit. This book also includes the entries of all the Bill Transactions from January till June, as laid down in the Memoranda of Transactions given in Lessons VIII. and IX.*

BILL BOOK.

(1) BILLS RECEIVABLE BOOK. (1)

When Received.		Received from.	No.	Drawn upon.	When Due.		Amount. £	s.	d.	How disposed of.	When.	
1881.					1881.						1881.	
April	13	Allison and Co.	1	Allison and Co.	June	16	150	0	6	In cash	June	16
,,	25	Lloyd and Co.	2	Warwick and Co.	May	15	120	10	0	In cash	May	15
,,	,,	Ditto	3	Thiselton and Co.	,,	25	102	19	10	In cash	,,	25
,,	26	Thomas Jones	4	Parker and Co.	,,	11	190	10	6	In cash	May	10
,,	,,	Ditto	5	Baring and Co.	June	3	36	0	10	In cash	June	3
							£600	1	8			
May	6	Thomas Jones	6	Abrahams and Co.	June	6	113	1	0	In cash	June	6
,,	,,	Ditto	7	Welch and Co.	May	29	100	0	0	In cash	May	29
,,	9	Lloyd and Co.	8	Barclay and Co.	June	1	217	18	10	Discounted	May	25
,,	12	Thomas Jones	9	Lubbock and Co.	,,	16	300	0	0	Discounted	,,	,,
,,	,,	Ditto	10	Payne and Co.	,,	18	37	0	8	In cash	June	18
,,	14	Ditto	11	Smith and Co.	,,	12	200	0	0	In cash	June	12
,,	,,	Ditto	12	Baring and Co.	,,	21	41	5	2	In cash	,,	21
,,	15	Powell and Co.	13	Wagnall and Co.	,,	26	100	0	0	In cash	,,	26
,,	,,	Ditto	14	Margetson and Co.	,,	30	199	17	2	In cash	,,	30
,,	31	Perkins and Co.	15	Warner and Co.	,,	7	200	0	0	In cash	,,	7
,,	,,	Ditto	16	Russell and Co.	,,	10	200	0	0	In cash	,,	10
,,	,,	Ditto	17	Payne and Co.	,,	15	375	10	0	In cash	,,	15
,,	,,	Ditto	18	Alexander and Co.	,,	28	47	16	0	In cash	,,	28
							£2132	8	10			
June	11	Powell and Co.	19	Payne, Smith, and Co.	July	10	150	0	0			
,,	,,	Ditto	20	Lloyd and Co.	,,	20	158	5	0			
							£308	5	0			

(1) BILLS PAYABLE BOOK. (1)

When Accepted.		Drawn by.	No.	Payable to	When Due.		Amount. £	s.	d.	When Paid.	
1881.					1881.					1863.	
Jan.	21	Osmond and Co.	1	Their Order	April	24	288	3	4	April	24
,,	31	Andrews and Co.	2	Their Order	May	3	327	5	0	May	3
,,	,,	Ditto	3	Smith and Co.	June	3	135	18	9	June	3
							£751	7	1		
March	31	Baring, Smith, and Co.	4	Their Order	July	3	288	1	3		
April	11	Andrews and Co.	5	Ford and Co.	July	14	238	17	4		
,,	29	Ovington and Co.	6	Spicer and Co	Aug.	2	245	8	0		
							£484	5	4		

LESSONS IN DRAWING.—XVI.

FOREGROUNDS—HIGH LIGHTS—SETTING DRAWINGS, ETC.

In continuation of our remarks upon Foregrounds, we introduce in this lesson a group of dock-leaves. In the drawing, Fig. 108, we have shown how the principles we endeavoured to explain in the last lesson are to be carried out. The leaf in front represents in itself a summary of our observations. Notice the projecting part receiving the highest light; the dark cast shadow underneath being the strongest in the drawing. Notice, also, the cast shadow across the leaf (caused by the one on the left, which throws the under-leaf back, and brings out the one in light), commencing strongly near the high light, and gradually becoming

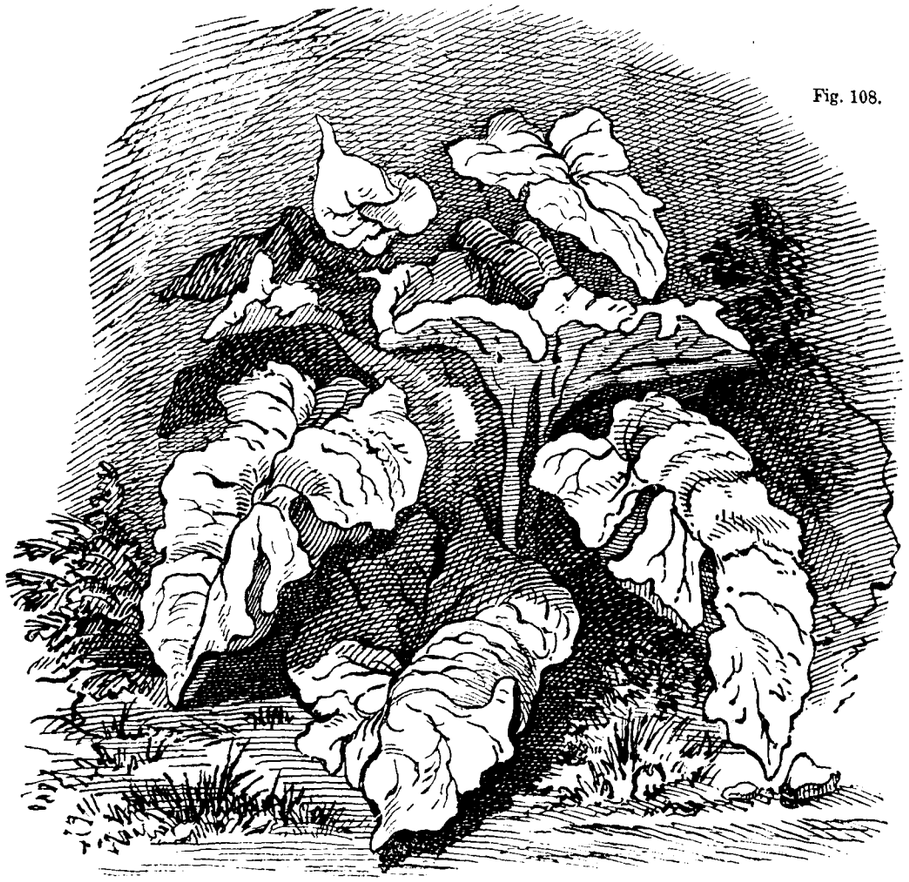
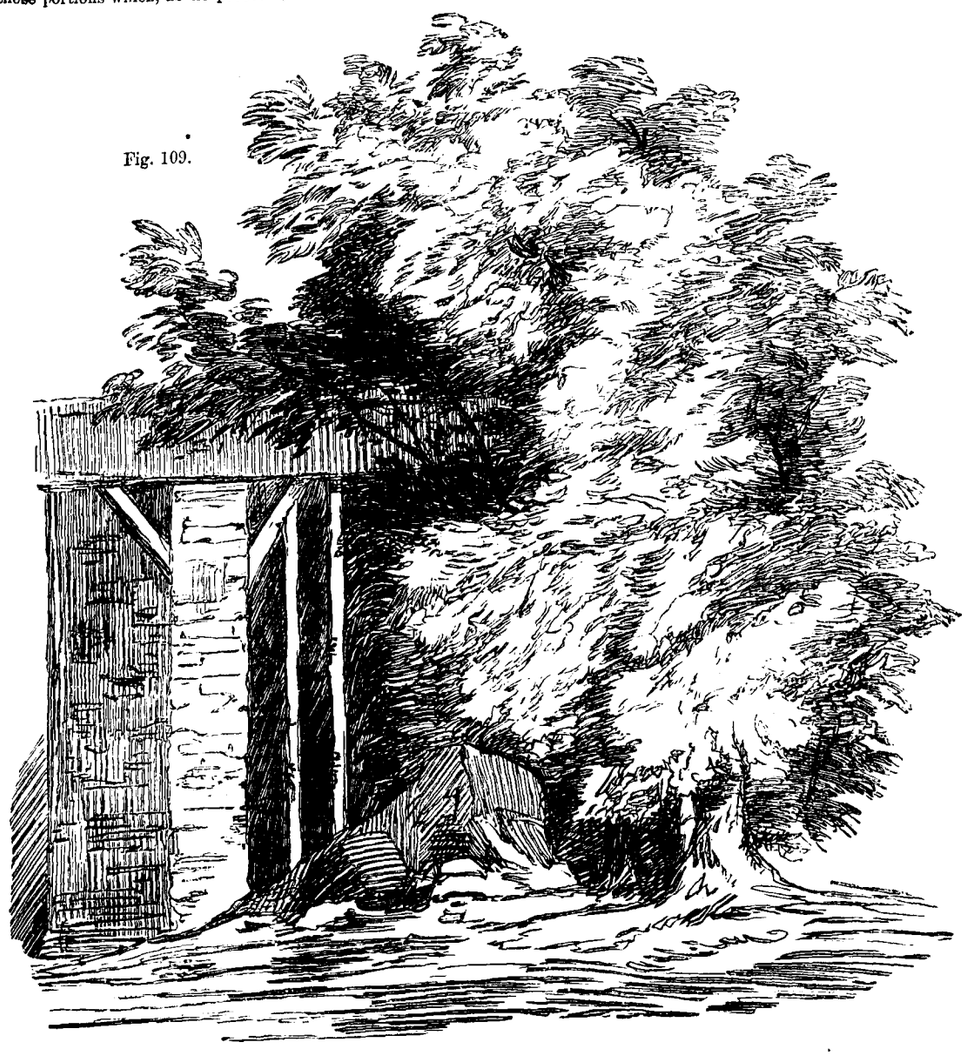


Fig. 108.

lower in tone as it recedes; this, together with the manner of drawing the curved lines on the surfaces of the leaves, tends to give the perspective, and consequently assists in this way to determine the size of the leaf. Examples of this kind can be so easily obtained from Nature, that we prefer to leave the pupil to select them for himself, advising him to preserve them for use as we have recommended, and, when drawing from them, to allow his mind to recur to the previous remarks upon the principles we have laid before him, which apply not only to the drawing of a simple weed or dock-leaf, but have their never-failing influence upon all subjects admissible in art. In the drawing of trees and the larger kinds of shrubs, we must urge the practice of being particularly careful of the outline, the first process of which must be confined to the general proportions and positions of the parts *in light;* and, at the same time, where it is possible, trace by a faint line the course of the stems, which will give additional character and truthfulness. It may not be necessary that these stems should be completed in the finished drawing, as probably their whole extent may not be seen; but the slight indication of their whereabouts may be useful for the purpose of adjusting the foliage according to the class of tree to be represented. This process is to be followed throughout the whole drawing. This, which we will call the first stage, must be done *faintly*, so that, with india-rubber—or, what is better for the softer kinds of paper, bread-crumbs—these marks may be weakened when the second stage is ready for commencement. In this portion of the work there must be no indecision, particulars must be entered into, especially those upon which the light falls. Amongst these will be found many that owe their prominence to sharp, clear terminations; and the distinctness of their forms will be in proportion to the amount of light which now receive in those parts in sight all the forcible and distinctive qualities they demand, even to the peculiarities observable upon the bark. At all times avoid a multiplicity of lines when one only will be sufficient. When we see, as we frequently do in the early attempts of beginners, a number of lines of all lengths and thicknesses muddled together, we can only attribute the practice to doubt and uncertainty; they are waiting to see the effect before they can make up their minds as to the *one right line* required. Such a proceeding indicates weakness, and creates confusion. If we were to extend our instructions beyond the single subject of a tree, and include the whole landscape generally, we could only repeat what has been said before, as our remarks are equally applicable to distances and mountains, where it

would be a great mistake not to be especially careful in their forms and outlines. These lines must not be strong, but firm and decisive, and the more simple the better; all darker lines must be reserved for the foreground. The method of securing the lights upon trees, which we have shown in Fig. 109, will explain to the pupil the manner of proceeding more clearly than words can do. In his practice we recommend him first to copy parts of the example, and make separate and repeated studies of those portions which, as he proceeds, he will find to be most

Fig. 109.



difficult. He will be better able to decide for himself than we can for him as to which of those parts may require more frequent repetition; and it is almost needless to say, that by frequent repetition only can he hope to succeed. There is a very easy and legitimate way of preserving in pencil drawings the sharp touches of light which are seen upon polished surfaces, streaks in water, blades of grass, the bright parts of clouds, small objects of a naturally light colour on a dark background, or any effect where brilliancy is requisite, and where a sharp, clear, and distinct outline of the form must be preserved. It is this:—After the outline of the object, or part to be preserved, has been made, dip a fine hair-pencil into tolerably strong gum-water, and with it cover down the whole of the part intended to be white; when dry, proceed to the completion of the drawing. It will not in the least matter if the lead pencil should pass over the part gummed, it will not have any effect upon it. When the drawing is finished, pin it down at the corners on a board, let it be held in an inclined position, and pour some hot water over it; the gum immediately dissolves, leaving the parts which were covered by it perfectly white. Broad spaces in light, upon which are to be drawn minute and sharply-cut details, may be preserved in this way, and, after the gum is washed off, the details may be made out upon them. This leads to the use of gum-water in another way, and that is, as a means of fixing the drawing. If a drawing is worth anything, it surely is worth *setting*, that is, fixing the lead or chalk with which it is drawn, so that, under moderate treatment, it cannot injure by rubbing. For highly-finished drawings, or where the chalk or pencil has been very liberally applied, it will be better to proceed in this way:—Nearly fill a shallow dish or tray, somewhat larger than the drawing, with a weak solution of gum-water, or—which may sometimes be more convenient—a mixture of milk and water, half of each; pass the drawing carefully through the mixture (face uppermost)

LESSONS IN GERMAN.—XXX.

SECTION LIX.—PECULIAR IDIOMS (continued).

Wie befinden Sie sich? (literally, how do you find yourself?) answers to our phrase "how do you do?"

Sich befinden is also applied to inanimate objects, and is then well rendered by "to be," as:—Das Buch befindet sich in meinem Zimmer, the book is in my room.

The adjective befindlich is frequently best translated by a relative clause, as:—Das Haus und die darin befindlichen Leute, the house and the people who are in it (literally, the house and the therein being people).

1. *Statt finden is equivalent to "to take place," as:—Wann fand die Revolution in Baden Statt? when did the revolution in Baden take (find) place?*

2. Schuld sein is equivalent to "to be in fault," as:—Ich bin Schuld daran, I am to blame for it, it is my fault.

Vocabulary.

Also, thus, therefore.
Ankündigen, to announce.
Antwort, f. answer, reply.
Auf'geklärt, intelligent, enlightened.
Auf'pflanzen, to plant, set up.
Ausgezeich'net, remarkably.
Befin'den (sich), to find oneself, to be.
Begei'sterung, *f.* enthusiasm.
Begin'nen, to begin.
Beklа'gen (sich), to complain.
Buch'druckerkunst, *f.* art of printing.
Daher', thence, therefore.
Daran', thereat, about it.
Darum, for that cause.
Demuth, *f.* humility.
Denkmal, *n.* monument.
Deßwe'gen, for that reason.
Durchnäs'sen, to wet through.
Erfin'der, *m.* inventor.
Ergrei'fen, to seize, lay hold of.
Fahne, *f.* standard, flag, colours.
Gebrau'chen, to use.
Gegend, *f.* region.
Krie'gerisch, warlike, martial.
Laufbahn, *f.* career.
Oberst, *m.* colonel.
Redner, *m.* orator, public speaker.
Reif, *m.* hoop.
Reizend, charming.
Schaaren, to flock together, to form into bands.
Schöpfer, *m.* Creator.
Spitze, *f.* summit, height.
Statt'finden, to take place.
Streben, to strive.
Ueberwin'den, to overcome, surmount.
Unterneh'mung, *f.* undertaking.
Verschie'ben, to postpone.
Vor'stellung, *f.* remonstrance.

Résumé of Examples.

Es fand bei Frankfurt am Main eine große Volks'versammlung Statt.	A large popular assembly took place at Frankfort-on-the-Maine.
Von nun an floß die übrige Zeit seines Lebens ruhig dahin.	From this time forth the remaining time (portion) of his life passed tranquilly away.
Daher kommt es, daß so viele Deutsche und Ungarn nach Amerika auswandern.	Thence it comes, that so many Germans and Hungarians emigrate to America.
Der Knabe ist Schuld daran', deß'wegen erdul'det er die Strafe.	It is the boy's fault, therefore he suffers the punishment.
Bis der Bote ankam, verfloß' eine Stunde.	Till the messenger arrived, an hour elapsed.
Bis auf ein kleines habe ich den Brief beendigt.	I have, within a little (all but), finished the letter.
Es thut mir wirklich in der Seele weh.	It really pains me to the soul.
Morgen also reisen wir ab.	To-morrow then we depart.
Das Band gehört' um den Hut.	The ribbon belongs around (to) the hat.
Darum ist er auch so traurig.	Therefore he is likewise so sorrowful.
Wie befin'den Sie sich?	How do you do?
Ich danke Ihnen, ich befinde mich wohl.	I am very well, I thank you.

Exercise 112.

1. Das in der Zeitung angekündigte Concert wird heute Abend nicht Statt finden. 2. Wollen Sie meine Bitte gewähren? 3. Ich werde sie gewähren wenn Sie von nun an vorsichtiger sind. 4. Demuth zeigt sich in wahrer Liebe zum Nächsten. 5. Von nun an ward die Gegend immer reizender. 6. Wir wollen von nun an zufrieden sein. 7. Daher kam es, daß so viele Unternehmungen mißlangen. 8. Er ergriff daher die Gelegenheit, ihm Vorstellungen zu machen. 9. Ihr seid selbst Schuld daran, könnt euch daher nicht beklagen. 10. Karl lernt stets fleißig, deßwegen loben ihn seine Lehrer. 11. Sie brauchen deßwegen (Sect. XLIII. 5) nicht böse zu sein, weil ich Ihre Feder gebraucht habe. 12. Der fleißige Schüler überwindet die Schwierigkeiten, welche eine jede fremde Sprache hat. 13. Joseph II. war ein aufgeklärter Fürst und der Vater seines Volkes, deßwegen spricht man noch stets mit vieler Achtung von ihm. 14. Er stieg bis auf (Sect. LVII.) die Spitze des Berges. 15. Wollen Sie nicht warten, bis Sie eine Antwort haben? 16. Nein, ich kann nicht länger warten. 17. Da er nicht bleiben wollte, bis ich meinen Brief geschrieben hatte, so mußte ich also glauben, daß er mir diesen Gefallen nicht thun wolle. 18. Alexander besiegte bei seinem Regierungsantritt viele Völker und begann also seine Laufbahn mit kriegerischen Thaten. 19. Nach dieser Nachricht kann er also Hoffnung haben, seinen Vater noch einmal zu sehen. 20. Ich werde Ihnen Alles pünktlich besorgen; haben Sie darum keine Sorgen. 21. Er war nicht zu Hause, deßhalb konnte ich den Brief nicht selbst an ihn abgeben. 22. *Nachdem der Oberst die Fahne aufgepflanzt hatte, schaarten sich die Soldaten darum.* 23. *Befindet sich Herr N. wohl?* 24. *Ja, er befindet sich ausgezeichnet wohl.*

Exercise 113.

1. Is there also a monument to Guttenberg, the inventor of the art of printing? 2. Yes, there are two; one is in Mainz, the other in Strasburg. 3. Are there naughty children in your school? 4. Oh, yes, there are many. 5. *These hoops belong to those casks.* 6. *The interment of the Duke of Wellington took place the 18th of November, 1852.* 7. *In the assembly which took place yesterday, some public speakers spoke with great enthusiasm.* 8. From that time forth he strove for greater fame. 9. He seized the first occasion to convince his brother of the truth of his assertions. 10. *Till to-day I had not received any answer from him.* 11. The rain has wetted us through to the skin; for that reason we shall postpone our voyage till this evening. 12. In former times more wonders and signs took place than in the present time.

KEY TO EXERCISES IN LESSONS IN GERMAN.

Exercise 27 (Vol. I., page 164).

1. Which table have you? 2. I have that of my friend, the joiner. 3. Which paper have you? 4. I have that of my friend, the teacher. 5. Which of these boys has my blue ink? 6. None of them has your ink, but one of these boys has your beautiful pink-coloured paper. 7. Which of them has it? 8. Adolphus has it, and Henry, your little cousin, has your wooden pencil. 9. Which of my books is in your room? 10. Your Gellert's Fables are there. 11. Which of these two little boys is your nephew? 12. They are both my cousins. 13. Are they brothers? 14. Yes, they are twins. 15. Which of your American friends are at the council-house? 16. Mr. C. and Mr. L. 17. Whose book have you? 18. I have that of your cousin. 19. When did Mr. Zimmermann have my letter? 20. He had it the day before yesterday, and his friend, the painter, had it yesterday, and I have it to-day. 21. Has the teacher praised the baker's son, or that of the tailor? 22. He has praised neither that of the baker nor that of the tailor, but that of the mason. 23. Have you the merchant's pens, or those of the book-keeper? 24. I have neither those of the merchant nor those of the book-keeper, but I have those of the toll-gatherer. 25. Who praises the old captain? 26. The captain praises him. 27. He praises the whole nation. 28. The Frenchman's wagon is large, and that of the Englishman beautiful.

Exercise 28 (Vol. I., page 164).

1. Welchen Regenschirm haben Sie? 2. Ich habe den meines Bruders, des Bildhauers. 3. Wann kauften Sie dieses rosenfarbene Kleid? 4. Ich kaufte es gestern von meinem Vetter, dem Tuchhändler. 5. Wollen Sie dieses Buch diesem oder jenem Manne geben? 6. Ich will es keinem geben.

Exercise 29 (Vol. I., page 179).

1. Has the captain his own or the general's sword? 2. He has his own. 3. Have you my scissors? 4. No, I have my own. 5. Who has my stick? 6. Mr. S. has it. 7. Has my sister your umbrella? 8. No, she has her own. 9. Has the locksmith my key? 10. No, he has his own. 11. Has the washerwoman my brother's and my friends' shirts? 12. She has his as well as theirs. 13. All people have their errors and peculiarities; I have mine, you have yours, and he has his. 14. God is almighty; man's destinies are in his hand, also mine and thine. 15. The ocean is between me and my family. 16. Has Mr. A. your paper or mine? 17. He has his own. 18. My brother has my book, and I have his. 19. Has he your wafers and stamps, or his own? 20. He has mine. 21. Whose wagon has your good friend Mr. G.? 22. He has that of his uncle. 23. And whose horses has he? 24. He has mine. 25. Whose coachman has he? 26. He has his own. 27. Whose sheep are those in the meadow? 28. They are ours. 29. Have these Germans their horses and their wagons, or ours? 30. They have ours. 31. Whose books have these scholars? 32. They have their own. 33. Do you always take your property? 34. Yes, everybody takes his own. 35. When did you see your family? 36. I saw them the day before yesterday. 37. Did you see me and my family yesterday evening at the concert? 38. Yes, I saw you and your family. 39. The commander praised his soldiers.

Exercise 30 (Vol. I., page 180).

1. Der Kutscher des Grafen B. hat meine Brille, und nicht die Ihrige. 2. Die Töchter des kranken Generals sind stolzer, als die meinigen. 3. Ich habe meinen Briefstempel verloren, aber hier ist der Ihrige und der seinige. 4. Wem gehören diese schönen Wiesen, sind sie die Ihrigen? 5. Nein, sie sind nicht die meinigen; sie sind das Eigenthum meines Freundes, des Kutschers. 6. Haben Sie seinen Schlüssel, oder den meinigen? 7. Ich habe weder den seinigen, noch den meinigen, sondern denjenigen meiner Frau. 8. Sie entdeckten den Dieb an dem Hemde, welches er trug, und welches nicht das seinige war. 9. Wann sahen Sie Ihre Freunde? 10. Ich habe sie seit jüngstem Sommer nicht gesehen. 11. Er liebt zu sehr das Seinige. 12. Haben Sie mich und die Meinigen, Heinrich und die Seinigen gestern Abend zwischen sieben und acht Uhr in der Allee gesehen?

Exercise 31 (Vol. I., page 180).

1. Which child does the uncle love? 2. He loves that which he praises. 3. Whose child loves the uncle? 4. The one that he loves, loves him. 5. Which hat have you? 6. I have that which your brother has had. 7. Which boy does the father love? 8. He loves the one that the mother praises. 9. Which boy loves the mother? 10. The one that the father praises. 11. Which horse has your brother bought? 12. He has bought that which you had yesterday. 13. Which man do you praise? 14. I praise that man whose son you love. 15. Which books have you bought? 16. I have bought those which my brother has had in his hands. 17. Whose books have you? 18. I have the books of those boys whose hats you have. 19. Those who are vicious have no tranquillity of soul. 20. The one who has the scar on the forehead is the old magistrate. 21. That is good which is useful. 22. These men are the same whose barns, stables, and dwellings you saw yesterday. 23. The labourers in the vineyard of him who gives the least reward are few. 24. The hermit of yonder chapel is a friend of those who are helpless and forsaken. 25. He is wise who is virtuous.

Exercise 32 (Vol. I., page 181).

1. Der Freund, welchen ich habe, ist treu. 2. Wessen Schlüssel haben Sie? 3. Ich habe den der Frau, deren Tochter Sie kennen. 4. Ich werde dieses Buch demjenigen geben, welcher zuerst hier sein wird. 5. Haben Sie mein Buch gesehen? 6. Nein, ich habe nicht dasjenige gesehen, welches Sie erwähnen. 7. Die Freude, die ich haben werde. 8. Ich kam, weil ich es ihm versprochen hatte. 9. Wo wohnen Sie? 10. Ich wohne in demselben Hause, in welchem ich wohnte, als Sie mich besuchten. 11. Welche dieser Damen ist Ihre Frau? 12. Diejenige, welche mit dem alten Herrn spricht. 13. Der Freund, welchen ich verloren habe, war mir sehr theuer. 14. Ich habe den Rock gekauft, welchen Sie in dem Fenster meines Schneiders sahen. 15. Empfehlen Sie mich dem Herrn, welcher so sehr höflich ist.

Exercise 33 (Vol. I., page 197).

1. Is this young man ill? 2. No, but he was ill yesterday. 3. Who has been in your father's garden? 4. Nobody has been in the garden, but somebody has been in his house. 5. How long does the old peasant still remain in the town? 6. I am not acquainted with the old peasant, and don't know how long he remains. 7. Is your old friend, the merchant, gone to Vienna? 8. I believe he is gone to Berlin to his brother. 9. From whom have you heard this news to-day? 10. I have spoken to one of my friends, who has come from Dresden, and has brought a letter to me from my father. 11. I reside with my uncle, and go with him to the little village. 12. My beautiful bird has flown out of the cage, and my little horse has run to the forest. 13. What has your father written to you? 14. He has written (to) me a long letter. 15. When were you at the market? 16. I was there the day before yesterday in the evening, and bought some beef. 17. We have had beautiful weather this afternoon. 18. These scholars have been lazy, and those diligent. 19. The snow was very deep the day before yesterday. 20. I have never been ill. 21. Frederick the Great was (a) King of Prussia.

RECREATIVE NATURAL HISTORY.

WHALES.

THE weary voyager, who for weeks has seen nothing but sea and sky, is at times diverted by the sight of some huge monster of the deep disporting itself on the bosom of the ocean. It may be a large Sperm Whale spending ten minutes in breathing before plunging once more to unknown depths, or a shoal of porpoises darkening the sea as they rise for the same purpose, or the huge common whale, so longed for by the whaler in search of whale-bone and blubber; but whatever the kind, it breaks in on their monotony, and is, for the time, a matter of deep interest to them. The whale, however, is a most remarkable animal, and is worthy of more than a passing thought as being the largest of all animals both on sea and land, not excepting the most gigantic of elephants, and as presenting us with the seeming paradox of being a fish, and yet no fish. This latter point is one of extreme interest from a scientific standpoint, and we may as well at once inquire into it.

The ordinary observer is persuaded that the whale is a fish when he reflects that it lives in water like other fishes, is shaped like them, and has fins and a tail which are used to propel it through the water. The naturalist, on the other hand, is also persuaded that it is no fish, but an animal much more like our cat, pig, or horse, and he classes it along with these domestic animals in preference to giving it a place among sharks, salmon, &c. Such an arrangement seems to do violence to one's idea of what is proper in the matter of classification, yet we shall now see that the naturalists are right; that, in short, a whale is more like the domestic animals we have mentioned than it is like a cod or a salmon, and for these reasons. A fish has a heart with two chambers only in it; a whale, on the other hand, has a four-chambered heart, like that possessed by each of the domestic animals we have referred to. A whale is unlike a fish and like the cat in many other important respects: thus, the whale is warm-blooded, *i.e.*, has a temperature of from 98° Fahr. to 120° Fahr., whereas a fish is cold-blooded, or has a temperature very much lower; the whale is a lung-breather, whereas the typical fish breathes by means of gills; the whale gives birth to its young alive, but the young of a fish are born by the hatching of eggs; the whale suckles its young until they are able to take care of themselves, the young of a fish receive little if any parental attention after they have broken the shell. Now, the reader will very readily perceive that in each of these particulars, while the whale differs from a fish, it is like, say the domestic cat, which is warm-blooded, has a four-chambered heart, breathes by means of lungs, and suckles its young. In order that there may be no misapprehension, we may say a few words more about the difference in their ways of breathing. Both whale and fish have their blood purified by means of oxygen, but while the former obtains it from atmospheric air, coming periodically to the surface for that purpose, the latter abstracts the oxygen it requires from the *air dissolved* in the water. Now air is not very soluble in water, and the amount of it which is dissolved varies much with the circumstances of pressure and temperature. Also more oxygen than nitrogen is dissolved by a given measure of water, so that it will readily be inferred that the air dissolved in water is richer in oxygen than atmospheric air. It is this oxygen which the fish abstracts from the dissolved air by means of its gills, so that it has no reason to rise to the surface to breathe like the whale.

The whale, then, plainly belongs to that large body of animals which suckle their young, if we are to be guided in our arrangement of them by similarities of structure, and this fact is now universally recognised by naturalists, who place whales in that large group of animals to which they have given the name of Mammalia.

The whale is externally unlike most other mammals, because it has to live under widely different conditions from them, moving, as it does, in a comparatively heavy fluid, and at times under very great pressure. Roughly speaking, its body is more or less cigar-shaped, tapering gradually until the tail is reached, where it expands into an enormous fin, sometimes as much as twenty feet broad. At the fore-part, and on each side, of the body, not far from the corners of the mouth, there is a swimming paddle. These flippers or paddles appear to be used mainly for balancing purposes. It is the tail fin which is principally used to propel the whale by its movements just as a single oar at the stern may be made to drive a boat through the water. The skin is generally quite hairless, and of enormous thickness, consisting of elastic fibres interlacing in all directions, in the interstices of which oil is contained. This is the substance which is known as blubber. This large accumulation of oily matter doubtless subserves two important ends: first, that of helping to keep up the animal heat by preventing the constantly changing surface of extremely cold water from carrying it off, and in the second place serving as a cushion to withstand

LESSONS IN BOOKKEEPING.—XI.

SUBSIDIARY BOOKS—CASH BOOK—BILL BOOK.

IN the present lesson in Bookkeeping we give our readers a continuation of the example of the method of keeping the CASH BOOK, one of the most necessary and important of the subsidiary books that are to be found in the offices of all mercantile men, whether they be wholesale merchants or retail traders. The learner should compare the entries in the Cash Book with cash entries in the *Memoranda of Transactions*.

CASH BOOK.

(2) DR. CASH ACCOUNT. CR. (2)

1881.		Receipts.	Bank Col.	Cash Col.	1881.		Payments.	Bank Col.	Cash Col.
April	1	To Balance of Cash		1746 13 9	April	1	By Balance of Deposits	1735 0 0	
„	13	„ Spencer and Co.		160 13 7	„	14	„ East India Company		330 16 0
„	14	„ London and Westminster Bank	180 0 0		„	15	„ Petty Cash		20 0 0
„	18	„ London and Westminster Bank	190 0 0		„	18	„ Osmond and Co.		183 4 3
„	24	„ London and Westminster Bank	290 0 0		„	24	„ Bills Payable, No. 1		288 3 4
„	25	„ London and Westminster Bank	330 0 0		„	25	„ East India Company		330 16 0
„	30	„ Balance of Deposits	745 0 0		„	30	„ Private Account		9 0 0
					„	„	„ Balance of Cash		745 7 9
			£1735 0 0	1907 7 4				£1735 0 0	1907 7 4
May	1	To Balance of Cash		745 7 9	May	1	By Balance of Deposits	745 0 0	
„	3	„ London and Westminster Bank	340 0 0		„	3	„ Bills Payable, No. 2		327 5 0
„	10	„ Bills Receivable, No. 4		190 10 6	„	11	„ Petty Cash		10 0 0
„	15	„ Bills Receivable, No. 2		120 10 0	„	„	„ London and Westminster Bank	180 0 0	
„	20	„ London and Westminster Bank	210 0 0		„	15	„ London and Westminster Bank	120 0 0	
„	25	„ Bills Receivable, No. 3		102 19 10	„	20	„ Perkins and Co., paid Stevenson and Co.		212 6 8
„	„	„ Bills Receivable, No. 8		217 18 10	„	25	„ Interest, Discount on Bills		1 2 3
„	„	„ Bills Receivable, No. 9		300 0 0	„	„	„ Perkins and Co., paid Stewart and Co.		610 19 4
„	27	„ Brown and Smith		97 8 0	„	29	„ London and Westminster Bank	100 0 0	
„	29	„ Bills Receivable, No. 7		100 0 0	„	30	„ London and Westminster Bank	100 0 0	
„	31	„ Balance of Deposits	695 0 0		„	31	„ Balance of Cash		713 1 8
			£1245 0 0	1874 14 11				£1245 0 0	1874 14 11
June	1	To Balance of Cash		713 1 8	June	1	By Balance of Deposits	695 0 0	
„	3	„ Bills Receivable, No. 5		36 0 10	„	3	„ Bills Payable, No. 3		135 18 9
„	„	„ London and Westminster Bank	100 0 0		„	5	„ Petty Cash		10 0 0
„	6	„ Bills Receivable, No. 6		113 1 0	„	6	„ London and Westminster Bank	100 0 0	
„	7	„ Bills Receivable, No. 15		200 0 0	„	7	„ London and Westminster Bank	200 0 0	
„	10	„ Bills Receivable, No. 16		200 0 0	„	10	„ London and Westminster Bank	200 0 0	
„	12	„ Bills Receivable, No. 11		200 0 0	„	12	„ London and Westminster Bank	200 0 0	
„	15	„ Bills Receivable, No. 17		375 10 0	„	15	„ Private Account		20 0 0
„	16	„ Bills Receivable, No. 1		150 0 6	„	„	„ London and Westminster Bank	360 0 0	
„	18	„ Bills Receivable, No. 10		37 0 8	„	16	„ London and Westminster Bank	150 0 0	
„	21	„ Bills Receivable, No. 12		41 5 2	„	18	„ London and Westminster Bank	40 0 0	
„	26	„ Bills Receivable, No. 13		100 0 0	„	21	„ London and Westminster Bank	50 0 0	
„	28	„ Bills Receivable, No. 18		47 16 0	„	26	„ London and Westminster Bank	100 0 0	
„	30	„ Bills Receivable, No. 14		199 17 2	„	30	„ London and Westminster Bank	250 0 0	
„	„	„ Balance of Deposits	2245 0 0		„	„	„ Balance of Cash		2247 14 3
			£2345 0 0	2413 13 0				£2345 0 0	2413 13 0

The next of the subsidary books that demands the learner's notice is the BILL BOOK. *The following is the form of this book, which we have adopted, in order to give our students the simplest possible idea of the nature of such a book in business. The first part consists of the Bills Receivable Book, and the second part of the Bills Payable Book. A greater number of columns are frequently introduced into both books for the convenience of the merchant, and the accuracy which is required in many Bill transactions; but what we have given will be found sufficient for the learner at the outset, as more would tend only to confuse his mind, without imparting any real benefit. This book also includes the entries of all the Bill Transactions from January till June, as laid down in the Memoranda of Transactions given in Lessons VIII. and IX.*

BILL BOOK.

BILLS RECEIVABLE BOOK.

(1)

When Received.		Received from.	No.	Drawn upon.	When Due.		Amount.			How disposed of.	When.	
1881.					1881.		£	s.	d.		1881.	
April	13	Allison and Co.	1	Allison and Co.	June	16	150	0	6	In cash	June	16
„	25	Lloyd and Co.	2	Warwick and Co.	May	15	120	10	0	In cash	May	15
„	„	Ditto	3	Thiselton and Co.	„	25	102	19	10	In cash	„	25
„	26	Thomas Jones	4	Parker and Co.	„	11	190	10	6	In cash	May	10
„	„	Ditto	5	Baring and Co.	June	3	36	0	10	In cash	June	3
							£600	1	8			
May	6	Thomas Jones	6	Abrahams and Co.	June	6	113	1	0	In cash	June	6
„	„	Ditto	7	Welch and Co.	May	29	100	0	0	In cash	May	29
„	9	Lloyd and Co.	8	Barclay and Co.	June	1	217	18	10	Discounted	May	25
„	12	Thomas Jones	9	Lubbock and Co.	„	16	300	0	0	Discounted	„	„
„	„	Ditto	10	Payne and Co.	„	18	37	0	8	In cash	June	18
„	14	Ditto	11	Smith and Co.	„	12	200	0	0	In cash	June	12
„	„	Ditto	12	Baring and Co.	„	21	41	5	2	In cash	„	21
„	15	Powell and Co.	13	Wagnall and Co.	„	26	100	0	0	In cash	„	26
„	„	Ditto	14	Margetson and Co.	„	30	199	17	2	In cash	„	30
„	31	Perkins and Co.	15	Warner and Co.	„	7	200	0	0	In cash	„	7
„	„	Ditto	16	Russell and Co.	„	10	200	0	0	In cash	„	10
„	„	Ditto	17	Payne and Co.	„	15	375	10	0	In cash	„	15
„	„	Ditto	18	Alexander and Co.	„	28	47	16	0	In cash	„	28
							£2132	8	10			
June	11	Powell and Co.	19	Payne, Smith, and Co.	July	10	150	0	0			
„	„	Ditto	20	Lloyd and Co.	„	20	158	5	0			
							£308	5	0			

BILLS PAYABLE BOOK.

(1)

When Accepted.		Drawn by.	No.	Payable to	When Due.		Amount.			When Paid.	
1881.					1881.		£	s.	d.	1863.	
Jan.	21	Osmond and Co.	1	Their Order	April	24	288	3	4	April	24
„	31	Andrews and Co.	2	Their Order	May	3	327	5	0	May	3
„	„	Ditto	3	Smith and Co.	June	3	135	18	9	June	3
							£751	7	1		
March	31	Baring, Smith, and Co.	4	Their Order	July	3	288	1	3		
April	11	Andrews and Co.	5	Ford and Co.	July	14	238	17	4		
„	29	Ovington and Co.	6	Spicer and Co	Aug.	2	245	8	0		
							£484	5	4		

plomb? 26. Non, Monsieur, j'ai un encrier de porcelaine. 27. L'étranger a-t-il de la volaille? 28. L'étranger n'a pas de volaille, mais il a de l'argent. 29. Votre frère a faim et soif, peur et sommeil. 30. Quelqu'un a-t-il honte? 31. Non, Monsieur, personne n'a honte. 32. Votre frère a-t-il raison ou tort? 33. Mon frère a raison, et le vôtre a tort. 34. Votre sœur n'a ni son chapeau de satin, ni son chapeau de velours.

Exercise 15 (Vol. I., page 60).

1. Have you the carpenter's hammers? 2. We have the blacksmith's hammers. 3. Have the blacksmiths two wooden hammers? 4. They have two iron hammers. 5. Have the generals the silk hats of the child? 6. They have the child's jewels and playthings. 7. Have the children the birds of your wood? 8. They have not the birds of my wood, but they have the horses of my general. 9. Has the blacksmith a pair of woollen stockings? 10. The blacksmith has two pairs of woollen stockings. 11. Sir, are you not cold? 12. No, Sir, I am warm. 13. Have you coffee or chocolate? 14. I have neither coffee nor chocolate. 15. Have you not the cabbages of my large garden? 16. I have the vegetables of your small garden. 17. What is the matter with your son? 18. My son has nothing. 19. Have you two pieces of bread? 20. The miller has a piece of bread and two barrels of flour. 21. Has the grocer coffee, tea, chocolate, and pepper? 22. He has tea and coffee, and your merchant's chocolate and pepper. 23. Who has money? 24. I have no money, but I have paper. 25. Have you good paper? 26. I have bad paper.

LESSONS IN CHEMISTRY.—III.

Measures used in Chemistry.—The French weights and measures, which are on the decimal system, are universally adopted in chemistry, on account of their simplicity.

MEASURES OF LENGTH.

	English Inches.
Millimètre	0·03937
Centimètre	0·39370
Decimètre	3·93707
MÈTRE	39·37079
Decamètre	393·70790
Hectomètre	3937·07900
Kilomètre	39370·79000
Myriomètre	393707·90000

MEASURES OF CAPACITY.

	In Cubic Inches.	
Millilitre	0·061027	
Centilitre	0·610271	
Decilitre	6·102705	
LITRE (a cubic decimètre)	61·027051	= Pints. 1·76
Decalitre	610·270515	
Hectolitre	6102·705151	
Kilolitre	61027·051519	
Myriolitre	610270·515194	

MEASURES OF WEIGHT.

	English Grains.
Milligramme	·015
Centigramme	0·154
Decigramme	1·543
GRAMME	15·452
Decagramme	154·323
Hectogramme	1543·234
Kilogramme	15432·348
Myriogramme	154323·488

A kilogramme = 2·2046 lbs. avoirdupois.

In verifying the following results by arithmetical calculation, the student will impress on his mind this system of weights and measures:—

1 inch	=	2·539954 centimètres.
1 foot	=	3·0479449 decimètres.
1 yard	=	0·9143834 mètre.
1 mile	=	1·6093149 kilomètre.
1 cubic inch	=	16·3861 cubic centimètres.
1 cubic foot	=	28·31531 cubic decimètres.
1 gallon	=	4·54345 litres.
1 grain	=	0·06480 gramme.
1 Troy oz.	=	31·103496 grammes
1 lb. avoir.	=	0·45359 kilogramme.
1 cwt.	=	50·80237 kilogrammes.

The whole of the above system is founded on the "mètre," which measure was originally intended to be $\frac{1}{10000000}$ of the distance along a meridian from the equator to the pole. But since the "mètre" was thus fixed, an error has been discovered in the measurement of the earth, and now a "standard" mètre is kept in Paris.

The measures of weight are connected with those of length through the *gramme*, which is the weight of 1 cubic centimètre of pure water, taken at the maximum density of water, a temperature of 4° Centigrade, and weighed at Paris.

THERMOMETRY.

Heat is—"that which produces in us the sensation of warmth."

Temperature is—"that energy with which one body seeks to impart its heat to another."

Thus the temperature of a body is no indication of the real quantity of heat in the body. Equal weights of mercury and water may have the same temperature, and yet the water will contain really thirty times more heat or caloric than the metal.

Thermometers are measurers of "temperature," not of *heat*. High temperatures are measured by pyrometers; extremely low temperatures by alcohol thermometers; while mercurial thermometers are used for the intermediate ordinary temperatures.



Fig. 1.

These instruments depend for their action upon the fact that all bodies, with the rise and fall of their temperatures, expand and contract. In *pyrometers* (Fig. 1), a small bar of platinum, s, which can only be melted by the intense heat of the flame of the oxy-hydrogen blowpipe, is placed in a hole, *b b*, drilled in a piece of graphite, o, a form of carbon which is capable of supporting any heat. The bar projects above the hole, and is bound to the graphite—a piece of which has been sliced away to expose the hole—by a platinum strap, *a*. The position of the top of the bar is carefully noted. It is now introduced into the furnace whose temperature is required. The bar expands, and when it is removed, the strap prevents it from resuming its former position. Thus the expansion of the platinum is found, and from experiment we have learnt that for every 100° Cent. platinum expands $\frac{1}{1131}$ of its length, and therefore we can calculate the heat of the furnace.

Mercury is chiefly used for thermometers for five reasons:—

1. It is easily got pure, for mercury can be distilled like water.

2. It does not stick to the glass.

3. It has a long range, freezing at — 40° Cent., and boiling at 350° Cent.

4. It expands uniformly—that is, it increases as much in bulk if heated from 50° to 60°, as it will from 150° to 160°.

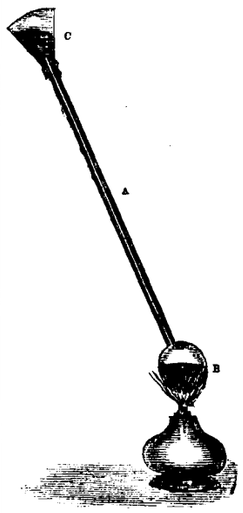


Fig. 2.

5. Having a low "capacity for heat," its temperature soon changes; it is, therefore, very sensitive.

To make a mercurial thermometer.

1. Take a glass tube with a capillary bore (fine, "like a hair"), as represented at A in Fig. 2; make about half an inch of mercury run down it, and measure it at different points in its descent. If it retain its length, the bore is *uniform*.

2. *Blow the bulb*, B, not with the mouth, lest moisture be introduced, but by connecting the tube, by an india-rubber pipe, with a bag of the same material, and then pressing the bag while the end of the tube is held in a gas flame, as hereafter to be described.

3. Fasten a funnel of paper, C, to the top of the tube, and put into it some purified mercury; now heat the bulb, and the air expanding will bubble through it. Upon removing the lamp, the air will contract, and the mercury will be forced into the bulb. Repeating this process a few times, the bulb and tube will be filled. The lamp flame is again applied to the bulb, and while the mercury is oozing out, the tube is hermetically sealed, by bringing a blowpipe flame to play upon its open end.

4. Thermometers are graduated according to three scales.

Fahrenheit's Scale, which is best known in England, divides the space between the two fixed points—the freezing and boiling points of water—into 180°. Fahrenheit fixed as his zero (0°) the temperature which had been observed at Dantzic in 1709, and which he found could always be reproduced by mixing salt and snow together. He therefore, though erroneously, concluded that this was nature's zero—the absolute zero. He computed that his instrument contained at 0°, 11,124 parts of mercury, and at the freezing point 11,156 parts; hence he divided the space between zero and the freezing point of water into 32 parts (11,156 — 11,124 = 32). From this point to boiling point contained 180 of these degrees, therefore 212° indicates the boiling point of water.

It was Fahrenheit who first used mercury for purposes of thermometry.

The *Centigrade Scale* was introduced by the Swedish philosopher, Celsius, who was a professor at Upsal. In it the freezing point is the zero, and the boiling point 100°. This scale is the one generally in use in the scientific world.

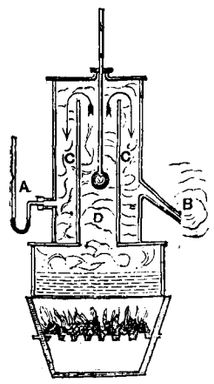


Fig. 3.

Reaumur's Scale was proposed by a French philosopher of that name in 1731. His thermometers were constructed with alcohol of such a strength, that 1,000 parts at the freezing point of water became 1,080 at its boiling point. Hence the interval between the two fixed points was divided into 80°.

It is evident that these scales are quite arbitrary, and that we have only two fixed points. It is necessary, therefore, to determine these before the instrument can be graduated.

To find the freezing point of water.

Water does not always freeze at the same temperature. If water be gradually reduced in temperature, and be kept perfectly still, 3 or 4 degrees below 0° Cent. may be reached before the ice will begin to form; but ice invariably melts at a fixed temperature. Therefore immerse the thermometer in *melting ice*, and mark the point to which the mercury falls.

To fix the boiling point.

Place the thermometer in a vessel such as is represented in Fig. 3, in which water is boiling, and the steam generated passes round the walls, c c, of the partition to make its escape at B. Thus the compartment D in which the instrument is placed, being enclosed by steam, cannot be affected by the temperature of the air.

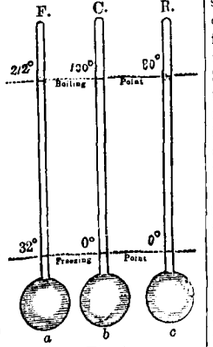


Fig. 4.

A is a bent tube of glass, open at each end, in which is a little mercury. So long as the exit of the steam from B is not impeded, the steam will be of a uniform temperature. If the steam could not escape at B, it would be indicated by A, for if the pressure of the steam increase, the mercury will not remain level. The point at which the mercury in the thermometer stands, is marked as the "boiling point."

The tube is then mounted on a piece of board, upon which is marked the scale. If Fahrenheit's (Fig. 4 *a*), the space between the two fixed points is divided into 180 equal parts, which are produced above and below 32° and 212° (which indicate the freezing and boiling points), as far as is required. For Centigrade (Fig. 4 *b*), the division is into 100°, the freezing point being 0°; for Reaumur (Fig. 4 *c*), into 80°. Fig. 4 compares at a glance these scales.

To convert degrees of one scale into another.

Since 180° Fahr. = 100° Cent. = 80° Reau.
Therefore 1° Fahr. = $\frac{5}{9}$° Cent. = $\frac{4}{9}$° Reau.

The reason of the following rules will be at once evident:—

To transfer Fahrenheit degrees to the other scales, subtract 32°, in order that the number of degrees *from* the freezing point may be ascertained. These multiplied by $\frac{5}{9}$ will give the equivalent number of Centigrade, and by $\frac{4}{9}$ the required Reaumur degrees.

To reduce Centigrade and Reaumur degrees to the Fahrenheit scale, multiply by $\frac{9}{5}$ and $\frac{9}{4}$ respectively, and add 32°.

If the temperature be below the zero in any of the scales, a minus (—) is placed before the number, thus: —5° Fahrenheit means 37° below freezing.

In verifying the following, the student will become expert in these conversions:—

Fahr.		Cent.		Reau.
185°	=	85°	=	68°
158°	=	70°	=	56°
126°	=	52·2°	=	41·7°
5°	=	— 15°	=	— 12°
— 13°	=	— 25°	=	— 20°
— 39°	=	— 39·4°	=	— 31·5°

In a *good* thermometer, the mercury ought to run to the end of the tube with a "click" when it is inverted, proving the absence of air, and completely fill the tube; and when placed in melting ice, the mercury ought to stand at 0°. It frequently happens that the mercury stands above the freezing point. This error is called "the displacement of zero," and is caused by the curious fact that sometimes the bulb does not perfectly contract for two or three *years* after it was blown; so that for the best instruments the bulbs are kept for more than that time unfilled.

If the bulb be made of thick glass, it is less likely to change.

It is plain that in a thermometer we are not given the absolute expansion of the mercury, but the difference between the expansion of the mercury and that of the glass. Mercury expands about seven times more than glass.

GREAT BOOKS.

V.—SHAKESPEARE'S PLAYS.

Of all "great books" known to the English-speaking race, the plays of Shakespeare are those which most immediately and most powerfully occur to the mind. They are the most varied and the most extraordinary productions of the English genius; familiar to us in the library and on the stage; still more familiar in those countless allusions, phrases, and well-known figures, which have become part of our common life; illustrated in a thousand ways by pictorial art; and so identified with the whole structure of our minds that it is difficult even for the uninstructed to help thinking Shakespeare when they suppose themselves to be only using the words of ordinary parlance. It cannot, indeed, be said of this wonderful man that he helped to form the English language, for it was formed when he began to write, but he undoubtedly helped to fix it. The dramas of Shakespeare, and the authorised translation of the Bible, are the noblest standards of English that we possess. Setting merely scientific and technical language aside, it is impossible to conceive any range of thought which the tongue of Shakespeare is not able to make articulate and eloquent. We have never advanced beyond that vivid and vital speech.

Great as are the plays of our chief poet, they will appear still greater if we consider the state of dramatic literature in this country at the time when their author began his career. To the "miracle-plays" of the middle ages—which were mere shows, and cannot be considered as literature—had succeeded a number of "moralities," comedies, interludes, and other entertainments of a very rude and primitive description. It was not until the reign of Queen Elizabeth that anything worthy to be called the poetic drama was composed in England; and although some writers preceded Shakespeare by a few years, tragedy and comedy, as we now understand them, did not attain their full development until about the period when the grand master himself arose in the splendour of his youthful genius. It is generally thought (for we have no certain records on the subject) that Shakespeare's earliest play appeared about 1590. As the poet was born in 1564, and was therefore six-and-twenty in the later year, it is probable that he had been engaged in dramatic composition some time before any one of his plays obtained a public hearing. Twenty years earlier

LESSONS IN GERMAN.—XXX.

SECTION LIX.—PECULIAR IDIOMS (*continued*).

Wie befinden Sie sich? (literally, how do you find yourself?) answers to our phrase "how do you do?"

Sich befinden is also applied to inanimate objects, and is then well rendered by "to be," as:—Das Buch befindet sich in meinem Zimmer, the book is in my room.

The adjective befindlich is frequently best translated by a relative clause, as:—Das Haus und die darin befindlichen Leute, the house and the people who are in it (literally, the house and the therein being people).

1. Statt finden is equivalent to "to take place," as:—Wann fand die Revolution in Baden Statt? when did the revolution in Baden take (find) place?

2. Schuld sein is equivalent to "to be in fault," as:—Ich bin Schuld daran, I am to blame for it, it is my fault.

VOCABULARY.

Alſo, thus, therefore.
Ankündigen, to announce.
Antwort, *f.* answer, reply.
Auf'geklärt, intelligent, enlightened.
Auf'pflanzen, to plant, set up.
Ausgezeich'net, remarkably.
Befin'den (ſich), to find oneself, to be.
Begei'ſterung, *f.* enthusiasm.
Begin'nen, to begin.
Beklа'gen (ſich), to complain.
Buch'druckerkunſt, *f.* art of printing.
Daher', thence, therefore.
Daran', thereat, about it.
Darum, for that cause.
Demuth, *f.* humility.
Denkmal, *n.* monument.
Deßwe'gen, for that reason.
Durchnäſſen, to wet through.
Erfin'der, *m.* inventor.
Ergrei'fen, to seize, lay hold of.
Fahne, *f.* standard, flag, colours.
Gebrau'chen, to use.
Gegend, *f.* region.
Krie'geriſch, warlike, martial.
Laufbahn, *f.* career.
Oberſt, *m.* colonel.
Redner, *m.* orator, public speaker.
Reif, *m.* hoop.
Reizend, charming.
Schaaren, to flock together, to form into bands.
Schöpfer, *m.* Creator.
Spitze, *f.* summit, height.
Statt'finden, to take place.
Streben, to strive.
Ueberwin'den, to overcome, surmount.
Unterneh'mung, *f.* undertaking.
Verſchie'ben, to postpone.
Vor'ſtellung, *f.* remonstrance.

RÉSUMÉ OF EXAMPLES.

Es fand bei Frankfurt am Main eine große Volks'verſammlung Statt. — A large popular assembly took place at Frankfort-on-the-Maine.

Von nun an floß die übrige Zeit ſeines Lebens ruhig dahin. — From this time forth the remaining time (portion) of his life passed tranquilly away.

Daher kommt es, daß ſo viele Deutſche und Ungarn nach Amerika auswandern. — Thence it comes, that so many Germans and Hungarians emigrate to America.

Der Knabe iſt Schuld daran', deß'wegen erdul'det er die Strafe. — It is the boy's fault, therefore he suffers the punishment.

Bis der Bote ankam, verfloß' eine Stunde. — Till the messenger arrived, an hour elapsed.

Bis auf ein kleines habe ich den Brief beendigt. — I have, within a little (all but), finished the letter.

Es thut mir wirklich in der Seele weh. — It really pains me to the soul.

Morgen alſo reiſen wir ab. — To-morrow then we depart.

Das Band gehört' um den Hut. — The ribbon belongs around (to) the hat.

Darum iſt er auch ſo traurig. — Therefore he is likewise so sorrowful.

Wie befin'den Sie ſich? — How do you do?

Ich danke Ihnen, ich befinde mich wohl. — I am very well, I thank you.

EXERCISE 112.

1. Das in der Zeitung angekündigte Concert wird heute Abend nicht Statt finden. 2. Wollen Sie meine Bitte gewähren? 3. Ich werde ſie gewähren wenn Sie von nun an vorſichtiger ſind. 4. Demuth zeigt ſich in wahrer Liebe zum Nächſten. 5. Von nun an ward die Gegend immer reizender. 6. Wir wollen von nun an zufrieden ſein. 7. Daher kam es, daß ſo viele Unternehmungen mißlangen. 8. Er ergriff daher die Gelegenheit, ihm Vorſtellungen zu machen. 9. Ihr ſeid ſelbſt Schuld daran, könnt euch daher nicht beklagen. 10. Karl lernt ſtets fleißig, deßwegen loben ihn ſeine Lehrer. 11. Sie brauchen deßwegen (Sect. XLIII. 5) nicht böſe zu ſein, weil ich Ihre Feder gebraucht habe. 12. Der fleißige Schüler überwindet die Schwierigkeiten, welche eine jede fremde Sprache hat. 13. Joſeph II. war ein aufgeklärter Fürſt und der Vater ſeines Volkes, deßwegen ſpricht man noch ſtets mit vieler Achtung von ihm. 14. Er ſtieg bis auf (Sect. LVII.) die Spitze des Berges. 15. Wollen Sie nicht warten, bis Sie eine Antwort haben? 16. Nein, ich kann nicht länger warten. 17. Da er nicht bleiben wollte, bis ich meinen Brief geſchrieben hatte, ſo mußte ich alſo glauben, daß er mir dieſen Gefallen nicht thun wolle. 18. Alexander beſiegte bei ſeinem Regierungsantritt viele Völker und begann alſo ſeine Laufbahn mit kriegeriſchen Thaten. 19. Nach dieſer Nachricht kann er alſo Hoffnung haben, ſeinen Vater noch einmal zu ſehen. 20. Ich werde Ihnen Alles pünktlich beſorgen; haben Sie darum keine Sorgen. 21. Er war nicht zu Hauſe, deßhalb konnte ich den Brief nicht ſelbſt an ihn abgeben. 22. Nachdem der Oberſt die Fahne aufgepflanzt hatte, ſchaarten ſich die Soldaten darum. 23. Befindet ſich Herr N. wohl? 24. Ja, er befindet ſich ausgezeichnet wohl.

EXERCISE 113.

1. Is there also a monument to Guttenberg, the inventor of the art of printing? 2. Yes, there are two; one is in Mainz, the other in Strasburg. 3. Are there naughty children in your school? 4. Oh, yes, there are many. 5. These hoops belong to those casks. 6. The interment of the Duke of Wellington took place the 18th of November, 1852. 7. In the assembly which took place yesterday, some public speakers spoke with great enthusiasm. 8. From that time forth he strove for greater fame. 9. He seized the first occasion to convince his brother of the truth of his assertions. 10. Till to-day I had not received any answer from him. 11. The rain has wetted us through to the skin; for that reason we shall postpone our voyage till this evening. 12. In former times more wonders and signs took place than in the present time.

KEY TO EXERCISES IN LESSONS IN GERMAN.

EXERCISE 27 (Vol. I., page 164).

1. Which table have you? 2. I have that of my friend, the joiner. 3. Which paper have you? 4. I have that of my friend, the teacher. 5. Which of these boys has my blue ink? 6. None of them has your ink, but one of these boys has your beautiful pink-coloured paper. 7. Which of them has it? 8. Adolphus has it, and Henry, your little cousin, has your wooden pencil. 9. Which of my books is in your room? 10. Your Gellert's Fables are there. 11. Which of these two little boys is your nephew? 12. They are both my cousins. 13. Are they brothers? 14. Yes, they are twins. 15. Which of your American friends are at the council-house? 16. Mr. C. and Mr. L. 17. Whose book have you? 18. I have that of your cousin. 19. When did Mr. Zimmermann have my letter? 20. He had it the day before yesterday, and his friend, the painter, had it yesterday, and I have it to-day. 21. Has the teacher praised the baker's son, or that of the tailor? 22. He has praised neither that of the baker nor that of the tailor, but that of the mason. 23. Have you the merchant's pens, or those of the book-keeper? 24. I have neither those of the merchant nor those of the book-keeper, but I have those of the toll-gatherer. 25. Who praises the old captain? 26. The captain praises him. 27. He praises the whole nation. 28. The Frenchman's wagon is large, and that of the Englishman beautiful.

EXERCISE 28 (Vol. I., page 164).

1. Welchen Regenſchirm haben Sie? 2. Ich habe den meines Bruders, des Bildhauers. 3. Wann kauften Sie dieſes roſenfarbene Kleid? 4. Ich kaufte es geſtern von meinem Vetter, dem Tuchhändler. 5. Wollen Sie dieſes Buch dieſem oder jenem Manne geben? 6. Ich will es keinem geben.

EXERCISE 29 (Vol. I., page 179).

1. Has the captain his own or the general's sword? 2. He has his own. 3. Have you my scissors? 4. No, I have my own. 5. Who has my stick? 6. Mr. S. has it. 7. Has my sister your umbrella? 8. No, she has her own. 9. Has the locksmith my key? 10. No, he has his own. 11. Has the washerwoman my brother's and my friends' shirts? 12. She has his as well as theirs. 13. All people have their errors and peculiarities; I have mine, you have yours, and he has his. 14. God is almighty; man's destinies are in his hand, also mine and thine. 15. The ocean is between me and my family. 16. Has Mr. A. your paper or mine? 17. He has his own. 18. My brother has my book, and I have his. 19. Has he your wafers and stamps, or his own? 20. He has mine. 21. Whose wagon has your good friend Mr. G.? 22. He has that of his uncle. 23. And whose horses has he? 24. He has mine. 25. Whose coachman has he? 26. He has his own. 27. Whose sheep are those in the meadow? 28. They are ours. 29. Have these Germans their horses and their wagons, or ours? 30. They have ours. 31. Whose books have these scholars? 32. They have their own. 33. Do you always take your property? 34. Yes, everybody takes his own. 35. When did you see your family? 36. I saw them the day before yesterday. 37. Did you see me and my family yesterday evening at the concert? 38. Yes, I saw you and your family. 39. The commander praised his soldiers.

EXERCISE 30 (Vol. I., page 180).

1. Der Kutſcher des Grafen B. hat meine Brille, und nicht die Ihrige. 2. Die Töchter des kranken Generals ſind ſtolzer, als die meinigen. 3. Ich habe meinen Briefſtempel verloren, aber hier iſt der Ihrige und der ſeinige. 4. Wem gehören dieſe ſchönen Wieſen, ſind ſie die Ihrigen? 5. Nein, ſie ſind nicht die meinigen; ſie ſind das Eigenthum meines Freundes, des Kutſchers. 6. Haben Sie ſeinen Schlüſſel, oder den meinigen? 7. Ich habe weder den ſeinigen, noch den meinigen, ſondern denjenigen meiner Frau. 8. Sie entdeckten den Dieb an dem Hemde, welches er trug, und welches nicht das ſeinige war. 9. Wann ſahen Sie Ihre Freunde? 10. Ich habe ſie ſeit jüngſtem Sommer nicht geſehen. 11. Er liebt zu ſehr das Seinige. 12. Haben Sie mich und die Meinigen, Heinrich und die Seinigen geſtern Abend zwiſchen ſieben und acht Uhr in der Allee geſehen?

EXERCISE 31 (Vol. I., page 180).

1. Which child does the uncle love? 2. He loves that which he praises. 3. Whose child loves the uncle? 4. The one that he loves, loves him. 5. Which hat have you? 6. I have that which your brother has had. 7. Which boy does the father love? 8. He loves the one that the mother praises. 9. Which boy loves the mother? 10. The one that the father praises. 11. Which horse has your brother bought? 12. He has bought that which you had yesterday. 13. Which man do you praise? 14. I praise that man whose son you love. 15. Which books have you bought? 16. I have bought those which my brother has had in his hands. 17. Whose books have you? 18. I have the books of those boys whose hats you have. 19. Those who are vicious have no tranquillity of soul. 20. The one who has the scar on the forehead is the old magistrate. 21. That is good which is useful. 22. These men are the same whose barns, stables, and dwellings you saw yesterday. 23. The labourers in the vineyard of him who gives the least reward are few. 24. The hermit of yonder chapel is a friend of those who are helpless and forsaken. 25. He is wise who is virtuous.

EXERCISE 32 (Vol. I., page 181).

1. Der Freund, welchen ich habe, iſt treu. 2. Weſſen Schlüſſel haben Sie? 3. Ich habe den der Frau, deren Tochter Sie kennen. 4. Ich werde dieſes Buch demjenigen geben, welcher zuerſt hier ſein wird. 5. Haben Sie mein Buch geſehen? 6. Nein, ich habe nicht dasjenige geſehen, welches Sie erwähnen. 7. Die Freude, die ich haben werde. 8. Ich kam, weil ich es ihm verſprochen hatte. 9. Wo wohnen Sie? 10. Ich wohne in demſelben Hauſe, in welchem ich wohnte, als Sie mich beſuchten. 11. Welche dieſer Damen iſt Ihre Frau? 12. Diejenige, welche mit dem alten Herrn ſpricht. 13. Der Freund, welchen ich verloren habe, war mir ſehr theuer. 14. Ich habe den Rock gekauft, welchen Sie in dem Fenſter meines Schneiders ſahen. 15. Empfehlen Sie mich dem Herrn, welcher ſo ſehr höflich iſt.

EXERCISE 33 (Vol. I., page 197).

1. Is this young man ill? 2. No, but he was ill yesterday. 3. Who has been in your father's garden? 4. Nobody has been in the garden, but somebody has been in his house. 5. How long does the old peasant still remain in the town? 6. I am not acquainted with the old peasant, and don't know how long he remains. 7. Is your old friend, the merchant, gone to Vienna? 8. I believe he is gone to Berlin to his brother. 9. From whom have you heard this news to-day? 10. I have spoken to one of my friends, who has come from Dresden, and has brought a letter to me from my father. 11. I reside with my uncle, and go with him to the little village. 12. My beautiful bird has flown out of the cage, and my little horse has run to the forest. 13. What has your father written to you? 14. He has written (to) me a long letter. 15. When were you at the market? 16. I was there the day before yesterday in the evening, and bought some beef. 17. We have had beautiful weather this afternoon. 18. These scholars have been lazy, and those diligent. 19. The snow was very deep the day before yesterday. 20. I have never been ill. 21. Frederick the Great was (a) King of Prussia.

RECREATIVE NATURAL HISTORY.

WHALES.

THE weary voyager, who for weeks has seen nothing but sea and sky, is at times diverted by the sight of some huge monster of the deep disporting itself on the bosom of the ocean. It may be a large Sperm Whale spending ten minutes in breathing before plunging once more to unknown depths, or a shoal of porpoises darkening the sea as they rise for the same purpose, or the huge common whale, so longed for by the whaler in search of whale-bone and blubber; but whatever the kind, it breaks in on their monotony, and is, for the time, a matter of deep interest to them. The whale, however, is a most remarkable animal, and is worthy of more than a passing thought as being the largest of all animals both on sea and land, not excepting the most gigantic of elephants, and as presenting us with the seeming paradox of being a fish, and yet no fish. This latter point is one of extreme interest from a scientific standpoint, and we may as well at once inquire into it.

The ordinary observer is persuaded that the whale is a fish when he reflects that it lives in water like other fishes, is shaped like them, and has fins and a tail which are used to propel it through the water. The naturalist, on the other hand, is also persuaded that it is no fish, but an animal much more like our cat, pig, or horse, and he classes it along with these domestic animals in preference to giving it a place among sharks, salmon, &c. Such an arrangement seems to do violence to one's idea of what is proper in the matter of classification, yet we shall now see that the naturalists are right; that, in short, a whale is more like the domestic animals we have mentioned than it is like a cod or a salmon, and for these reasons. A fish has a heart with two chambers only in it; a whale, on the other hand, has a four-chambered heart, like that possessed by each of the domestic animals we have referred to. A whale is unlike a fish and like the cat in many other important respects: thus, the whale is warm-blooded, *i.e.*, has a temperature of from 98° Fahr. to 120° Fahr., whereas a fish is cold-blooded, or has a temperature very much lower; the whale is a lung-breather, whereas the typical fish breathes by means of gills; the whale gives birth to its young alive, but the young of a fish are born by the hatching of eggs; the whale suckles its young until they are able to take care of themselves, the young of a fish receive little if any parental attention after they have broken the shell. Now, the reader will very readily perceive that in each of these particulars, while the whale differs from a fish, it is like, say the domestic cat, which is warm-blooded, has a four-chambered heart, breathes by means of lungs, and suckles its young. In order that there may be no misapprehension, we may say a few words more about the difference in their ways of breathing. Both whale and fish have their blood purified by means of oxygen, but while the former obtains it from atmospheric air, coming periodically to the surface for that purpose, the latter abstracts the oxygen it requires from the *air dissolved* in the water. Now air is not very soluble in water, and the amount of it which is dissolved varies much with the circumstances of pressure and temperature. Also more oxygen than nitrogen is dissolved by a given measure of water, so that it will readily be inferred that the air dissolved in water is richer in oxygen than atmospheric air. It is this oxygen which the fish abstracts from the dissolved air by means of its gills, so that it has no reason to rise to the surface to breathe like the whale.

The whale, then, plainly belongs to that large body of animals which suckle their young, if we are to be guided in our arrangement of them by similarities of structure, and this fact is now universally recognised by naturalists, who place whales in that large group of animals to which they have given the name of Mammalia.

The whale is externally unlike most other mammals, because it has to live under widely different conditions from them, moving, as it does, in a comparatively heavy fluid, and at times under very great pressure. Roughly speaking, its body is more or less cigar-shaped, tapering gradually until the tail is reached, where it expands into an enormous fin, sometimes as much as twenty feet broad. At the fore-part, and on each side, of the body, not far from the corners of the mouth, there is a swimming paddle. These flippers or paddles appear to be used mainly for balancing purposes. It is the tail fin which is principally used to propel the whale by its movements just as a single oar at the stern may be made to drive a boat through the water. The skin is generally quite hairless, and of enormous thickness, consisting of elastic fibres interlacing in all directions, in the interstices of which oil is contained. This is the substance which is known as blubber. This large accumulation of oily matter doubtless subserves two important ends: first, that of helping to keep up the animal heat by preventing the constantly changing surface of extremely cold water from carrying it off, and in the second place serving as a cushion to withstand

*

than 1590, the drama was still in a crude and half-formed condition. Even in 1580, none of the works of Shakespeare's contemporaries which have attained any lasting position had been given to the world. Between 1580 and 1590, Lyly first, and Marlowe afterwards, wrote some plays that are still read and reprinted; but if Marlowe preceded Shakespeare at all, it could have been only by two or three years at the utmost. We must conclude, therefore, that a simultaneous efflorescence of dramatic genius appeared in several individuals.

It would be extremely interesting to know which was the first of Shakespeare's plays, and what were the respective dates of his other works, so that we might follow with certainty the development of his marvellous powers. Unfortunately, however, we know scarcely anything of these matters, and are perhaps less acquainted with the details of Shakespeare's life than with those of any other famous man of the modern world. In so brief an essay as the present, it would be idle to repeat conjectures which are incapable of verification. But it is evident to every heedful reader of Shakespeare that his works belong at least to two categories—those of a less and those of a greater maturity. To the former, we may refer "The Two Gentlemen of Verona," "The Comedy of Errors," "A Midsummer Night's Dream," some of the chronicle plays, and various other dramas; "Hamlet," "Macbeth," "Othello," "A Winter's Tale," "The Tempest," "Twelfth Night," and the Greek and Roman plays, are as manifestly the productions of a ripened intellect, profoundly acquainted with Nature and with the world. Between the least excellent and the most admirable, are some which seem to mark an intermediate stage, and the best order in which to print the plays of Shakespeare would be according to the scale of merit, but that this would be imposing too difficult a task upon any editor.

The life of our great dramatist came to a close in 1616, when he was exactly fifty-two years of age. Supposing him to have begun writing at about twenty-two (the time at which he probably left Stratford-on-Avon for London), he had thus, in a period of thirty years, produced some thirty-five tragedies and comedies (if not more), together with a number of poems, besides discharging the duties of an actor and a theatrical manager. Many dramatists of that time wrote much more; but when we consider the degree and variety of power by which the plays of Shakespeare are distinguished, the number in itself becomes surprising. Another remarkable fact connected with this literary phenomenon is the indifference which he appears to have shown to the preservation and correct presentment of his own works. It is probable that several of his plays were treated with considerable freedom by the actors, and, although some were printed during the lifetime of the author, it is very doubtful whether he took any trouble to amend the errors of the press. The first collected edition of the dramas was published in 1623, seven years after the poet's death. This was the celebrated folio, the authority of which is so often quoted in opposition to that of the quartos. In quarto, there is no collected edition of the plays; but seventeen out of the five-and-thirty were issued in this form previous to the folio of 1623. Three other folios followed the earliest, at various parts of the seventeenth century. All these volumes swarmed with the most ridiculous blunders, and it was not until 1709 that Nicholas Rowe, the author of "Jane Shore," published the first of the critical editions of Shakespeare, with conjectural restorations of the text. After that followed many others, and the literature of Shakesperian comment is now a library in itself.

LESSONS IN ARITHMETIC.—XXVI.

COMPOUND SUBTRACTION.

5. THE process of finding the difference of any two compound quantities of the same kind is called *Compound Subtraction.*

This is performed upon the same principle as simple subtraction—*namely*, that the difference between any two quantities is not altered by adding the same quantity to each.

EXAMPLE.—*From* £25 9s. 7¾d. subtract £14 17s. 9¾d.

Write the less quantity under the greater, with the corresponding denominations under each other, and express, for clearness, the farthings in a separate column.

Three farthings cannot be subtracted from 1 farthing. We therefore add 1 penny, or 4 farthings, to the 1 farthing of the upper quantity, and 1 penny to the 9 pence of the lower quantity. Then 3 farthings subtracted from 5 farthings leave 2 farthings. Again, 10 pence cannot be subtracted from 7 pence. We therefore add 1 shilling, or 12 pence, to the 7 pence of the upper quantity, and 1 shilling to the 17 shillings of the lower quantity. Then 10 pence subtracted from 19 pence leave 9 pence. Again, 18 shillings cannot be subtracted from 9 shillings. We therefore add 1 pound, or 20 shillings, to the 9 shillings of the upper quantity, and 1 pound to the 14 pounds of the lower quantity. Then 18 shillings subtracted from 29 shillings leave 11 shillings; and 15 pounds subtracted from 25 pounds leave 10 pounds.

£	s.	d.	far.
25	9	7	1
14	17	9	3
10	11	9	2

We have, in fact, subtracted the less of the annexed two quantities from the greater, and they are obtained by adding (as it will be found by examination we have done) £1 1s. 1d. to each of the quantities originally given.

£	s.	d.	far.
25	29	19	5
15	18	10	3
10	11	9	2

Hence we get the following

6. *Rule for Compound Subtraction.*

Write the less quantity under the greater, so that the same denominations stand beneath each other. Beginning with the lowest denomination, subtract the number in each denomination of the lower line from that above it, and set down the remainder below. When a number in the lower line is greater than that of the same denomination in the upper, add one of the next highest denomination to the number in the upper line. Subtract as before, and carry one to the next denomination in the lower line, as in simple subtraction.

7. ADDITIONAL EXAMPLE.

Subtract 75 gals. 3 qts. 1 pt. from 82 gals. 2 qts.

gals.	qts.	pts.
82	2	0
75	3	1
6	2	1 Ans.

Here, there being no pints in the upper line to subtract the 1 pint of the lower line from, we add 1 quart—*i.e.*, 2 pints—to the upper line, and the same quantity to the quarts of the lower line. Then 1 pint subtracted from 2 pints leaves 1 pint. 4 quarts cannot be subtracted from 2 quarts. We therefore add 1 gallon—*i.e.*, 4 quarts—to the 2 quarts of the upper line, and 1 gallon to the 75 gallons of the lower. Then 4 quarts subtracted from 6 quarts leave 2 quarts; and 76 gallons subtracted from 82 gallons leave 6 gallons. The operation we have really performed is the subtraction of the less of the subjoined quantities from the greater, and they are obtained from the original two quantities by the addition of 1 gal. 1 qt. to each.

gals.	qts.	pts.
82	6	2
76	4	1
6	2	1 Ans.

EXERCISE 44.

Find the difference of—

1. £48 17s. 6½d. and £37 14s. 9¾d.
2. £1,000 and (£500 6s. 7½d. + £496 7s. 6d.)
3. 16 cwt. 3 qrs. 15 lbs. and 8 cwt. 2 qrs. 8 lbs. 6 oz.
4. 85 tons 16 cwt. 39 lbs. and 61 tons 14 cwt. 68 lbs.
5. 69 m. 41 r. 12 ft. and 89 m. 10 r. 14 ft.
6. 17 leagues 2 m. 3 fur. 4 r. 4 ft. and 19 leagues 1 m. 2 fur. 15 r.
7. 85 bush. 2 pks. 4 qts. and 49 bush. 3 pks. 6 qts.
8. 115 qrs. 3 bush. 1 pk. and 95 qrs. 4 bush. 3 pks.
9. 85 yds. 1 qr. 2 nls. and 29 yds. 2 qrs. 3 nls.
10. 100 yds. and 55 yds. 2 qrs. 1 nl.
11. 140 acres 17 rods and 54 acres 1 rood 18 rods.
12. 465 acres 48 rods and 230 acres 1 rood 30 p.
13. 446 cubic ft. 75 in. and 785 cubic ft. 69 in.
14. 30° 55′ 15″ and 55° 58′ 30″.
15. 71° 10′ and 36° 6′ 30″.
16. 160 yrs. 11 mo. 2 wks. 3 d. 16 h. 30 min. 40 sec. and 106 yrs. 8 mo. 3 wks. 6 d. 13 h. 45 min. 34 sec.
17. How many days from February 22, 1845, to May 21, 1847?
18. How many days from August 25, 1840, to February 6, 1842?

COMPOUND MULTIPLICATION.

8. Multiply £25 2s. 7¾d. by 6.

We may perform the operation as follows:—

		£	s.	d.
3 farthings	× 6 is 18 farthings, or	0	0	4½
7 pence	× 6 is 42 pence, or	0	3	6
2 shillings	× 6 is 12 shillings, or	0	12	0
5 pounds	× 6 is 30 pounds, or	30	0	0
The sum of all these is		£30	15	10½

This is the required result, because, in multiplying any quantity by a number, if we multiply separately the parts of which the quantity is composed, and then add the products together, the result is the same as would be obtained by multiplying the whole quantity by that number. The above operation would, in practice, be thus arranged:—

£5 2s. 7¾d.
6

£30 15s. 10½d.

Hence we see the truth of the following

9. *Rule for Compound Multiplication.*

Multiply each denomination separately, beginning with the lowest, and divide each product by that number which it takes of the denomination multiplied to make one of the next higher. Set down the remainder, and carry the quotient to the next product, as in addition of compound numbers.

Obs.—Any multiplier is of necessity an *abstract* number. Two concrete quantities cannot be multiplied together. Multiplication implies the repetition of some quantity a *certain number of times;* and we see, therefore, that to talk of *multiplying* one concrete quantity by another is nonsense.

In the case of geometrical magnitudes—in finding the area of a rectangle, for instance—we do not *multiply* the feet in one side by those in the other, but we multiply the *number* of feet in one side by the *number* of feet in the other, and from geometrical considerations we are able to show that this process will give us the *number* of square feet which the rectangle contains. The very idea of multiplication implies that the multiplier must be an *abstract* number. It is of the nature of *twice, thrice,* etc. (*Vide* Obs. of Art. 7, Lesson XXII., Vol. I., page 380.)

10. ADDITIONAL EXAMPLE IN COMPOUND MULTIPLICATION.

Multiply 12 lbs. 3 oz. 16 dwts. by 56.

In a case like this, where the multiplier exceeds 12, it is often more convenient to separate it into factors, and to multiply the compound quantity successively by them (Lesson VI., Art. 2, Vol. I., page 95). Now 56 = 7 × 8.

lbs.	oz.	dwts.
12	3	16
		7
86	2	12
		8
689	8	16 Answer.

EXERCISE 45.

Work the following examples in compound multiplication:—

1. £35 6s. 7d. by 7.
2. £1 6s. 8½d. by 18.
3. 1 ton 270½ lbs. by 15.
4. 16 tons 3 cwt. 10½ lbs. by 25 and 84.
5. 17 dwts. 4½ grs. by 96.
6. 15 gals. 2 qts. 1 pt. by 63 and 126.
7. 175 miles 7 fur. 18 rods by 84, 196, and 96.
8. 40 leagues 2 m. 5 fur. 15 r. by 50, 200, and 385.
9. 149 bush. 12 qts. by 60, 70, 80, and 90.
10. 26 qrs. 7 bush. 3 pks. 5 qts. by 110 and 1008.
11. 150 acres 65 rods by 52, 400, and 3000.
12. 70 yrs. 6 mo. 3 wks. 5 d. by 17, 29, and 36.
13. 265 cubic ft. 10 in. by 93, 496, and 5008.
14. 75° 40′ 21″ by 210, 300, and 528.
15. £213 5s. 6½d. by 819 and by 918.
16. 5 tons 15 cwt. 17 lbs. 3 oz. by 7, by 637, and 763.
17. £13 7s. 9½d. by 1086012 and by 1260108.

(For the last three questions refer to Lesson VII., Arts. 15, 16, Vol. I., page 111.)

KEY TO EXERCISE 43, LESSON XXV. (Vol. II., page 37).

1. £18 3s. 4½d.
2. £102 3s. 5½d.
3. £93 0s. 2$\frac{53}{176}$d.
4. £4345 2s. 0½d.
5. £57613 2s. 6½d.
6. 9 tons 8 cwt. 5 lbs.
7. 45 tons 4 cwt. 45 lbs. 2 oz.
8. 107 lbs. 7 oz. 8 dwts. 11 grains.
9. 109 leagues 2 miles 6 fur. 1 foot.
10. 468 acres 1 rood 6 p.
11. 43 sq. yds. 5 sq. ft. 125 sq. in.
12. 240 gallons.
13. 115 weeks 15 hours 25 minutes.
14. 71 years 5 months 1 week 4 days 11 hours 7 min.
15. 2 oz. 3 drachm 12 grains.
16. 1203 cubic yards 6 feet 1059 inches.
17. 9 square miles 86 acres 1 rd. 35 p.
18. 22 Fr. e. 4 qr. 2 nl.
19. 11 cong. 7 o 16 f℥ 5 f℥ 6 ℥.
20. 22 loads 1 quarter 3 bushels 2 pecks.

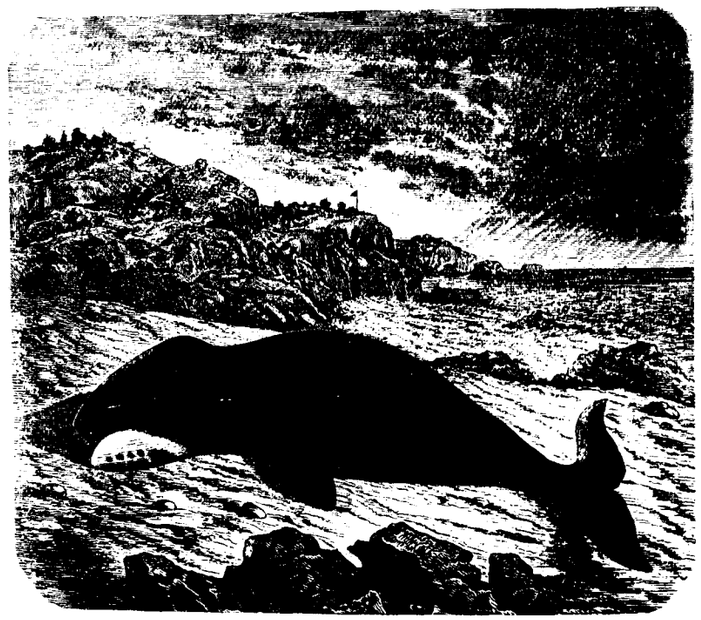
LESSONS IN GEOGRAPHY.—XVI.

HAVING explained, in a previous Lesson (see Vol. II., page 4), the nature of the seasons arising from the annual motion of the earth in its orbit or path round the sun, and the parallelism of its axis, or the invariable inclination of that axis to the plane of its orbit, we shall render this subject more strikingly evident by means of the accompanying diagram of the seasons. Here the sun is considered to be fixed at the point F in Fig. 4 (page 80), which is considered to be the *focus* of the elliptical or oval orbit in which the earth moves, and which is so near to the centre of the curve that it may be, on this small scale of figure, reckoned the same with that centre; and you know that the centre is the point where the *major* axis, between summer and winter, intersects or crosses the *minor* axis, between spring and autumn. If you are curious enough to know how far the *focus,* F, is from the real centre of the orbit, we shall tell you; it is about *one-sixtieth part* of the half of the *major axis,* or of the *mean distance* between the earth and the sun, from the real centre. Let us see if we can express this distance in some known measure. The mean distance of the earth from the sun, or the length of the mean semi-diameter of the earth's orbit, is about 23,109 times the length of the mean terrestrial radius, or of the mean distance from the centre of the globe of the earth to its surface. The earth's mean radius is 3,956½ British miles, its mean diameter being 7,913 miles. Therefore multiplying 3,956½ miles by 23,109, we have the mean distance of the earth from the sun, that is, half the major axis of its orbit, about 91,431,000 in round numbers. This makes the mean diameter of the earth's orbit about 182,862,000 miles, and its approximate circumference about 574,709,000 miles. The linear eccentricity of the earth's orbit being ·0168, or about *one-sixtieth* of its semi-axis major, or mean distance of 91,431,000 miles, we have 1,523,850 miles for the distance between the centre of the orbit and the centre of the sun, or the focus of that orbit. Consequently, the earth is about double this distance, or 3,047,700 miles *nearer* to the sun *in winter* than in summer.

In Fig. 4, the earth is represented in four different positions (*momentary* positions) in its orbit; namely, at mid-summer, mid-spring, mid-winter, and mid-autumn. In all these positions, as well as all round in its various positions in the orbit, the parallelism of its axis, N S, is preserved. This axis is inclined to the plane of the orbit, as we have before observed, at an angle of 66° 32′; hence it makes an angle of 23° 28′ with the perpendicular to the plane of its orbit; for the perpendicular, represented by the dotted line passing through the centre, O, makes an angle of 90° with the plane of the orbit; and subtracting 66° 32′ from 90° gives the remainder 23° 28′, which is the angle between the axis, N S, and the perpendicular, or dotted line. By reason of this parallelism of the axis N S, it so happens that at *mid-spring,* or March 20th, the half of the globe is illuminated from pole to pole, that is, from the northern extremity of the axis N, to the southern extremity of the axis S, and the days and nights are then exactly equal all over the earth; that is, there are twelve hours of light and twelve hours of darkness to every spot on the earth's surface for this day. Hence this day is called the *equinox* (*equal night*) *of spring,* or the vernal equinox. Again, at *mid-summer,* or June 21st, the half of the globe is illuminated from the circumference of a small circle of the globe at the distance of 23° 28′ from the north pole, N, to the circumference of a small circle at the distance of 23° 28′ from the south pole, S; and the day is twenty-four hours long at all places of the earth contained in the space between the small circle and the north pole; that is, there are twenty-four hours of light and no darkness at all to every spot within this space on this day; but the night is twenty-four hours long at all places of the earth contained in the space between the small circle and the south pole, that is, there are twenty-four hours of darkness and no light at all to every spot within this space on this day. As at this point the earth begins to *return* to a position similar to that at the vernal equinox, and the sun seems to be *stationary* as to its appearance and effects on the earth's surface for two or three days before and after this day, it is called the *summer solstice* (*sun-standing*), or the *tropic* (*turning*) *of summer.* Next, at *mid-autumn,* or Sept. 23rd, the half of the globe is again illuminated from pole to pole, and the same appearances take place as at the equinox of the spring, that is, the days and nights are then exactly equal all over the

the enormous pressure the animal has to bear at great depths. Suppose a whale after breathing darts down a thousand fathoms, there would then be a pressure of nearly 25 cwt. on every square inch of its surface. The nostrils are situated at the highest point of the head, so that the animal can breathe as soon as ever this portion emerges from the water. Beneath the nostrils there are two reservoirs communicating with the back of the mouth by means of the nasal passage, which is furnished with a valve so strong that even the enormous pressure we have already mentioned is not sufficient to force the external water into its mouth. If, however, when at the surface it desires to spout water from the nostrils or blow-holes, the water is forced out of the mouth into the nasal passage, and the valve being now closed, the walls of the reservoir are contracted, and the water forced out in a stream. This is the process of *spouting*. And the whale-bone, where does that come from?

If the history of a bit of whale-bone taken out of an old umbrella could be correctly known, it would form a most entertaining account of natural fact and adventure. It was originally taken from the mouth of a Greenland whale of prodigious size, for some of these whales attain to a length of seventy feet, according to Scoresby. The mouth is so large that men can stand upright in it as in a small chamber, for it attains to a length of ten feet and a height of thirteen feet. It has a tongue of enormous size, but no teeth. The whale-bone or *baleen* plates hang from the upper jaw, which in form is not unlike a boat's keel reversed. The thin and closely-set baleen plates serve to retain the small marine animals on which it subsists. When it feeds it swims rapidly below the surface of the water with open jaws, and the stream of water entering them charged with minute life finds an outlet at the sides, being filtered of these organisms by the thick internal hairy whalebone plates. The animalculæ, fish, &c., are now gathered up by the tongue and swallowed. The gullet is very small, and only fitted for taking such food. And now let us see how the whale is caught.



THE GREENLAND WHALE (*Balæna mysticetus*).

Imagine you are on a whaling ship in the far-off ice regions. The sailor posted on the look-out on the highest portion of the ship suddenly gives the signal that he sees a whale. The boats are launched, and with an officer at the stern of each and a harpooner at the bow, the sailors in measured time ply their oars. Having arrived at or near the place where the whale disappeared, the officer and harpooner both keep a sharp look-out for the animal. A rumbling sound is heard, and presently a broad whirlpool announces that the whale is approaching the surface; then the blow-holes appear, sending up a double column of white vapour. If by successful manœuvring the boat has approached within two or three fathoms, the harpooner is ready to fling his iron dart at the animal. The favourable moment arrives, and the officer cries out "Strike!" Instantly the quivering harpoon is buried deep in the flesh of the whale, that is, of course, should the harpooner have successfully performed his duty. But often it happens that the instrument is not well fixed from his having sent the harpoon badly. The whale may then free itself, and make its escape. But where the first harpoon has been successfully driven into the flesh, it is often followed by another before the whale has time to recover from its first direful alarm caused by the pain, and now there follows a succession of wild divings and harpoonings terribly exciting and dangerous, until the monster of the deep with one last struggle gives up his life. If they now be successful in getting it near the ship, a rich prize has been obtained, as the whale-bone or baleen from a single whale has been known to fetch £200, and from the blubber a large supply of valuable oil is obtained.

There are many other kinds of whales besides the one we have just spoken about, and one of them is of very great importance from a commercial point of view, as a single individual has been known to yield oil worth £1,000. We refer to the Cachalot or Spermaceti whale. It is of enormous size, attaining to a length of 78 feet, and having a head nearly as long as the rest of its body, and exceeding it in bulk. The size of its head is owing mainly to the presence of a large quantity of spermaceti, which lodges in a hollow or trough on the upper part of the skull, and is not less than six feet deep. This reservoir is quite separate from the brain cavity, which is comparatively small. The Cachalot is also provided with a layer of blubber, yielding a less quantity of oil than that obtained from the Greenland whale, but of purer quality. The lower jaw is furnished with large conical teeth, sometimes to the number of fifty-four. This is utilised in the arts as a kind of inferior ivory. Each tooth fits into a sort of socket in the upper jaw, which is toothless.

Want of space precludes our speaking in detail of other whales; of the long-tusked narwhals, or sea unicorns, which travel in great herds; of the prettily-shaped dolphin, the favourite of ancient mythology, and the amuser even of modern mariners by its leaps and frisky movements; of the porpoise, which is the smallest of whales, being little over a yard in length, but which is, nevertheless, the terror of mackerel, herring, and salmon, which flee before it for dear life; of the grampus, about eight yards long, noted for its fights with the most gigantic of whales, which having met, it hustles and worries until in very weariness it opens its enormous mouth, when the voracious grampuses eat up its tongue; and lastly of the manatee—mild, affectionate, and sociable—which, from its fancied resemblance to a woman when seen at a distance holding its young to its breasts with its flippers, has been called a woman of the sea. These various kinds of whales are divided into families, and the families are again grouped under two headings—*Cetacea* and *Sirenia*. The manatee, with its fancied resemblance to the mythical siren, belongs to the latter order, and the other whales we have spoken of belong to the order of *Cetacea*.

GEOMETRICAL PERSPECTIVE.—II.

In this course upon Geometrical Perspective we propose to place before our pupils several methods of construction, and show where they are applicable to special cases. The *ground-plan* method is the most simple and general. The *lineal method*, although it is equally useful, involves the necessity, in some instances, of a greater number of lines; but as this system dispenses with the use of a ground-plan, it may to some extent curtail the amount of labour. Some of the problems will be worked by both systems; and with regard to the ground-plan method, we shall introduce some modifications which we hope will enable our pupils to understand it thoroughly.

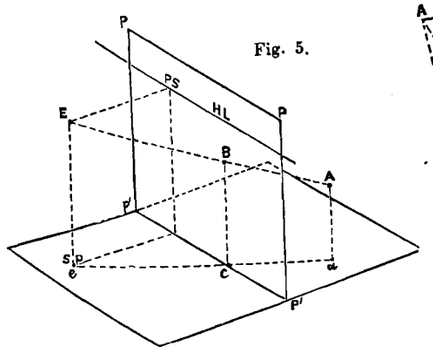


Fig. 5.

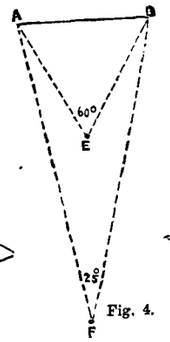


Fig. 4.

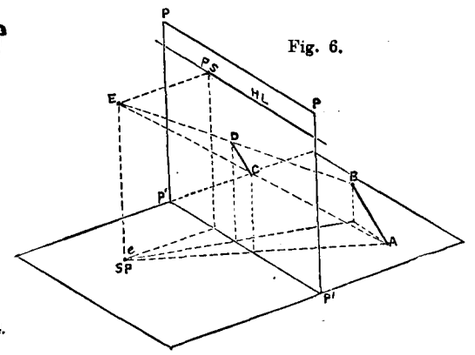


Fig. 6.

The *station-point* is sometimes determined by placing it at a given distance from the *picture-plane*, sometimes from the object represented by its ground-plan, the picture-plane intervening. In either case we must bear in mind that the *visual rays* from the two extremities of the object must not form an angle greater than 60°, meaning that the whole of the object must be included in that angle, because the full extent of vision each way, right and left, without moving the head, is not greater than 60°. But even if we include the object within 60° only, we should be too near it to make a satisfactory and effective drawing; therefore an angle of about 25° or 30° at the outside is sufficiently large, as in Fig. 4, where the eye at E embraces the line A B within an angle of 60°, while at F the same line is included within an angle of 25°. The latter point, F, is a better distance for viewing the object, A B. An explanation of the practical operations of perspective and their results may be limited to that which relates to a point, or in the same way to a series of points; for as points are the extremities of straight lines, no matter their positions, it must be evident that if we can determine the position of one point upon the plane of projection, which we call the picture-plane, we can do so of more, and thus determine the extremities of lines. Let A (Fig. 5) be a point in space—that is, somewhere in the air above the ground, and away from the picture-plane, P P, P¹ P¹. The horizontal projection of this point—in other words, its plan—will be *a*. Let E be the position of the eye, *e* will be the horizontal projection of the eye—that is, over where the eye is placed, otherwise called the station-point, S P. Now if *e* and *a* are joined by a straight line, the line *e a* will be the horizontal projection or plan of the visual ray from the object, A, to the eye, E; because A *a* and E *e* are perpendicular lines, therefore every part of the line E A is perpendicularly over the plan *e a*. It will be observed that *e a* cuts the base of the picture, P¹ P¹, in *c*, from which a perpendicular is drawn to meet the line E A in B, therefore B is the perspective projection on the picture-plane of the point or object, A. We give a similar representation of two points (Fig. 6), which are the extremities of the line A B. A is on the ground, B is above the ground; consequently the line A B is inclined to the horizon. We need not enter into an explanation of this after that of Fig. 5, as it will be seen by the working lines that C D is the perspective representation of A B.

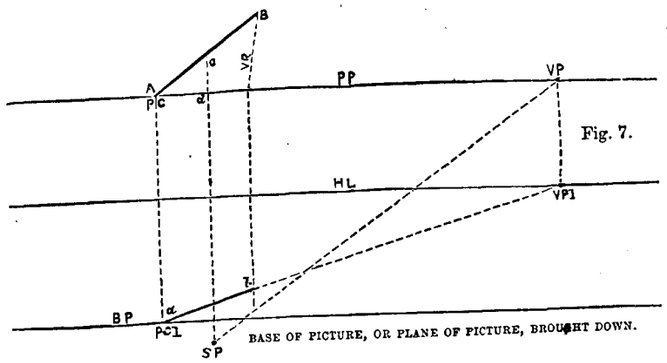


Fig. 7.

BASE OF PICTURE, OR PLANE OF PICTURE, BROUGHT DOWN.

We shall have to consider objects under various positions.

Case 1. When they are parallel with the picture-plane, and also with the ground.

Case 2. When they are perpendicular to the picture-plane, and parallel with the ground.

Case 3. When they are perpendicular to the ground, and parallel with the picture-plane.

Case 4. When they form an angle with the picture-plane, and parallel with the ground.

Case 5. When they form an angle with the ground, and parallel with the picture-plane.

Case 6. When they form an angle both with the picture-plane and the ground.

To illustrate the *first position*, place a rectangular table before you, so that both ends may be equally distant from the eye: the front edge of the table will be *parallel with the picture-plane*, and the top will be *parallel with the ground*; and at the same time the retiring edges of the ends will be *perpendicular to the picture-plane* and *parallel with the ground*. This answers to the *second case*. The front of the table, from the top to the ground, will explain the *third case*, because it is *perpendicular to the ground*, and *parallel with the picture-plane*. Now push one end of the table away from you, so as to cause the distance between the two ends from the eye to be different, then the *front edge will be at an angle with the picture-plane, but the top will remain parallel with the ground*. This illustrates the *fourth case*. Bring the table back to its first position, and let one end be raised, then *the top will form an angle with the ground*, and *the front edge will be parallel with the picture-plane*. This answers to the *fifth case*. The *sixth case* will be explained if you push the raised end of the table away from you, as was done in Case 4, then *the front edge will be at an angle with the picture-plane*, and *the top will be at an angle with the ground*. These positions might have been illustrated by a line only, but

earth, or there are twelve hours of light and twelve hours of darkness to every spot on the earth's surface for this day. Hence this day is called the *equinox of autumn*, or the autumnal equinox. Lastly, at *mid-winter*, or Dec. 21st, the half of the globe is illuminated from the circumference of a small circle of the globe at the distance of 23° 28′ from the south pole, S, to the circumference of a small circle at the distance of 23° 28′ from the north pole, N, and the day is twenty-four hours long at all places of the earth contained in the space between the small circle and the south pole; that is, there are twenty-four hours of light and no darkness at all to every spot within this space on this day; but the night is twenty-four hours long at all places of the earth contained in the space between the small circle and the north pole; that is, there are twenty-four hours of darkness and no light at all to every spot within this space on this day.

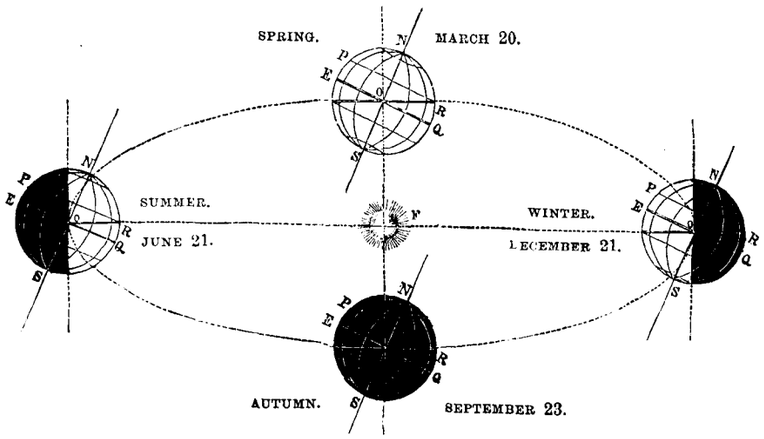


FIG. 4.—DIAGRAM SHOWING THE CHANGES OF THE SEASONS.

In looking at the diagram, you see at the equinox of spring, or March 20th, the *whole* of the illuminated half of the globe, because from the representation of its position it is turned in front both to the sun at F, and to you the spectator; at the summer solstice, or June 21st, you see only *half* of the illuminated half of the globe, because it is turned in front to the sun at F, but only sideways to you the spectator, you being outside of the orbit; at the autumnal equinox, or Sept. 23rd, you see *none* of the illuminated half of the globe, because it is turned in front to the sun at F, but at the back to you, the spectator, you being outside the orbit and as it were behind the globe; and at the winter solstice, or Dec. 21st, you again see *half* of the illuminated half of the globe, because it is turned in front to the sun at F, but only sideways to you, the spectator, for the same reason as before. But were you placed in the middle of the orbit at the point F, you would, by turning round and round to the different points of it we have been describing, see the *whole* of the illuminated half of the globe at each point; and were you placed outside of the orbit in the directions of the major and minor axes, and made to look at the globe in these directions only, you would see *none* of the illuminated half of the globe, but only the dark side in each position.

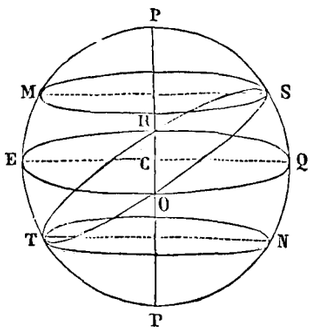


FIG. 5.

We must now explain the nature of some of the more important circles on the sphere or globe of the earth. If in Fig. 5, which we suppose to be a representation of the globe of the earth, P P denotes the axis—that is, the diameter of the sphere, passing through the centre, C, on which the sphere or globe revolves like a wheel on an axle—then it is evident that every point on its surface will, in the course of its revolution or whirling on its axis, describe a circle. Thus the points, M, E, and T on the surface, will describe the circles M S, E Q, and T N respectively; and it is evident that the point E, equally distant from the two points P P, the extremities or poles of the axis, will describe the largest circle of all in the course of the revolution; and that if the sphere were cut by a plane or flat surface, like an orange by a knife, through the circle E Q, it would pass through C, the centre of the sphere. Every circle, whose plane thus passes through the centre of the sphere, is called *a great circle* of the sphere. It is further evident that every point, such as M, on the surface of the sphere, will describe a circle smaller than the circle E Q in proportion to its distance from the point E on either side, or to its vicinity to either of the points P P; and that if the sphere were cut by a plane or flat surface, like an orange by a knife, through such a circle as M S, it would *not* pass though C, the centre of the sphere. Every circle whose plane does not pass through the centre of the sphere, is called *a small circle* of the sphere. Accordingly, the circles M S and T N are called small circles of the sphere; and if the points M and T be equally distant from the point E, these circles will be equal in size, and their planes will cut the axis in two points equally distant from the centre, C. The plane of a great circle, such as E Q, cuts the globe or sphere into *two equal hemispheres;* but the plane of a small circle cuts it into *two unequal parts*, or *segments (cuttings) of a sphere.*

For some purposes, the circumference of a circle, large or small, is divided into 360 equal parts, in order to enable us to measure distances along the circumference; each of these equal parts being called *a degree;* for other purposes, the circle is divided into two equal parts called *semicircles*, and these are also divided into degrees, each containing 180 degrees, and both 360 degrees as before; and for other purposes still, the circle is divided into four equal parts called *quadrants*, each containing 90 degrees, and the whole containing 360 degrees as before. Each degree is divided into 60 equal parts called *minutes*, and these minutes (minute parts) are employed to express any part or fraction of a degree which may be found over and above a certain number of degrees in any distance. Again, each minute is divided into 60 equal parts called *seconds*, and these *seconds* (second minute parts) are employed to express any part or fraction of a minute which may be found over and above a certain number of degrees and minutes in any distance; and so on, to *thirds*, *fourths*, etc. This division of *the degree* is called the *sexagesimal* (*by sixtieths*) division of the *degree;* the division of the *quadrant* of a circle into 90 degrees is called the *nonagesimal* (*by ninetieths*) division of the *quadrant*. The French, in some of their scientific works, divide the *circle* into 400 equal parts, calling them degrees; and of course, the *quadrant* into 100 degrees; also the *degree* into 100 parts called *minutes;* and so on: this is called the *centesimal* (*by hundredths*) division of the *quadrant*. Any number of *degrees* is marked by a *small circle* placed on the right of the number in a small character, and above the line; thus 27° denotes 27 degrees. Any number of *minutes* is marked by *one dash* from right to left, on the right of the number; of *seconds*, by *two dashes*, and so on; thus 10′ denotes 10 minutes, 10″ denotes 10 seconds, etc.

COMPARATIVE ANATOMY.—II.

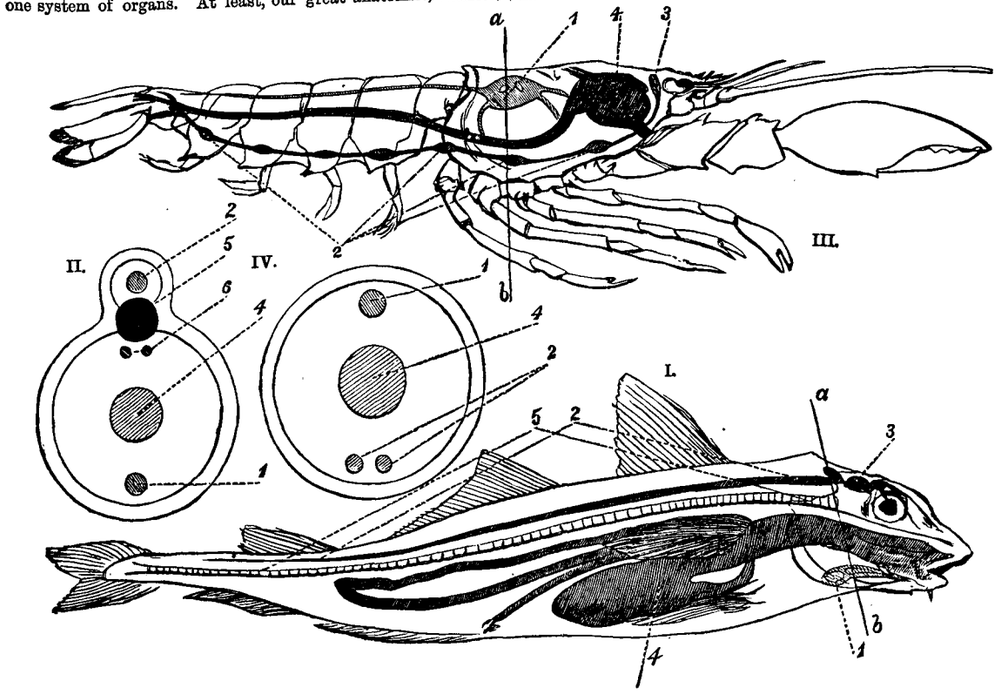
DIVISIONS OF THE ANIMAL KINGDOM—VERTEBRATA—MOLLUSCA—MOLLUSCOIDA—ANNULOSA—ANNULOIDA—CŒLENTERATA—PROTOZOA.

THE main divisions of the animal kingdom, called sub-kingdoms or branches, were first established on anything approaching a scientific basis by the great Baron von Cuvier. Previous classifiers had endeavoured to mark out these divisions by differences in some one organ or system of organs. The system which was generally made use of, as producing the most natural classification, was that of the organs of circulation of the blood, or the nutritive fluid which answered to the blood. The classification of animals according to the structure of their hearts, blood-vessels, etc., was perhaps as good as any founded on any one system of organs. At least, our great anatomist, Hunter, who had carefully examined all the systems of organs of animals in relation to their use in classifying, thought so. It now, however, seems to be laid down as a rule that it will not do to rely on any one character in classification. If a classification be made in dependence on the modifications of but one organ, it is sure to be an unnatural one. If, on the contrary, it can be stated that any group of animals is distinguished from the rest by peculiarities in two or more systems of organs, that group is sure to be a natural one. Cuvier was more successful than his predecessors, not so much because he had any better key by which to interpret the animal kingdom, as because he relied on no key, but trusting to his wide knowledge of the structure of animals, and to his sagacious perception of what similitudes or differences were fundamental and what were unimportant, he made a classification which recognised the plan of structure of each animal as a whole, that is, as made up of the sum of its organs. The difficulties attending such a method are far greater, the definitions of the branches thus formed are less simple and precise, than those of the former methods, but the results have the merit of being true to nature, and therefore stable.

Cuvier divided the animal kingdom into four sub-kingdoms, as follows:—

Vertebrata.
Mollusca. *Articulata.*
Radiata.

The three higher divisions remain very much as he constituted them. There could be no higher testimony to the value of these than this, that all the multitude of higher animals that have been discovered or examined since his time fall naturally under one or other of his divisions. Cuvier himself assigned some animals to the wrong branch, yet when the error was discovered it did not necessitate the formation of a new system, but merely a transference from one branch to another; and this proves conclusively that the classification was not an artificial system fitted on to his knowledge, which, though wide, was of course limited, but was a recognition of the fundamental plan of nature.



I. SKETCH OF HADDOCK, SHOWING ITS EXTERNAL FORM, AND ALSO THE ARRANGEMENT OF ITS INTERNAL ORGANS. II. TRANSVERSE SECTION OF HADDOCK AS EXHIBITED AT THE LINE *a b*. III. SKETCH OF LOBSTER, SHOWING ITS EXTERNAL FORM AND THE ARRANGEMENT OF ITS INTERNAL ORGANS. IV. TRANSVERSE SECTION OF LOBSTER, EXHIBITED AT THE LINE *a b*.
Refs. to Nos. in Figs. I., II., III., IV.—1, heart; 2, nervous system; 3, brain; 4. alimentary canal; 5, vertebral column; 6, sympathetic nervous system.

The lowest of these branches, designated *Radiata*, has not maintained its ground as the others have, for the following reasons. Many of the animals assigned to this branch are microscopic, and had been but little examined, and Cuvier founded his branch on the plan of structure exhibited by some of the more conspicuous animals, such as the star-fish, and he assumed that all the lower animals conformed to that plan of structure. This, however, has been found not to be the fact. Nor was the definition of this branch good as far as it went, since it was founded on one peculiarity alone, namely, the plan of structure. In fact, however derogatory the admission may be to the great anatomist, we are compelled to admit that his sub-kingdom *Radiata* stands in the same relation to the rest of his admirable system, as the untidy lumber-room—which generally exists in even a well-ordered house, and into which everything which has no definite place of its own is thrown—does to the rest of the establishment. Most of us who make natural history collections of any kind have in our cabinets a spare drawer, into which specimens we have not had time to examine or to name, or whose place in the collection we are doubtful

probably they will be better understood from the table, as the position of the several parts will be easily recognised. We recommend our pupils to go through this experiment with a table, it will help them better to understand the positions of objects in the problems that will be given in the course of these lessons.

In ground-plan perspective the rule for finding the vanishing-point is:—

Draw a line from the station-point, SP, *parallel with the ground-plan, as far as the plane of the picture,* PP, *from which draw a perpendicular line to the horizontal line,* HL; *this will give the vanishing point,* VP.

In order to assist the pupil in comprehending this, we request him to turn to Fig. 7 in the preceding page, and he will notice first the *ground-plan*, of a line only, A B, at an angle with the PP. It must be remembered that this line, PP, is the plan or projection of the whole surface of the picture, supposed to be in an upright position, and as we cannot draw upon a piece of paper so placed, it is necessary to *rabat* it—that is, turn it down and lay it flat upon the table. This is done by bringing down the picture-plane, and all the points of intersection of visual rays and points of contact (*anywhere*, so that there may be sufficient space to make the drawing), towards the station-point, SP—we have marked it BP, "base of picture, or plane of picture, brought down." From this line we arrange the height of the eye, or horizontal line. Now to find the vanishing point for the line represented by its ground-plan:—Draw a line from SP to VP, parallel to A B, and draw a perpendicular line from VP to VP^1. VP^1 will be the vanishing point for the given line represented by the plan A B. This must be learnt *at once*, as it will be wanted in almost every case of ground-plan perspective. It does not signify whether the given line is inclined or parallel to the horizon; it is the *plan only* of the line we use for finding the VP, as will be seen when we come to problems relating to inclined lines and planes.

We advise the pupil to work the problems that we shall bring under his notice in the course of these lessons to a scale of half an inch to the foot—that is, if we say he is to draw a line five feet long, he will make it five half inches; and, to save a great deal of repetition, we will settle at once that the height of the eye, HL, from the ground is five feet, and ten feet from the picture-plane. This scale may be employed until we propose another, when we come to other problems.

PROBLEM I. (Fig. 7).—*Draw the perspective view of a given line,* A B, *five feet long, lying on the ground, forming an angle with the picture-plane of* 35°, *and touching the picture-plane; the eye to be opposite the centre of the given line.*

Draw a line, PP, to represent the picture-plane; from any point, A, draw a line, A B, at an angle of 35° with PP (see Lessons in Geometry, Problem XX., Vol. I., page 256), and make it, according to the given scale, five feet long; find the centre of A B in *c*, and from *c* draw a line perpendicularly to the picture-plane to any length; mark the point *d* on PP. Anywhere below, draw the base of the picture, BP, parallel to PP, and draw the line HL parallel to BP or PP. From *d* make *d* SP equal to ten feet. Now find the vanishing-point, VP^1, as we have already explained. Because the end of the given line A B touches the PP at A, therefore A is the point of contact of the line A B; mark it PC. Bring it down perpendicularly to the line BP to PC^1. Draw a line from PC^1 to VP^1, and somewhere upon this line will be the perspective view of the given line, A B, to be found thus:—As the line A B touches or is in contact with the PP, therefore the perspective view will commence at PC^1; the other end B, away from PP, is found by drawing a visual ray, V R, from B towards the SP, stopping at the picture-plane, from which it is taken perpendicularly until it cuts the line PC^1 and VP^1 in *b*; *a b* is then the perspective representation of the given line A B. Make the space between *a* and *b* somewhat darker than the rest of the line.

We advise the pupil to repeat this problem until he knows the method of working by heart, then to turn the line or plan the other way; and, again, increase or diminish the angle of inclination with the picture-plane. Also change the height of the eye, or horizontal line, and the distance of the eye from the picture-plane; these various positions of the object will very materially assist the pupil in understanding the method of working the problem.

LESSONS IN ENGLISH.—XXI.

WORDS THAT ARE BOTH PREFIXES AND SUFFIXES.

SOME of the words which we treated of in the last Lesson as uncombined suffixes, may also be regarded as uncombined prefixes. The same word stands before and after its stem. You may take, as an instance, to cast-*down*, and *down*-cast. In this instance the meaning varies, but does not greatly vary; to cast-*down* is used physically, and *down*-cast signifies *dejected, sorrowful*. Besides this difference, there is a difference also as to the function of the two words, for the former is a *verb*, the latter is an *adjective*. Rarely, perhaps, does the import remain the same, if the position of the adverb is altered. Make a prefix a postfix (or suffix), and in general you produce a greater or less modification of meaning. Indeed, some of the most delicate shades and hues of thought expressed in the English language are connected with, if not dependent on, the varied use of these movable particles. It may, therefore, be proper to go into some little detail on the point.

It is not all the prefixes and suffixes that usage permits to take their stand before or after their principal word. *Out* enjoys the privilege, and makes free use thereof. Look at these examples:—

cast-*out*,	*out*-cast.	cry-*out*,	*out*-cry.
bid-*out*,	*out*-bid.	laugh-*out*,	*out*-laugh.
grow-*out*,	*out*-grow.	look-*out*,	*out*-look.
do-*out*,	*out*-do.	right-*out*,	*out*-right.
live-*out*,	*out*-live.		

An *out*-cast is one who undergoes the result and consequences of being cast-*out*. Corresponding with *out*-cast, is *out*-law. But though we may say to *out*-law, we cannot say to law-*out*. *Out*-post is again different from *out*-cast, for *out*-post does not make the idea of action so prominent as does *out*-cast. In this respect *out*-cast is not unlike *out*-lay. *Out*-lay may be reversed; thus, lay-*out*. But while the verb is lay-*out*, the noun is *out*-lay. To bid-*out*, is to bid with a clear, loud voice; but to *out*-bid, is to bid more than another. To grow-*out* is very different from to *out*-grow. A young brother, by becoming taller, *out*-grows an elder brother; and the elder brother, who is thus surpassed, may be grown-*out* at the shoulders so as to be hump-backed. To do a person *out* of anything, is to cheat him; but to *out*-do a competitor is to excel him. If my children live-*out* the century, they will *out*-live me. By crying-*out* lustily, boys make a great *out*-cry. That shameless man, by laughing-*out* so loud and so long, *out*-laughed all the company. If you look-*out* at the window, you will have a pleasant *out*-look.

"We have taken all the *out*-lying parts of the Spanish monarchy."—*Temple.*

"But for public dormitories, how many a poor creature would have been obliged to *lie-out* of doors in the nights of the last severe winter!"—*Anon.*

"Oh, my lord,
You said that idle weeds are fast in growth;
The prince, my brother, hath *out*-grown me far."—*Shakespeare.*

"Albert has *grown-out* of his clothes."—*Anon.*

"But breathe his faults so quaintly
That they may seem the taints of liberty;
The flash and *out*-break of a fiery mind."—*Shakespeare.*

"A fire *breaking-out* in the cellar, consumed the whole house."—*Anon.*

"Nor they which use
To *out*-*drink* the sea."—*Donne.*

"You have *drunk-out* the cask. Children cannot well *drink out of* goblets."—*Anon.*

"He looked and saw what numbers numberless
The city gates *out*-*poured*."—*Milton.*

"*Pour-out* a glass of wine for the famished woman."—*Anon.*

"The workmen, in *standing-out* for the wages, have *out*-*stood* the appointed time."—*Anon.*

"Sense and appetite *out*-*vote* reason."—*South.*

"A large majority of the constituency *voted* the old member *out*."—*Anon.*

"Better at home lie bed-rid, idle,
Inglorious, unemployed, with age *out*-*worn*."—*Milton.*

"This reverent leecher, quite *worn out*
With rheumatisms, and crippled with his gout."—*Dryden.*

"By Shakespeare's, Johnson's, Fletcher's lines,
Our stage's lustre Rome's *out*-*shines*."—*Denham.*

"Out of Zion, the perfection of beauty, God *hath shined*."—*Psalm* l. 2.

Over produces many combinations.

look-*over*,	*over*-look.	flow-*over*,	*over*-flow.
reach-*over*,	*over*-reach.	persuade-*over*,	*over*-persuade.
run-*over*,	*over*-run.	ride-*over*,	*over*-ride.

You look-*over* your workmen and find faults that you cannot *over*-look. A bad tradesman reaches-*over* his counter and *over*-reaches his customers. Cisterns *over*-run, and drivers run-*over*. A river *over*-flows its banks, and the water flows-*over* the fields. You persuade an opponent *over* to your own party, and so *over*-persuade an associate that he relinquishes your company. If you persuade a person *over* you cannot *over*-persuade him. In attempting to *over*-ride a competitor, take care you do not ride *over* him. The boy having run *over* his companion in the race, easily *over*-ran him.

Other particles are of less frequent use, but not less curious are they. To *back*-stitch differs from to stitch-*back*. By reckoning his *in*come a man learns how much he has coming *in*. The *out*-goings of a family should be regulated by its *in*come. If I *with*-hold my opinions I may continue to hold *with* you. He talks so much of bearing *with* me that I can hardly *for*bear to reprove him. The poor man has been taken *off* as if he were the *off*-scouring of the streets. That young girl was taken *off* at the early age of seventeen, being *over*taken by disease. One general made an *on*slaught on the cavalry, while the other fell *on* the infantry.

"Immediately the mountains huge appear
Emergent, and their broad, bare backs *up*-*heave*
Into the clouds."—*Milton.*

"Thou hast made my curdled blood run back, my heart *heave up*, my hair to rise in bristles."—*Dryden.*

*Along*side the cutter we coasted *along* the shore. The *under*-takings of your father are *under*-paid. The *under*standing was that you *stand under* the spout. The *under*taker receives funereal arrangements *under* his care.

"An *under*-plot may bear such a near relation to the principal design as to contribute towards the completion of it, and be concluded by the same catastrophe."—*Spectator.*

"In *under praising* thy deserts
Here find the first deficience of our tongue."—*Dryden.*

"*Under* two conditions the poet engaged to compose the eulogy."—*Anon.*

"For this assembling all the peers
Whose counsels now must *under*-*prop* the throne."—*Drayton.*

He *placed* a line of props *under* the falling wall. An *influx* of gold causes bank-notes to *flow out* of circulation. The *inlets* are more numerous than the *out*-*lets*, consequently you will be compelled to *let out* the water by artificial means.

EXERCISES FOR PARSING.

Our abodes out-last our bodies. Curtail your outlays if you wish for ease of condition. He laughed out-right. Let thine eyes look right on. You shall be driven out right forth. This way, right down to Paradise, descend. An over-much use of salt, besides that it occasions thirst and over-much drinking, has other ill effects. You have yourself your kindness over-paid. He gained a large fortune over the counter. Parents too often overpraise their children. Come o'er the brook, Bessy, to me. With an over-running flood God will make an utter end of the place. Were it not for the incessant labours of this industrious animal, Egypt would be overrun with crocodiles. Milk while it boils, and wine while it works, run over the vessels they are in. I shall not run over all the particulars that would show what pains are used to corrupt children. Should a man run over the whole circle of earthly pleasures, he would be forced to complain that pleasure was not satisfaction. The zeal of bigotry runs out into all manner of absurdities. The zeal of many outruns their discretion.

COMPOSITION.

As minds are differently formed and capacity varies with every successive individual, I am desirous of making another suggestion or two, which may possibly smooth the way to original composition for some whom the instructions previously given may have left in difficulty. I advise you, then, to accustom yourself to report as correctly as you can, to a child, something that has struck your attention, whether in what you have heard, what you have seen, or what you have read. I say report the substance by word of mouth. Endeavour to employ suitable words, to pronounce them correctly, and to put them together grammatically. At first you will commit errors; but, in time, perseverance will enable you to overcome all difficulties. Make your report to a child, say a younger brother or sister; I mention a child, because in speaking to a child you will speak readily and naturally. There is another advantage: in order to gain a child's attention you must take a simple subject, and on simple subjects you will not want words. Subjects such as I contemplate are constantly occurring wherever there are human beings. You may take as your theme some accident that has happened in the house where you reside, in a neighbouring mine, on the high road; or you may describe a bird's nest; the peculiar form, colour, and habits of the swallow, the dog tribe, the cat tribe, the daisy, the wild rose, the honey-bee, etc.

Well, having described the object to a child, take your pen and write down as well as you can the very things you said, and having carefully corrected them according to the best of your ability, copy out the whole in your composition-book.

Many children would be far better as an auditory than one child. And very desirable for your purpose is it that utility to others should be immediately in your view. For these reasons I advise you to become a teacher in a Sunday-school, or if that is not possible or not convenient, then gather around you a number of children and form a class. By preparing to teach them you will give your mind useful discipline, and in communicating to them what you know you will take effectual lessons in the difficult art of correctly expressing your thoughts. By teaching others you will best teach yourself. To diligence there is nothing impossible. Report to a child or two the following anecdote:—

SOUTHEY'S SCHOOLING.

Here one year of my life was passed with little profit, and with a good deal of suffering. There could not be a worse school in all respects. Thomas Flower, the master, was a remarkable man, worthy of a better station in life, but utterly unfit for that in which he was placed. His whole delight was in mathematics and astronomy, and he had constructed an orrery upon so large a scale that it filled a room. What a misery it must have been for such a man to teach a set of stupid boys, year after year, the rudiments of arithmetic! And a misery he seemed to feel it. When he came to his desk, even there he was thinking of the stars, and looked as if he were out of humour, not from ill-nature, but because his calculations were interrupted. But, for the most part, he left the school to the care of his son Charley, a person who was always called by that familiar diminutive, and whose consequence you may appreciate accordingly. Writing and arithmetic were all they professed to teach; but twice in the week a Frenchman came from Bristol to instruct in Latin the small number of boys who learnt it, of whom I was one. That sort of ornamental penmanship, which I now fear has wholly gone out of use, was taught there. The father, as well as Charley, excelled in it. They could adorn the heading of a rule in arithmetic in a ciphering-book, or the bottom of a page, not merely with common flourishing, but with an angel, a serpent, a fish, or a pen, formed with an ease and freedom of hand which was to me a great object of admiration; but, unluckily, I was too young to acquire the art. I have seen, in the course of my life, two historical pieces produced in this manner; worthy of remembrance they are, as notable specimens of whimsical dexterity. One was David killing Goliath; it was in a broker's shop at Bristol, and I would have bought it if I could have afforded, at that time, to expend some ten shillings upon it. They taught the beautiful Italian, or lady's hand, used in the age of our parents; engrossing (which, I suppose, was devised to ensure distinctness and legibility); and some varieties of German text, worthy, for their square, massy, antique forms, to have figured in an antiquarian's title-page.

EXERCISES IN COMPOSITION.

Historical Theme—The formation of the Hebrew Tabernacle. *Personal Theme*—What have been my thoughts during this day? *Poetical Theme*—The stillness of the country.

Form each of the following words into a simple sentence:—

Girl; boy; dove; California; amendment; Adam; England; disturbance.

Describe a butterfly; a robin; a lark; a salmon; a mackerel; a sheep; a rabbit.

Supply suitable adjectives in the ensuing sentences:—

Wise men love ——— counsels. ——— men must die. The ——— fruit of autumn is delicious. Small faults produce ——— ones. O how ——— is hypocrisy!

Complete the following propositions:—

——— for having been too exacting. ——— to respect the aged. ——— the prevention of evil. ——— for having soiled his book ——— the scholar's negligence.

about, are placed. The contents of such a drawer are the measure of our ignorance, and when we are particularly fresh in spirit, or have much leisure, we open it with a confident expectation that a patient study of its contents will lead us to a further knowledge, and a truer and more complete arrangement. Such a drawer is Cuvier's branch *Radiata*, and men who have felt that Cuvier had forestalled all other anatomists in the arrangement of the higher animals into their main divisions, have been able to solace themselves by re-arranging the heterogeneous number of animals for which the star-fish and sea-urchin stood as the representatives in the mind of Cuvier.

Inasmuch as we must dismiss this branch *Radiata* from our system, and shall not be able to recur to it again, as we must to the other branches, it is, perhaps, as well that we should explain the character on which it was founded. Cuvier observed that while some of the higher animals have their two sides alike, yet they could be split down the middle in one direction only, so as to leave two exactly similar halves. Thus, if one of us were divided from the crown of the head vertically downward, so that the division passed through the mid-line of the back and also of the breast, we should be divided into two like halves; but if the vertical division were made in any other direction, the two halves, though they might be equal, would certainly be not alike. If, on the other hand, a star-fish be placed flat on a table, it may be bisected in more than one direction, and the halves would be alike. Indeed, if we wanted to divide it into like portions, we should naturally cut it into five or ten or more segments, beginning from the centre, and cutting outwards. The organs are not paired on each side of one plane, but arranged like the spokes of a wheel in diverging directions from a central axis. This plan of structure was therefore considered as the type of the branch *Radiata*, a *radius* meaning a line drawn from the centre to the circumference of a circle. If this radial arrangement of organs had been universal throughout this sub-kingdom, and were found in no other, this would have formed a well-marked division, but it is not so. Some of the organs of higher animals have an apparent radial arrangement, as, for instance, the hooklets by which intestinal worms fix themselves. In so-called radiate animals there is generally a two-sided arrangement to be found. Thus, while the arms of the sea-anemone are radial, stretching away on all sides, its mouth has two lips and two corners. The common purple-tipped sea-hedgehog (*echinus*) is in outward form a typical radiate, but its near ally, the heart-urchin, is almost as two-sided as ourselves. We therefore reject this sub-kingdom, and substitute others in its stead, as will be seen in the sequel.

Instead of at once enumerating the numbers of sub-kingdoms of the animal kingdom, and appending to each a dry catalogue of the characters upon which they are formed, it is, perhaps, better to induce the reader to examine two animals belonging to two different branches for himself, so that he may remark the essential differences in structure which they manifest. Suppose, then, he procure a prawn and a stickleback, or, if he aim at larger specimens, more easily examined, he can obtain, as we have done, a lobster and a haddock. If these be carefully observed, first as to their external character, and then as to their internal organs, there will be found some points of similarity, but a great many points of difference.

Both are elongated animals, and both can be divided by a mid-vertical section into two similar halves. The outer covering of the fish, though it is covered with small scales, is thin and flexible. It offers but little resistance to pressure, and no firm support, or fixed point, from which muscles can play upon the limbs. It, moreover, manifests no tendency to division into segments or rings. Turning to the lobster, we find it is enclosed in a hard, inflexible armour, which is divided into segments or rings, placed one behind the other. This division is well marked and complete in the hinder part of the body, where there are seven hard annular pieces united by softer membrane. They overlap one another above, but are separated below. The great shield which covers the head and fore part of the body also consists of fourteen segments, but they have all become united. This thick, hard outer covering is the only solid part of the animal, and therefore to this must be attached the muscles at both ends; that is, both at the fixed point of support from which they pull, and also at the part of the body or limbs which they are intended to move. This arrangement is carried out even to the limbs, whose joints are likewise cased in separate hard tubes, and which are wielded from within. Further, there is a manifest tendency for each segment of the body to have a pair of limbs. Thus, beginning from behind, we find on the last segment the limbs are not developed, but only indicated; but on the next they form the side lobes of the tail, and are the main instruments by which the lobster darts rapidly backward when alarmed. The next four segments have each paired limbs, consisting of two small fringed plates set at the end of a joint, and with them the lobster paddles quietly forward. Then comes a segment with a pair of limbs composed of two joints, used for other necessary purposes. Then under the great shield are the walking limbs, all many-jointed. Two pairs with one claw are preceded by two more terminated by small pincers; then come the formidable claws. Next come the foot-jaws and jaws. There are six pairs of these, placed closely one over the other, beneath the mouth; they cannot be seen in the engraving. Then come the pair of longer feelers, the shorter feelers, and finally the jointed eye-stalks. Thus each of the twenty-one segments of which the lobster's integument is supposed to consist has a pair of well-developed limbs, with the exception of the last.

How utterly different is the locomotive apparatus of the fish! The necessary hard parts upon which the muscles must play are nowhere to be found on the outside. They are situated internally. Running through the centre of the body from snout to tail is a bony column or axis. This axis consists of pieces which are so closely united end to end that they support one another, but are capable of a slight motion on one another, so that the back-bone which they form can be bent and slightly twisted. This back-bone, ending forward in the base of the skull, is the main part of the hard skeleton which affords attachment to the muscles which move the limbs. In this case the tendency of each segment of the internal skeleton to produce limbs is so little marked, that there are not more than two pairs of paired limbs in all; and throughout this large sub-kingdom, which includes brutes, birds, reptiles, and fish, there are never more than this number found, though sometimes there is but one pair, and sometimes none at all. These limbs are not jointed hard tubes, pulled and moved by muscles running up the inside of them, but they are supported by bony levers, while the muscles act on them externally.

Passing on to the other systems of internal organs, we find a marked difference in the arrangement of the nervous, alimentary (food), and blood circulatory systems, in relation to one other.

In the lobster the nervous system consists of a double series of rounded masses called ganglions, which commence with two lying side by side (though partially united together) above the mouth, and in connection with the eyes, antennæ (feelers), etc. From these two cords stretch back, one running on each side the mouth or throat, to another double ganglion, and from this cords pass back which unite the remaining nervous masses together, all of which lie in a series along the floor of the tubular cavity of the body enclosed by the rings. Each ring has a double ganglion of its own, but these are sometimes united together, as in the lobster. The food canal runs from end to end through the centre of the body, and at its front extremity passes through the nervous tract (as we have seen), and opens on the under side of the body. The heart is situated above the food canal, and just under the hard covering of the back. We have, therefore, the main blood system situated above the food canal in the centre, and the nervous system below it; these two latter, however, crossing one another and exchanging places just at the front of the animal. All these structures are contained within one tube, which is the hard covering of the animal.

Contrasted with this arrangement is that of the fish. In this animal the food canal occupies the same central position, but the heart, instead of lying above it, lies on the under side. The nervous system does not consist of a series of knots, but of a continuous column, and it is contained not in the tube which lodges the other viscera, but in another tube, formed of bony arches springing from the back-bone, and which is super-imposed on the other tube. The relative arrangement is best understood by a reference to the illustration, where transverse sections are given, supposed to be taken from the parts of the animals where the lines marked *a b* cross the lateral views of the lobster and haddock.

The fish and the lobster, then, present two types of structure which are utterly different in many fundamental points, and if

in the comparison we have seized on those points which are of greatest importance, we shall find that when we compare any other animals belonging to these branches, first to the one type and then to the other, in reference to these peculiarities, we shall have no difficulty in classifying them either in one division or the other.

A dog, for instance, though a very different animal from a fish, is like it in the points we have noted. It has a back-bone of jointed vertebræ, and a columnar nervous system. It has no segmented external skeleton. It has but four limbs, and its jaws are not paired limbs lying side by side, but are placed one above the other. A dragon-fly is very different from a lobster in less fundamental particulars, but in the essentials named it is like to it. It has a chain of double nerve masses on the floor of its tubular body, crossed by the food canal between the first and second masses; and so we might run on through the whole of the structure, and show that it was really built upon the same general plan as the lobster.

The sub-kingdom to which the fish belongs is called *Vertebrata*, a vertebra being the technical name given to one of the joints of the back-bone. This name *vertebra* was given because the fact that the back-bone was so sub-divided enabled its elements to turn one on another (*verto* being the Latin for *to turn*).

The lobster belongs to the invertebrate animals, but the invertebrates include more than one sub-kingdom, and that to which the lobster belongs was called by Cuvier *Articulata*, because they are jointed as to external skeleton of both body and limbs. *Articulus* is the Latin for *a joint*.

If, instead of a dog or a dragon-fly, we had taken a slug, we should have found that while the arrangement of the nervous, blood, vascular, and food systems to one another was quite different from the fish, and similar to the lobster, yet we should have found no hard jointed body, no chain of double ganglions on the floor of the body, and no limbs. This animal, therefore, belongs to neither of these types, though it is, of course, an invertebrate.

The student is now prepared for the enumeration of the sub-kingdoms and their characters. They are these:—

Vertebrata.

Mollusca (of Cuvier) { *Mollusca.* / *Molluscoida.* } — *Annulosa* = *Articulata* of *Annuloida.* Cuvier.

Cœlenterata.

Protozoa.

It should be noted that the form in which these are given has a meaning. That the *Vertebrata* stand at the top of the scale is admitted by all; the *Protozoa* are as unquestionably the lowest animals, and next above them come the *Cœlenterata*. It is, however, impossible to determine whether the *Mollusca* or the *Articulata* are the higher animals. The *Mollusca* seem, in the higher members of their branch, to approach most nearly to the vertebrates, but the higher members of the branch *Articulata* are of such beautiful and complicated structure that they certainly cannot be placed lower than the *Mollusca*. We are compelled, therefore, to range them side by side, at a like elevation. We proceed to give the characters of the sub-kingdoms:—

1. *Vertebrata.*—Animals, the main trunk of whose nervous system consists of ganglionic matter massed together in the form of a column. It is found on the dorsal (upper) aspect of the body, its axis lying in the median vertical plane which divides the animal into two symmetrical halves. This main nervous trunk consists anteriorly of the brain and posteriorly of the spinal cord. It is usually enclosed in a bony or cartilaginous cavity formed by the upper arches of the vertebræ. The bodies of these vertebræ form the essential portion of an internal bony or cartilaginous (gristly) skeleton. The column thus formed is placed immediately below the central nervous trunk, and sends upward processes to form a series of dorsal arches to defend the nervous axis, and downward a series of less perfect arches, in which lie the circulatory and alimentary organs. Appended to this column, which forms the axis of support and resistance whereon the rest of the skeleton hinges, are (normally) four limbs, two anterior and two posterior. The blood is red, and enclosed in vessels. Jaws playing vertically.

Mollusca (from mollis, *soft*).—Animals with soft bodies enveloped in soft skin, which is constantly moist, which is itself muscular, and to it the muscles are attached. This skin has usually the power of secreting within or upon its tissues a calcareous extravascular secretion (the shell). The nervous masses are dispersed unsymmetrically through the body, their number and position being very various in the different divisions of the sub-kingdom. Organs of secretion, nutrition, and propagation more perfect than those of locomotion and animal life.

Molluscoida.—Animals having the general character of the *Mollusca*, but distinguished from them by having hearts of a simple saccular character without division, or none at all. With ciliated tentacles disposed in a circle or horse-shoe shape round the mouth.

Annulosa (from annulus, *a ring*).—Animals with a body composed of a longitudinal series of more or less distinctly developed ring-like segments, which are more or less repetitions of one another, according to the lower or higher position of the species. The horny or leathery exteriors of these rings form an exo-skeleton, to which the muscles are attached, and which forms a protective envelope to the body. Nervous system consisting of a double chain of ganglia. Every organ or system of organs bi-laterally symmetrical. Locomotive organs and organs of sense attain in this class a high development.

Annuloida.—Animals somewhat like the *Annulosa*, but the perfect form is developed within a ciliated larva.

Cœlenterata.—Animals whose alimentary canal freely communicates with their body cavity. Body consisting of two foundation membranes of definite cellular structure.

Protozoa.—Animals whose body consists of a sarcode substance, which has no definite cellular structure, but which is elastic, extensile, and albuminous in composition. They have no nervous system or organs of sense, but have structures called respectively nucleus and contractile vesicle.

If the student finds these descriptions hard to understand, he must wait for explanation till the following lessons are before him. It is now necessary to be concise, even at the risk of being obscure.

LESSONS IN LATIN.—XVI.

RELATIVE AND INTERROGATIVE PRONOUNS.

Relative—Qui, quæ, quod, *who* or *which*. Interrogative—Quis, quæ, quid? *who* or *which?*

RELATIVE.

Singular.

Cases.	M.	F.	N.
N.	qui, *who;*	quæ, *who;*	quŏd, *which.*
G.	cujus, *whose;*	cujus, *whose;*	cujus, *of which.*
D.	cui, *to whom;*	cui, *to whom;*	cui, *to which.*
Ac.	quem, *whom;*	quam, *whom;*	quod, *which.*
Ab.	quō, *by whom;*	quā, *by whom;*	quō, *by which.*

Plural.

N.	qui, *who;*	quæ, *who;*	quæ, *which.*
G.	quorum, *whose;*	quarum, *whose;*	quorum, *of which.*
D.	quibus, *to whom;*	quibus, *to whom;*	quibus, *to which.*
Ac.	quos, *whom;*	quas, *whom;*	quæ, *which.*
Ab.	quibus, *by whom;*	quibus, *by whom.*	quibus, *by which.*

INTERROGATIVE.

Singular.

N.	quis?	quis? before a noun, quæ?	quid? before a noun, quod?
G.	cujus?	cujus?	cujus?
D.	cui?	cui?	cui?
Ac.	quem?	quam?	quid
Ab.	quo?	qua?	quo?

Plural.

N.	qui?	quæ?	quæ?
G.	quorum?	quarum?	quorum?
D.	quibus?	quibus?	quibus?
Ac.	quos?	quas?	quæ?
Ab.	quibus?	quibus?	quibus?

The preposition cum is sometimes set after the pronoun; as, quocum, quacum, quibuscum, *with whom, with which.*

Quis is repeated so as to form the compound pronoun quisquis, *whosoever*. In this case, both parts are declined thus: quisquis, m.; quæquæ, f.; quicquid, n. When the neuter is used as a substantive it is generally written quidquid. Take as instances: quoquo modo res habet, *in whatever way the thing is;* quicquid id est, *whatever that is.* In quicunque, *whosoever*, the qui is declined, and to its parts cunque is added, as cujuscunque, quodcunque, etc.

LESSONS IN MUSIC.—XI.

"THE PATTERN" AND "THE MOVABLE DOH."

THE other difficulties found by students relate to "the pattern" and "the movable DOH."

Often students will ask "whether they can learn the Music Lessons without the aid of a friend to set the pattern." A large number of our pupils are, no doubt, like one of them who says, "I have naturally a good ear for music, and am able to sing almost any song after hearing it two or three times." By such persons, very little patterning will be needed. Let them only learn, from a friend, how to strike the chord (DOH, ME, SOH) to any sound that may be given, and the rest will easily follow. We ourselves were exactly in their position, and *did* thus "make out" tunes, and teach ourselves to sing plain tunes at sight—*constantly using the modulator, and pointing as we sang*, and often having to run up or down from one note to another, in order to know how to strike an interval. We had nothing but a c^1 tuning-fork, by means of which we found out the key-note. Everything depends on the faithfulness with which you master the exercises of the first three lessons. But to many persons, doubtless, who have no friend to set the pattern, some simple instrument will be necessary. If you are already acquainted with an instrument, *whatever it is*, use that. Only let us warn you not to sing *with* your instrument—that is, to use it as a "pattern," not as a "leader"—to make yourself independent of the pattern as soon as possible, often endeavouring to do without it, and to trust more and more to your own perception of the mental effect of notes, as developed in our lessons; for instruments may be out of tune, and some of them—the piano and organ for instance—are systematically (to however small an extent) *imperfect* in tune. The flatness of the fifths on the piano, for instance, are very obvious. The fifth note in the scale (SOH) should be brilliant and trumpet-like in its effect. The pupil's knowledge may thus correct the slight inaccuracies of his instrument.

Before proceeding to the third difficulty, the "movable DOH, or key-note," let our pupils practise carefully the following exercise. It is intended to exhibit the contrasted effects of ME and SOH (the third and fifth of the scale) in a somewhat quick movement.

EXERCISE 19.—"I LOVE TO LINGER." KEY A. M. 100.

(Words by Martin Farquhar Tupper. Tune, OLD ENGLISH.)



2. *My foot falls lightly on the sward,*
Yet leaves a deathless dint,
With tenderness I still regard
Its unforgotten print.

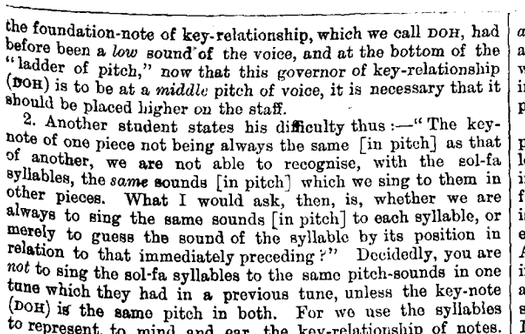
3. Old places have a charm for me
The new can ne'er attain,
Old faces! how I long to see
Their kindly looks again!

1. In pursuance of the plan already adopted, while our pupils are continuing their practice and study of the three chief notes of the scale, we shall "revise" and enlarge our previous Lessons in reference to those points which are capable of being misunderstood, or need to be more fully explained. We must ask the patience of those pupils who have put themselves into our hands, with all good faith, content to learn one thing at a time, for we have to teach many who cannot understand us, because they have misunderstood music before. *Docility*—that quality so absolutely necessary to the student of any arranged course of lessons, which develops truth step by step, leads from the known to the unknown, from the easy to the difficult—is too often forgotten; and, as Dr. Marx says, to punish him for neglect of docility, the student loses all certainty of success. The "MOVABLE DOH," on account of the common misapprehension of the first foundations of musical truth, and the false teachings which are abroad, is a great difficulty with some of our pupils. One of them "proceeded very pleasantly as far as the fifth Exercise, in which the key-note (or DOH) is G. But that he could not understand." He says, "In the previous exercise the notes DOH, ME, SOH, are placed respectively below the line in the first and second spaces; but in the exercise I have mentioned, I find DOH on the second line. Why should there be that change in the position of the note? And how is it to be sounded?" The last question is clearly answered in the note to Exercise 5—"Take a *middle* sound of your voice for the key-note of DOH." In the previous exercises a *low* sound had been taken for DOH. In the first case *any* middle sound, and in the second *any* low sound, would have answered the purpose. The reason of the change of DOH'S position on the staff is, that the staff aims to represent to us height and lowness of absolute *pitch*, as well as *key-relationship*; and as

the foundation-note of key-relationship, which we call DOH, had before been a *low* sound of the voice, and at the bottom of the "ladder of pitch," now that this governor of key-relationship (DOH) is to be at a *middle* pitch of voice, it is necessary that it should be placed higher on the staff.

2. Another student states his difficulty thus:—"The key-note of one piece not being always the same [in pitch] as that of another, we are not able to recognise, with the sol-fa syllables, the *same* sounds [in pitch] which we sing to them in other pieces. What I would ask, then, is, whether we are always to sing the same sounds [in pitch] to each syllable, or merely to guess the sound of the syllable by its position in relation to that immediately preceding?" Decidedly, you are *not* to sing the sol-fa syllables to the same pitch-sounds in one tune which they had in a previous tune, unless the key-note (DOH) is the same pitch in both. For we use the syllables to represent, to mind and ear, the key-relationship of notes. And we use the well-known letters c^1, B, A, G, F, E, D, to represent their absolute *pitch*. We hope presently to show that this practice of ours is both the oldest and the best. But do not let our friends suppose that upon *any* of the common plans of solfa-ing they can associate a *distinct idea* of pitch with each place on the staff. Take, for instance, the first place below the staff. That place may be filled by any one of three perfectly distinct sounds, by D, by D sharp, or by D flat. Now you may call these three sounds by the same name—RAY, for instance—but they are three most distinguishable sounds still. Your syllable RAY, then, cannot possibly represent a *distinct* idea of pitch. It can only stand for an indistinct, or, at best, a three-fold idea! Hence the indecision of voice, common among those who pursue the fixed method of solfa-ing.

3. Neither let our friends imagine that, even if they *could* establish in their minds a fixed association of absolute pitch with each place on the staff, in learning to sing at sight, it is the attainment chiefly to be sought. For, undoubtedly, we *learn to recognise* a note by the effect which it produces on the mind; and, as was amply proved in our eighth lesson, the effect of a note on the mind arises not, except in a small degree, from its pitch, but chiefly from its key-relationship. Some of our readers will understand these remarks better when they see this same phrase (essentially the same, though placed at different heights in pitch) in the old notation. They will perceive that the sol-fa syllables, which, having taken their pitch from the key-note, represent thenceforth only *relationship* of sound, remain the same in all three cases. And why should they not? for the *tune* is essentially the same!



4. Once more, let not our friends suppose, with the student last named, that it is necessary to "*guess*" at the sound of the notes, because DOH is placed wherever the key-note is. If your DOH were fixed, and were nothing but another name for the pitch-note C, as in the French method of solfa-ing, then, indeed, you would have to "guess" at the sound of the notes. For instance, when you saw RAY, you would have to "guess" which of the three RAYS (above-named) it was. But if, on the English plan of solfa-ing, you make DOH the key-note, then RAY is *always* at one and the same *interval* from DOH, and always produces a corresponding mental effect. And, as it is *by* this relative position and mental effect that notes are most easily recognised and most correctly sung, you will soon learn to *know* and to *strike* the right sound with a *decision* and *accuracy* perfectly unattainable on the other plan, and without any "guessing" at all. As Mr. Lowell Mason says, "Ours would be more properly called the *immovable* DOH," for it is immovably fixed as the key-note. The other DOH is at all the parts of the scale by turns.

5. We are anxious to carry the perfect satisfaction of our pupils along with us, and must therefore step aside a moment longer to prove to them, once for all, that the method of solfa-ing with "the movable DOH"—especially as distinguished from the French method imported by Mr. Hullah—is the *oldest*, is supported by the best *authority*, and is in itself the *best* for educational purposes. It seems generally admitted that Guido Aretino, the monk of Arezzo, who in the eleventh century invented both the staff and the use of the sol-fa syllables, applied the syllable UT (for which DOH has since been substituted) to the key-note. (See the Musical Histories of Dr. Burney and Sir J. Hawkins.) Morley, the first English writer on music, adopts the same principle of measuring interval from the key-note. (See his "Introduction to Practical Music," published A.D. 1597.) We have an old English black-letter Bible, dated A.D. 1629, with Sternhold and Hopkins' Metrical Psalms appended. Here we find the tunes printed over the psalms, and the initial letters of the sol-fa syllables, as then used, printed on the staff close to the head of the notes; and, notwithstanding the curious perplexity which arises from the want of the seventh syllable SI (which we call TE, to distinguish its initial letter from SOH), it is perfectly clear that the syllables *move* with the key-note. The following advertisement "to the Reader" is prefixed to the book:—"Thou shalt vnderstand (Gentle Reader) that I haue (for the helpe of those that are desirous to learne to sing) caused a new print of note to bee made, with letters to bee ioyned to euery note: Whereby thou maist know how to call euery note by his right name, so that with a very little diligence (as thou art taught, in the introduction printed heretofore in the psalmes) thou maist the more easily, by the viewing of these letters, come to the knowledge of perfect *solefaying*: whereby thou mayest sing the psalmes the more speedily and easily. The letters be these, V for VT, R for RE, M for MY, F for FA, S for SOL, L for LAH. Thus when you see any letter ioyned by the note, you may easily call him by his right name." This old book, circulated and used with the Bible itself throughout the kingdom more than 200 years ago, contains, in fact, a "Tonic Sol-fa Notation!" The perplexity above mentioned led to the common use throughout England of what was called the Tetrachordal System, in which the notes of the scale are thus named: Fa, Sol, La, Fa, Sol, La, Mi, Fa. Here the syllable FA is used for the key-note, and also for the fourth—of course *moving* with them. "Look well to your FAS, my boy," is the instruction which many an old sight-singer, now living, received from his father or teacher. This, also, is a tonic (or key-note) method of solfa-ing. The far-famed French writer Rousseau gives strong and most satisfactory reasons for the "movable UT or DOH." (See his "Dictionary of Music," vol. ii., p. 223.)

LESSONS IN GREEK.—VIII.

THE THIRD DECLENSION (*continued*).

THE adjectives which follow the nouns of the Third Declension given in the last lesson, are—1, ὁ, ἡ ἀπατωρ, το ἀπατορ, *fatherless*, αμητωρ, αμητορ, *motherless*, the genitive ends in ορος: 2, ὁ, ἡ αρρην, το αρρεν, *manly*; gen. αρρενος: 3, adjectives in ων (m. and f.) and ον (n.), as ὁ ἡ ευδαιμων, το ευδαιμον, *happy*; and the comparatives in ων, ον, ιων, ιον. These comparatives, after dropping the ν, suffer contraction in the accusative singular, and in the nominative, accusative, and vocative plural. The vocative is the same as the nominative neuter.

Singular.

	Happy.		*More hostile.*		*Greater.*	
	ὁ, ἡ	το	ὁ, ἡ	το	ὁ, ἡ	το
Nom.	ευδαιμων,	ευδαιμον.	εχθιων,	εχθιον.	μειζων,	μειζον.
Gen.	ευδαιμονος.		εχθιονος.		μειζονος.	
Dat.	ευδαιμονι.		εχθιονι.		μειζονι.	
Acc.	ευδαιμονα,	ευδαιμον.	εχθιονα, (εχθιω).	εχθιον.	μειζονα, (μειζω).	μειζον.
Voc.	ευδαιμον.		εχθιον.		μειζον.	

*

VOCABULARY.

Ardenter, adv., *ardently, glowingly* (E. R. *ardent*).
Civitas, -ātis, f., *the state.*
Curo, 1, *I care for, take care of* (E. R. *a cure*).
Devasto, 1, *I lay waste, devastate.*
Exaudio, 4, *I grant the request of.*
Gero, 2, *I carry* (E. R. *gestation*).
Guberno, 1, *I govern.*
Honōro, 1, *I honour.*
Justus, -a, -um, *just.*
Lex, legis, f. *a law* (E. R. *legal*).
Maleficus, -a, -um, *wicked;* as a noun, *an evil-doer.*
Mitis, -e, *mild* (E. R. *mitigate*).
Mors, mortis, f., *death* (E. R. *mortal*).
Probus, -a, -um, *good, kind* (E. R. *probity*).
Sanctus, -a, -um, *holy* (E. R. *sanctity*).
Succurro, 3, *I hasten to aid, I succour.*
Tibi placet, *thou art pleased.*

EXERCISE 59.—LATIN-ENGLISH.

1. Rex qui civitatem gubernat, civium salutem curare debet. 2. Regi cujus imperium mite et justum est, omnes cives libenter parent. 3. Regem cui leges sunt sanctæ, cives colunt. 4. Felix est rex quem omnes cives amant. 5. O rex qui civitatem nostram gubernas, tibi placet honorare bonos cives, terrere maleficos, succurrere miseris, exaudire probos.

EXERCISE 60.—ENGLISH-LATIN.

1. Kings who govern states must care for the safety of all the citizens. 2. Good men willingly obey kings whose government is mild and just. 3. Kings whose laws are holy are willingly obeyed by good citizens. 4. The kings are happy who are dear to their citizens. 5. O kings who rule our states, ye ought to honour a good and great man. 6. O God, we worship thee who art pleased to succour the wretched. 7. The enemies with whom you contend lay waste your country.

VOCABULARY.

Ago, 3, *I drive, I do.*
Ambulo, 1, *I walk abroad.*
Cogito, 1, *I think.*
Curro, 3, *I run, pass away.*
Exercucio, 1, *I torture* (E. R. *excruciate*, from crux, *a cross*).
Falsus, -a, -um, *false.*
Habeo, 2, *I have.*
Honestus, -a, -um, *honourable* (E. R. *honesty*).
Indulgeo, *I am lenient to* (E. R. *indulge*).
Ingratus, -a, -um, *unthankful* (E. R. *ingratitude*).
Lusciniа, -æ, f., *a nightingale.*
Me habeo, *I have myself* (that is, *in a certain condition*), *I am.*
Opinio, -ōnis, f., *an opinion.*
Peccatum, -i, n., *a sin.*
Quæro, 3, *I seek.*
Repugno, 1, *I fight against* (E. R. *repugnance, pugilist*).
Sententia, -æ, f., *view, opinion.*
Utilis, -e, *useful* (E. R. *utility*).
Veritas, ātis, f., *truth* (E. R. *verity*).

EXERCISE 61.—LATIN-ENGLISH.

1. Quis me vocat? 2. Quid agis, mi amice? 3. Quis scribit has literas? 4. Quid cogitas? 5. Quid ago? 6. Cur me excrucio? 7. Quæ amicitia est inter ingratos? 8. Quod carmen legis? 9. Quis homo venit? 10. Quis poeta dulcior est quam Homerus? 11. Cujus vox suavior est quam vox lusciniæ? 12. Quibus peccatis facillime indulgemus? 13. Quicquid est honestum, idem est utile. 14. Quicquid vides, currit cum tempore. 15. Quoquo modo res sese habet, ego sententiam meam defendo. 16. Quæcunque opinio veritati repugnat, falsa est.

EXERCISE 62.—ENGLISH-LATIN.

1. What dost thou say? 2. Who is that man? 3. Who is that woman? 4. With whom does thy friend walk? 5. Whom seekest thou? 6. What book dost thou read? 7. To whom dost thou write this letter? 8. However the things are we praise your view.

INDEFINITE PRONOUNS.

Quis in a dependent form undergoes slight changes in declination: thus, quis, qua or quæ, quid; pl. qui, quæ, quæ. When it is used as an adjective pronoun, then quis may become qui, qua becomes quæ, and quid becomes quod. The same is the case with aliquis, *some one:* thus, sub. aliquis, aliqua, aliquid; adj., aliquis, allqua, aliquod. So alicujus, alicui, etc. In the plural, quis, etc., become qui, quæ, quæ, or qua, aliqui, aliquæ, aliqua.

Quis united with piam, becoming quispiam, acquires an indefinite import, *any one soever;* and runs thus: quispiam, quæpiam, quidpiam; adj. quodpiam.

Another form is quisquam (quis and quam), *every one;* which is declined: nom. quisquam, quicquam; gen. cujusquam; dat. cuiquam. Quidam, *a certain one*, stands thus: nom. quidam, quædam, quiddam; adj. quoddam; gen. cujusdam, and so on. Quisque answers to our *each one:* nom. quisque, quæque, quidque (quodque); gen. cujusque; dat. cuique; acc. quemque, etc.

Unusquisque, *every one*, brings the idea of individuality into greater prominence, and is formed thus: unusquisque, unaquæque, unumquidque; adj. unumquodque; the pronoun is made up of que, *and*, quis, *who* or *which*, and unus, *one.*

In quivis, quævis, quidvis (quodvis), the termination vis, *thou wilt*, increases the indefiniteness, so that quivis is, *who* or *what you will*, cujusvis; acc. quemvis, quamvis, etc. A similar import is found in quilibet (libet, *it pleases*), quælibet, quidlibet (quodlibet), *who* or *what you please;* so, gen. cujuslibet.

Alius, *another;* alter, *the other, the second of a pair* (the *latter*, corresponding to the *former*); ullus, *any;* nullus (non ullus), *no one;* uter, *which* (*of the two*); neuter (non uter), *neither, neither the one nor the other*, take the genitive singular in ius, and the dative in i, like unus. See the next lesson on numbers.

VOCABULARY.

Admo, 3, *I take away.*
Augurium, -i, n., *augury*
Dignitas, -ātis, f., *dignity.*
Futūrus, -a, -um, *future.*
Græcia, f., *Greece.*
Idcirco, *therefore.*
Impendeo, 2, *I hang over* (E. R. *impend*).
Inhæreo, 2, *I stick to.*
Insitus, -a, -um, *inborn.*
Jus, juris, n., *right, law* (E. R. *jury, jurisdiction*).
Justitia, -æ, f., *justice.*
Locus, -i, m., *a place* (E. R. *local, locality*).
Mens, mentis, f., *a mind* (E. R. *mental*).
Meritum, -i, m., *worth, value, merit.*
Pecunia, -æ, f., *money.*
Quasi, *as if.*
Sæculum, -i, n., *an age* (E. R. *secular*).
Terror, -ōris, m., *terror.*
Tribuo, 3, *I assign, allot.*

EXERCISE 63.—LATIN-ENGLISH.

1. Si mortem timemus semper aliquis terror nobis impendet. 2. Si cuipiam pecuniam fortuna adimit idcirco miser non est. 3. Græcia parvum quendam (quemdam) locum Europæ tenet. 4. Inhæret in In unoquoque virorum bonorum habitat deus. 6. Justitia jus unicuique tribuit pro dignitate cujusque. 7. Cuique nostrum amor vitæ est insitus.

EXERCISE 64.—ENGLISH-LATIN.

1. Some terror always hangs over the bad. 2. What terror (*quid terrōris*, literally, what of terror?) hangs over thee? 3. If thou takest fortune from any one thou art blamed. 4. They hold a certain small part of Greece. 5. In every bad man evil dwells. 6. Justice allots to every one his merits. 7. Certain ones have money.

CORRELATIVE PRONOUNS.

Correlative is a term denoting mutual relation, in such a way, that of two or more things, as is the one so is the other. Take, as an instance, the pair of correlative pronouns, qualis and talis; meaning *as* and *as;* thus, qualis sum ego, talis es tu, *such as I am, such art thou.*

These correlative pronouns are various, and are exhibited in this table of

CORRELATIVE PRONOUNS.

Interrogative.	*Demonstrative.*	*Indefinite.*
Qualis, *of what kind?*	talis, *of such kind,*	
Quantus, *how great?*	tantus, *so great;*	aliquantus, *of some size.*
Quot, *how many?*	tot, *so many;*	aliquot, *some number.*
Relative.	*Relative Indefinite.*	
Qualis, *of what kind?*	qualiscunque, *of what kind soever.*	
Quantus, *of what size?*	quantuscunque, *how great soever.*	
Quot, *of what number?*	quotcunque, quotquot, *of whatever number.*	

Quot, tot, aliquot; quot, quotcunque, and quotquot, are indeclinable, and are used only in the plural number; as, quot homines sunt? *how many men are there?* aliquot homines, *some men;* tot homines quot video, *as many men as I see;* quotcunque homines video omnes boni sunt, *all the men I see are good.*

VOCABULARY.

Aristīdes, -is, m., *the name of a celebrated Athenian.*
Bonum, -i, n., *good, the good.*
Contemno, 3, *I despise.*
Existo, 3, *I stand out, become, exist.*
Fragilis, -e, *easily broken, fragile* (from frango, *I break*).
Grex, gregis, m., *a flock.*
Imitator, -ōris, m., *an imitator.*
Liberi, -orum, m., *children* (used in the plural only).
Oratio, -ōnis, f., *speech.*
Pastor, -ōris, n., *a shepherd* (E. R. *a pastor*).
Pecco, *I sin, fail, err.*
Permultus, -a, -um, *very much.*
Prædico, 1, *I speak before, declare* (E. R. *preach*).
Quod, conj., *that.*
Respublica (res and publica, both parts are declined; thus, rei publicæ, rem publicam), *the state, the republic, the commonwealth.*
Solco, 2, *I am accustomed.*

EXERCISE 65.—LATIN-ENGLISH.

1. Quot sunt homines, tot sunt sententiæ. 2. Tantum malum est hoc, quod peccant principes, quantum illud quod permulti imitatores principum existunt. 3. Quot genera orationum sunt, tot oratorum genera reperiuntur. 4. Quales sunt duces, tales sunt milites. 5. Qualis est rex, talis est grex. 6. Quales in republica sunt principes, tales

solent esse cives. 7. Vir bonus non contemnit homines miseros, qualescunque sunt. 8. Corporis et fortunæ bona, quantacunque sunt, sunt incerta et fragilia. 9. Quotquot homines sunt, omnes vitam amant. 10. Quotcunque sunt scriptores, omnes Aristidis justitiam prædicant.

EXERCISE 66.—ENGLISH-LATIN.

1. As many men so many minds (the minds are as numerous as the men). 2. As many boys so many girls. 3. As many fathers so many mothers. 4. As great as is thy grief so great is my joy. 5. Such as are parents such are children. 6. As is the shepherd so is the flock. 7. I do not despise the things, whatever they are. 8. Aristides is declared just by all writers, how many soever they are.

KEY TO EXERCISES IN LESSONS IN LATIN.—XIV.

(Vol. II., p. 64.)

EXERCISE 53.—LATIN-ENGLISH.

1. Every nature is preservative of itself. 2. A wonderful desire for the city, for my friends, and for thee holds (possesses) me. 3. Thy father is very much delighted by thy remembrance of him. 4. Anger has no power over itself. 5. A wise man has always power over himself. 6. Care for you makes me uneasy. 7. All men are kind judges of themselves. 8. Thy recollection of us is exceedingly pleasant to me. 9. The friend is mindful of me and of thee. 10. (Our) father in his absence is held by a great longing after me, and after you, my brother, and after you, O sisters. 11. (Our) friends are mindful of us. 12. Many of you please me. 13. Very many of us greatly love thee.

EXERCISE 54.—ENGLISH-LATIN.

1. Insipiens est impotens sui. 2. Pater est potens sui. 3. Potens sui est virtus. 4. Non est vitium potens sui. 5. Potensne sui est trix sui. 8. Nemo vestrum sui potens est. 9. Nostrum plurimi sui sunt potentes. 10. Immemor mei est infidus amicus. 11. Fidi amici non sui sunt memores. 12. Tua memoria et desiderium mei mihi sunt gratissima. 13. Cura tui me angit. 14. Plurimi vestrum, O discipuli, diligentes sunt. 15. Mirus est amor sui.

EXERCISE 55.—LATIN-ENGLISH.

1. Sallust is a very elegant writer. 2. His books I gladly read (I am glad to read). 3. I have a faithful friend. 4. I am very much attached to him. 5. The song of (thy) brother pleases me much, thou oughtest to read it. 6. Idleness makes the body grow heavy, labour strengthens (it). 7. Avoid that, seek this. 8. This letter moves me very much. 9. These songs are very sweet. 10. I do not believe that false man. 11. The soldiers gladly obey that general. 12. All favour that man. 13. That precept of thine is excellent. 14. This opinion pleases me, that displeases me. 15. This war is very cruel. 16. This boy is industrious, that (one) sluggish. 17. I keep in memory that excellent precept. 18. That friend of thine is a very good man. 19. That authority of yours is very great. 20. I praise the diligence of that scholar, I blame the slowness of this (one). 21. To that (one) school is very pleasant, to this (one) very troublesome.

EXERCISE 56.—ENGLISH-LATIN.

1. Sallustius est scriptor elegans, Livius elegantior, et Cicero elegantissimus. 2. Eorum libros libenter lego. 3. Ejus frater et amicus mihi sunt cari. 4. Fidum amicum habes et ei es addictissimus. 5. Filii mei habent fidas uxores et eas valde amant. 6. Vehementer his literis moveor. 7. Mendaci mulieri non credas. 8. Hic puer mihi placet, ille displicet. 9. Hoc poema valde est elegans, illud elegantius. 10. Hic tuus miles fortis est. 11. Hujus discipuli diligentia a me præceptore laudatur. 12. In hac scholā plures quam in vestra sunt industrii discipuli.

EXERCISE 57.—LATIN-ENGLISH.

1. Many men do not think the same on the same things (subjects) for the same day. 2. The fool now trusts, now distrusts the same opinion. 3. Seditious soldiers withstand the commander himself. 4. The mind moves itself. 5. Virtue is praiseworthy on its own account. 6. Often nothing is more hostile to a man than he is to himself. 7. Every animal loves itself. 8. Our country ought to be dearer to us than we ourselves. 9. That precept of the Delphic oracle is excellent —Know thyself.

EXERCISE 58.—ENGLISH-LATIN.

1. Hostes urbem obsident et eam expugnare tentant. 2. Hujus magni hominis factum ab omnibus scriptoribus laudatur. 3. Cæsar et Pompeius præclari duces Romani sunt. 4. Illi fortuna amicior est quam huic. 5. Illius et hujus fortitudo mira est. 6. Rex ipse exercitūs est dux. 7. Non semper eādem de iisdem rebus sentis. 8. Pater et filius iisdem literis student. 9. Virtutes per se amabiles sunt. 10. Omnes se ipsos diligunt. 11. Patria tibi carior esse debet quam tute tibi. 12. Noscite vos ipsos, juvenes. 13. Mendax sæpe sibi ipsi diffidit.

HISTORIC SKETCHES.—XVI.

THE BLOODY ASSIZE.

THERE are some historical events of which we gladly cherish the memory, because of the lustre they spread around our national character, or because of the intrinsic worth of the events themselves. Such are the great victories of the nation, abroad and at home, the enforcers of our foreign and colonial policy against external foes, the winners of steps onward in the path of constitutional freedom, in opposition to the tactics of absolutists and tyrants. Other events there are over which we would gladly draw a veil, if it were permitted us to do so—events so sad and disgraceful, not only to our national character, but to humanity itself, that we would fain not look at them. But we cannot afford to lose sight of them, much as the contemplation may disgust us; we are bound in our own interests, and in the interests of those who are to come after us, not to "let oblivion damn" the record in which these ugly histories are written. There is, seemingly, a natural tendency in politics to repeat themselves, and in principles to re-assert themselves; and if, according to this rule, we may look for a re-appearance of past glories, so we must look also for a fresh advent of past evils. They may not come in the same shape—indeed, the chances are strongly against their doing so—but come they will, and it behoves us to watch very diligently against the evils lest they take us by surprise, and furnish for posterity a chapter of horrors, a counterpart of those old chapters which we are bound freshly to remember. To use the emphatic language of Lord Erskine, with reference to some irregular proceedings in the law courts, presided over by the subject of this sketch (Judge Jeffreys), which were taken off the file and burnt, "to the intent that the same might no longer be visible to after ages:"—"It was a sin against posterity; it was a treason against society; for instead of being burnt, they should have been directed to be blazoned in large letters upon the walls of our courts of justice, that, like the characters deciphered by the prophet of God to the Eastern tyrant, they might enlarge and blacken in your sight to terrify you from acts of injustice."

It is a sketch of one of those subjects which, for the above reason, should never be forgotten, that it is proposed now to bring under the notice of our readers.

The Duke of Monmouth, the illegitimate son of Charles II. and Lucy Waters, having been engaged in many intrigues to procure his own elevation to the throne instead of the Duke of York (James II.), had got into trouble during his father's lifetime; but when Charles died in 1685, and his brother, James II., succeeded him, the Duke of Monmouth renewed his intrigues more energetically, and succeeded in fastening to his cause a very considerable following. There were said to exist proofs of Charles II. having been married to Lucy Waters; and though they did not actually exist, many believed they did, and on that ground alone, apart from their dislike to James, regarded him as their lawful king. Finding his party, as he fancied, sufficiently strong, he determined, in the spring of 1685, a few weeks after the king's accession, to try his hand at an invasion. With a slender force he landed on the 11th of June, at Lyme, in Dorsetshire, where many of the country people joined him. Shortly afterwards he proclaimed himself king, denounced James as a usurper, and all his adherents as traitors. In a lengthy declaration Monmouth asserted the reasons why James ought to be deposed, and stated the measures which he intended to introduce if the people would put him in possession of the throne.

Four days after landing he left Lyme at the head of over 3,000 men, raw levies for the most part, badly officered, and without the countenance or help of any of the country gentlemen. At Taunton, where the Duke was received with open arms, some addition was made to the number, but hardly to the quality of his army. At Bridport, where a detachment of his men first came in contact with the royal forces, he experienced a check, and nowhere did he gain anything by force of arms. Wells, Bridgewater, and Exeter received him; but Bath and Bristol shut their gates on him, and refused him supplies. At Sedgemoor, about five miles to the south-east of Bridgewater, in Somersetshire, he was compelled to fight on the 6th of July, by the king's general, Lord Feversham; and after a combat of some hours' duration, in which the royal troops lost about 300 men, and the rebels 800, besides three times that number of prisoners, he was completely defeated. The Duke, with two companions,

Plural.

	ὁ, ἡ	τὸ	δ, ἡ	τὸ	δ, ἡ	τὸ
Nom.	ευδαιμονες,	ευδαιμονα.	εχθιονες, (εχθιους),	εχθια. (εχθιω).	μειζονες, (μειζους),	μειζονα, (μειζω).
Gen.	ευδαιμονων.		εχθιονων.		μειζονων.	
Dat.	ευδαιμοσι.		εχθιοσι.		μειζοσι.	
Acc.	ευδαιμονας,	ευδαιμονα.	εχθιονας. (εχθιους).	εχθια. (εχθιω).	μειζονας, (μειζους),	μειζονα. (μειζω).
Voc.	*Like the Nom.*		*Like the Nom.*		*Like the Nom.*	

Dual.

N.A.V.	ευδαιμονε.	εχθιονε.	μειζονε.
G.D.	ευδαιμονοιν.	εχθιοσιν.	μειζοσιν.

b. The Nominative has the short vowel of the stem lengthened, as ε into η, and ο into ω.

Stems in ντ drop the τ in the nominative; as, λεων instead of λεοντ.

Singular.

	Shepherd.	*Divinity.*	*Lion.*	*Ether (air).*	*Speaker. (orator).*
Nom.	ποιμην.	δαιμων.	λεων.	αιθηρ.	ῥητωρ.
Gen.	ποιμεν-ος.	δαιμον-ος.	λεοντ-ος.	αιθερ-ος.	ῥητορ-ος.
Dat.	ποιμεν-ι.	δαιμον-ι.	λεοντ-ι.	αιθερ-ι.	ῥητορ-ι.
Acc.	ποιμεν-α.	δαιμον-α.	λεοντ-α.	αιθερ-α.	ῥητορ-α.
Voc.	ποιμην.	δαιμον.	λεον.	αιθηρ.	ῥητορ.

Plural.

Nom.	ποιμεν-ες.	δαιμον-ες.	λεοντ-ες.	αιθερ-ες.	ῥητορ-ες.
Gen.	ποιμεν-ων.	δαιμον-ων.	λεοντ-ων.	αιθερ-ων.	ῥητορ-ων.
Dat.	ποιμε-σι.	δαιμο-σι.	λεου-σι.	αιθερ-σι.	ῥητορ-σι.
Acc.	ποιμεν-ας.	δαιμον-ας.	λεοντ-ας.	αιθερ-ας.	ῥητορ-ας.
Voc.	ποιμεν-ες.	δαιμον-ες.	λεοντ-ες.	αιθερ-ες.	ῥητορ-ες.

Dual.

N.A.V.	ποιμεν-ε.	δαιμον-ε.	λεοντ-ε.	αιθερ-ε.	ῥητορ-ε.
G.D.	ποιμεν-οιν.	δαιμον-οιν.	λεοντ-οιν.	αιθερ-οιν.	ῥητορ-οιν.

Δαηρ, *a husband's brother*, makes in the vocative δαερ; Αμφίων (ονος) makes ω Αμφιον; also Αγαμεμνων (ονος) vocative Αγαμεμνον.

The following in ων (ονος) in some cases drop the ν and undergo contraction: ἡ αηδων, *the nightingale*, genitive αηδονος, contracted into αηδοῦς, dative αηδοῖ; ἡ χελιδων, *swallow*, genitive χελιδονος, dative χελιδοῖ.

VOCABULARY.

Αγελη, -ης, ἡ, a flock, herd.	Εικω (dat.), yield; — της ὁδου, get out of the way of.	Ολβιος, -α, -ον, happy.
Αδικος, -ον, unjust (a priv., and δικη, justice).	Ἡγεμων, -ονος, ὁ, a leader, general.	Σωφρων, -ον, gen. -ονος, sound-minded.
Ανευ (genitive), without.	Θεραπευω, I honour.	Ὑπερφρων, ὑπερφρον, genitive -ονος, high-minded, too high-minded, proud (ὑπερ, over).
Γερων, -οντος, ὁ, an old man.	Κολαστης, -ου, ὁ, a punisher,	Φρην, -ενος (pl. φρενες), the heart, soul.
Δημος, -ου, ὁ, the people (Lat., populus).	Λιμην, -ενος, a harbour.	Φυλαττω, I watch, guard, keep.
	Ναιω, I inhabit, dwell.	
	Ὁδος, -ου, ἡ, a way.	

EXERCISE 21.—GREEK-ENGLISH.

1. Τον γεροντα θεραπευε. 2. Σεβου τους δαιμονας. 3. Οἱ ποιμενες αγελας φυλαττουσιν. 4. Τον κακον φευγε ὡς κακον λιμενα. 5. Ανευ δαιμονος ὁ ανθρωπος ουκ ολβιος εστιν. 6. Ὁ θεος εν αιθερι ναιει. 7. Πολλακις χαλεται μεριμναι τειρουσι τας των ανθρωπων φρενας. 8. Ἑπου, ω φιλε, αγαθοις ἡγεμοσιν. 9. Εικε, ω νεανια, τοις γερουσι της ὁδου. 10. Πολλακις δημος ἡγεμονα εχει αδικον νοῦν. 11. Ὁ θεος κολαστης εστι των αγαν ὑπερφρονων. 12. Εχε νοῦν σωφρονα. 13. Ω δαιμον, παρεχε τοις γερουσι καλην εντυχιαν. 14. Οἱ θηρευται τους λεοντας ενεδρευουσιν.

EXERCISE 22.—ENGLISH-GREEK.

1. Good boys honour old men. 2. Old men are honoured by good boys. 3. Sound-minded young men get out of the way of old men. 4. Follow, O friends, a good leader. 5. We have good leaders. 6. The people often follow bad leaders. 7. God affords prosperity to the sound-minded. 8. Lions are hunted by huntsmen. 9. We worship the divinity.

To the previous examples belong the following substantives in ηρ—namely, ὁ πατηρ, the father; ἡ μητηρ, the mother; ἡ θυγατηρ, the daughter; ἡ γαστηρ, the belly; ἡ Δημητηρ, Demeter (*Ceres* in Latin); and ὁ ανηρ, the man; differing, however, from them in the omission of ε in the genitive and dative singular and in the dative plural; also in the interposition of α before σι of the dative plural, in order to soften the sound. The word ανηρ (stem ανερ), throws away the ε in all the cases of the three numbers, except the vocative singular, and for the sake of sound introduces a δ: as appears from this tabular view.

Singular.

Nom.	πατηρ.	μητηρ.	θυγατηρ.	ανηρ.
Gen.	πατρ-ος.	μητρ-ος.	θυγατρ-ος.	ανδρ-ος.
Dat.	πατρ-ι.	μητρ-ι.	θυγατρ-ι.	ανδρ-ι.
Acc.	πατερ-α.	μητερ-α.	θυγατερ-α.	ανδρ-α.
Voc.	πατερ.	μητερ.	θυγατερ.	ανερ.

Plural.

Nom.	πατερ-ες.	μητερ-ες.	θυγατερ-ες.	ανδρ-ες.
Gen.	πατερ-ων.	μητερ-ων.	θυγατερ-ων.	ανδρ-ων.
Dat.	πατρ-α-σι.	μητρ-α-σι.	θυγατρ-α-σι.	ανδρ-α-σι.
Acc.	πατερ-ας.	μητερ-ας.	θυγατερ-ας.	ανδρ-ας.
Voc.	πατερ-ες.	μητερ-ες.	θυγατερ-ες.	ανδρ-ες.

Dual.

N.A.V	πατερ-ε.	μητερ-ε.	θυγατερ-ε.	ανδρ-ε.
G.D.	πατερ-οιν.	μητερ-οιν.	θυγατερ-οιν.	ανδρ-οιν.

The word αστηρ, -ερος, a star, which otherwise retains the ε of the stem, belongs to this class in consequence of having its dative plural in αστρασι.

VOCABULARY.

Αθλον, -ου, το, a prize gained in the public games.	Εχθαιρω, I hate.	Στεργω, I love.
Δουλευω, I am a slave, I serve.	Περσεφονη, -ης, ἡ, Persephoné (*per-sef'-o-ne*), Proserpine.	Χαιρω (dative), I rejoice at, delight in.
	Σοφος, -η, -ον, wise.	Χαριζομαι, I show favour, gratify.

EXERCISE 23.—GREEK-ENGLISH.

1. Στεργετε τον πατερα και την μητερα. 2. Μη δουλευε τη γαστρι. 3. Χαιρε, ω φιλε νεανια, τω αγαθω πατρι και τη αγαθη μητρι. 4. Μη συν κακω ανδρι βουλευου. 5. Δημητρι πολλοι και καλοι νεω ησαν. 6. Ἡ αγαθη θυγατηρ ἡδεως πειθεται τη φιλη μητρι. 7. Οἱ αγαθοι ανδρες θαυμαζονται. 8. Πολλακις εξ αγαθου πατρος γιγνεται κακος υἱος. 9. Εκθαιρω τον κακον ανδρα. 10. Τοις αγαθοις ανδρασι λαμπρα δοξα ἑπεται. 11. Ἡ Δημητρος θυγατηρ ην Περσεφονη. 12. Ω φιλη θυγατερ, στεργε την μητερα. 13. Ἡ αρετη καλον αθλον εστιν ανδρι σοφῳ. 14. Οἱ αγαθοι υἱοι τους πατερας και τας μητερας στεργουσιν. 15. Οἱ Ἑλληνες Δημητερα σεβονται. 16. Πειθεσθε, ω φιλοι νεανιαι, τοις πατρασι και ταις μητρασιν. 17. Χαριζου, ω φιλε πατερ, τη αγαθη θυγατρι.

EXERCISE 24.—ENGLISH-GREEK.

1. O young men, love your father and mother. 2. Good daughters obey their (the) father and mother. 3. The citizens worship Ceres. 4. Persephoné follows Ceres. 5. We admire the star. 6. Be not ye, O huntsmen, slaves to the belly. 7. A good mother loves a good daughter. 8. O mother and father, love your children. 9. The man is hated. 10. They hate the man. 11. They obey wise men. 12. I follow Ceres. 13. Often bad sons arise from a good father and mother.

Note that the Greek article has frequently the force of an English possessive pronoun, when, from the nature of the sentence, no mistake as to the meaning can arise. Consequently, in such cases, when you translate into English, give the possessive pronoun for the Greek article, and when you translate into Greek, give the article for the possessive pronoun.

KEY TO EXERCISES IN LESSONS IN GREEK.—VII.

EXERCISE 15.—GREEK-ENGLISH.

1. Temples are built to the gods. 2. It is not easy to walk on ropes. 3. We hunt hares. 4. Androgeus was the son of Minos. 5. Hares are hunted by huntsmen. 6. Pray to the merciful God. 7. Eagles capture hares. 8. Reverence the merciful divinities. 9. The brave receive deathless praise. 10. Pray that you may have (find) God merciful. 11. The gods are propitious to the good. 12. Pleasures lead away most people as captive. 13. The Samians support beautiful peacocks in honour of Juno. 14. The peacock has beautiful wings.

EXERCISE 16.—ENGLISH-GREEK.

1. Τοις θεοις νεως κτιζεις. 2. Κτιζονται νεῳ τοις θεοις. 3. Νεων τῳ Θεῳ κτιζω. 4. Επι καλῶν βαινουσι. 5. Τους λαγως θηρευομεν. 6. Οἱ λαγῳ θηρευονται. 7. Οἱ Σαμιοι καλους ταως σεβονται. 8. Τον ἱλεων Θεον σεβονται. 9. Ὁ Θεος ἱλεως εστι τοις αγαθοις. 10. Οἱ θηρευται ἁρπευουσι τους λαγως. 11. Ὁ Μενελεως λαμβανει αγηρων επαινον.

EXERCISE 17.—GREEK-ENGLISH.

1. Peacocks were sacred to Hera (Juno). 2. We admire Menelaus for his valour. 3. The poets call the morning rosy-fingered. 4. Truth (ἡ αληθεια) often does not satisfy the people. 5. Helen was the wife of Menelaus. 6. Babylon produces many peacocks. 7. In the temples of the gods are many pillars. 8. Hares are timid animals. 9. The voyage round (Mount) Athos was dangerous. 10. The palace has fine chambers.

EXERCISE 18.—ENGLISH-GREEK.

1. Μενελεως θαυμαζεται επι τη αρετη. 2. Θαυμαζομεν την ῥοδοδακτυλον Ἑω. 3. Πολλοι ταῳ εν Βαβυλωνιᾳ τικτονται. 4. Εν τῳ της Ἡρας νεῳ εστι καλος ταως. 5. Οἱ θηρευται ταως ενεδρευουσι. 6. Οἱ ταῳ ενεδρευονται ὑπο των θηρευτων. 7. Οἱ αγαθοι πολιται τον ανοητον λεων φευγουσι.

EXERCISE 19.—GREEK-ENGLISH.

1. Avoid wild beasts. 2. A hand washes a hand. 3. Keep from the wasp. 4. The meadows bloom. 5. The soldiers sing their war song. 6. We know (try) gold and silver in (by) fire. 7. Many become friends at the goblet (over their cups), but most (a greater number become) enemies. 8. Men are delighted with the harp and banqueting and dances and songs of victory. 9. The Greeks worship Apollo and Poseidon (Neptune). 10. Industrious scholars read the works of Xenophon with pleasure.

EXERCISE 20.—ENGLISH-GREEK.

1. Φευγε τους θηρας. 2. Θηρα φευγουσι. 3. Τας χειρας νιζε. 4. Απεχεσθε των ψηνων. 5. Στρατιωτης τῳ παιανι τερπεται. 6. Ὁ παιαν τους στρατιωτας τερπει. 7. Ω σπουδαιοι μαθηται, τα του Ξενοφωντος βιβλια αναγιγνωσκετε. 8. Τα του Ξενοφωντος βιβλια αναγιγνωσκονται ὑπο των σπουδαιων μαθητων. 9. Ἑρπομεθα τοις καλοις λειμοσι. 10. Οἱ λειμωνες θαλλουσι. 11. Οἱ ποιηται τον Απολλω σεβονται. 12. Τον Ποσειδω σεβεται ὁ ποιητης.

LESSONS IN GEOGRAPHY.—XXI.

NATURAL DIVISIONS OF THE EARTH'S SURFACE

(*continued*).

WITH regard to the natural divisions of the water, the *sea* which surrounds the land is divided into *three* great sections, called oceans, exclusive of the comparatively small portions lying within the polar circles, which are denominated the *Arctic* and *Antarctic Oceans*. These three sections are:—1st. The *Atlantic Ocean*, extending from the Arctic Circle to the Antarctic Circle, a distance of 9,188 miles, and from the western coasts of the Old World to the eastern coasts of the New World, varying in breadth from 1,818 miles, the distance between Sierra Leone and Cape Roque, to 4,135 miles, the distance between the Cape of Good Hope and Cape Horn. 2nd. The *Pacific Ocean*, also extending from the Arctic Circle to the Antarctic Circle, and from the eastern coasts of the Old World to the western coasts of the New World, varying in breadth from sixty miles at Behring Straits, to about 11,000 miles at the equator, and then tapering to 5,277 miles, the distance between Cape Horn and Tasmania. 3rd. The *Indian Ocean*, extending from the Tropic of Cancer to the Antarctic Circle, a distance of 6,214 miles, and from the eastern coasts of Africa to the western coasts of Australia, varying in breadth from 3,491 miles at the equator, to 6,126 miles, the distance between the Cape of Good Hope and Van Diemen's Land.

The ocean which rolls between Asia and America, called the *Pacific*, from the smoothness of its waves, and sometimes the *Great South Sea*, from its vast extent, exceeds the whole surface of the dry land. It is usually divided into two parts by the equator, the portion which lies in the northern hemisphere being called the North Pacific Ocean, and that in the southern hemisphere the South Pacific Ocean. It is bounded *on the east* by the western and north-western shores of America, and *on the west* by the eastern coasts of Asia and Australia. Towards the eastern side, and in the torrid zone, the face of this ocean is studded with innumerable groups of islands, all remarkably small. These consist generally of coral reefs, rising up like a wall from unfathomed depths, and emerging but a little way above the level of the sea. The most noted of these groups is that called the Society Islands, the chief of which is Otaheite or Tahiti (for an engraving of Otaheite see Vol. I., page 237); but all of them are the works of insects, both minute and innumerable, whose incessant labours are gradually forming new groups at the bottom of the ocean. The situation of these islands is such that, although lying between the tropics, the temperature of their atmosphere is so moderated by the surrounding ocean that they enjoy the most delightful climate in the world.

On the western side of the Pacific Ocean are the seas of Japan and Okhotsk, and the Yellow Sea and China Sea; and on the eastern side are the inlets called the Gulf of California and Queen Charlotte's Sound.

The ocean which rolls between Europe and America, and also between Africa and America, is usually divided into two parts by the equator, the one being called the North Atlantic Ocean, and the other the South Atlantic Ocean. The whole ocean receives the name *Atlantic*, from its washing the shores of that part of Africa where the mountains of *Atlas* were situated, which the poets feigned were employed to support the heavens. The Atlantic Ocean is bounded *on the east* by Europe and Africa, and *on the west* by America; that part of it between Europe and America is called, from ancient times, the Western Ocean. The Atlantic Ocean, taken between the limits of the Arctic Circle and the latitudes of 35° S. on the one side, and 55° S. on the other, is only about half the size of the Pacific Ocean. The South Atlantic Ocean contains few islands of any size, and no inlets of consequence. The North Atlantic Ocean abounds in large islands, of which Great Britain and Ireland are the most noted; and in deep and numerous inland seas, which penetrate far into the interior of both the Old and New Worlds, and which have rendered the nations which possess its seaboard the most commercial and enterprising people on the face of the globe. The Mediterranean Sea and the Baltic Sea are but arms of the North Atlantic Ocean, on the east; and the Caribbean Sea, the Gulf of Mexico, Hudson Bay, and Davis Strait, arms of the same on the west. On the eastern shores, few large rivers, except the Niger, discharge themselves into its waters; but on the western shores it receives the great rivers La Plata, the Orinoco, the Maränon or Amazons, and the Mississippi, the largest water-ways on the surface of the globe.

The Indian Ocean rolls between the Atlantic and Pacific Oceans, washing the eastern shores of Africa, the southern shores of Asia, and the western shores of Australia; whence its western, northern, and eastern boundaries are manifest; on the south it is bounded by the Pacific and Antarctic Oceans. This ocean contains many islands, the most important of which are Madagascar and Ceylon; and several bays and gulfs, such as the Bay of Bengal, the Arabian Sea, the Persian Gulf, the Red Sea or Arabian Gulf, etc.

The *ocean* (from the Greek ωκεανος, o-ke'-a-nos, *the great outward sea surrounding the world*) means collectively, all the water which surrounds the earth; or, individually, any very large expanse of water.

The term *sea* (from Saxon, sæ) is used in the same sense, both collectively and individually; but it is also applied to a smaller portion of water, and is often synonymous with the term *gulf*, from the Italian golfo, which is a *bay*, or opening of the sea into the land, either by a wide or a narrow opening. When the mouth of the opening into the land is wide, it is more usually called a *bay*, from the French baie; and when narrow, a *gulf*. When the sea penetrates far and wide into the land, the collection of water is then called an *inland sea*; such are the *Mediterranean Sea* and the *Baltic Sea*, the one in the *south* and the other in the *north* of Europe.

The *Arctic Ocean* is the sea that surrounds the north pole, or rather that lies within the Arctic Circle; its boundaries are not exactly known, that is, it is not yet ascertained how much land lies within this zone, and, consequently, the extent of sea is equally unascertained. Whether Greenland extends to or falls short of the north pole has not yet been discovered; and the limits of North America have not quite been determined. This sea, besides the greater part of Greenland, contains Nova Zembla, the extreme north of Europe, the Liakhov Islands or New Siberia, and others, and some north of Baffin Bay. The White Sea is on the borders of the Arctic Ocean. The *Antarctic Ocean*, though considered as being likely to contain more land, is still less known than the Arctic Ocean; and if both were equally free of land, they would be of the same size within the Arctic and Antarctic Circles.

Lakes are large or small portions of water wholly surrounded by land; some of these are so large as to be called seas, such as the *Caspian Sea*, the *Sea of Aral*, etc.

A *channel* is a narrow passage between two seas, or two parts of the same sea; as, the *English Channel*, between the North Sea or German Ocean and the Atlantic.

As appropriate illustrations to the present lesson on the

fled before the fight was done, and galloped off in hope of ultimately reaching the Hampshire coast, but after hiding themselves for several days, in various disguises, they were captured, and Monmouth, who had been already condemned by Act of Parliament, was brought to London and executed.

Perhaps it cannot be said, on a calm review of the facts, that the Duke of Monmouth received anything but what he deserved. He was "the head and front of the offending," and in his person it might be said that the law fairly claimed its due. Not much could have been said on the score of strict justice if the other leaders in the rebellion had shared his fate, but the proceedings of Judge Jeffreys on the circuit, well called the "Bloody Assize," were of such a kind as to make one doubt whether even the guilty were not unwarrantably condemned. Immediately after the battle of Sedgemoor, thirteen of the prisoners were hanged without trial, by order of Colonel Kirk, a brutal commander of brutal soldiers, who were called by the satirical nickname of "Kirk's Lambs." Further military executions would, no doubt, have taken place; but the king decided to have the rebels tried according to the law of the land, a decision which would have been recorded to his advantage had he not chosen the man he did choose to put the law in motion.

The prisons in the western counties, except Cornwall, which had remained loyal, were crowded with prisoners. On account of the disturbed state of the country there had not been any summer assize on the western circuit, so that the ordinary prisoners remained for trial, but the people who crowded the gaols to overflowing were the captives taken at and after Sedgemoor. For the trial of these a special commission was issued, with Jeffreys, Lord Chief Justice of England, at its head. A second commission was given to Jeffreys alone, appointing him temporarily commander-in-chief of the troops in the west, with the rank of lieutenant-general.

Now Jeffreys was a man who had risen at the bar by brute force exhibited through his mind. Was there any dirty, disgusting case to be taken in hand, any utter scoundrel to be defended, any honest man to be hunted down, Jeffreys was the counsel employed. His knowledge of law was small, but the amount of his brazen hardihood was enormous, and by dint of this questionable quality he acquired a large practice of the baser sort. When the Crown, during the life of Charles II., wanted such talents for the purpose of prosecuting its enemies to death, Jeffreys came forthwith to the front. He was rapidly promoted to the highest official dignity at the bar, and when Lord William Russell and Colonel Algernon Sydney were to be tried for complicity in the Rye House Plot—a plot to waylay and assassinate the king and the Duke of York on their return from Newmarket—with which neither of the accused had any real connection, it was recognised as a necessity that Jeffreys should be promoted to the office of their judge. The selection was thoroughly justified by the result. In defiance of the rules of evidence, even such as they were in those days, with brutal browbeating and cross-examining of witnesses from the bench, the prisoners all the while being undefended by counsel, Jeffreys, the judge, helped the Crown lawyers to procure a verdict of guilty; and having succeeded, he had the indecency to mock the prisoners after having sentenced them to death.

The public of that day, not over-squeamish, were scandalised at his proceedings, and many about the court made no secret of their disgust for him; but the man was necessary to such a government as then existed, and the king distinguished him with favour. When James II. succeeded his brother, the Chief Justice found favour in the sight of the new king, to whom he was as necessary as he had been to Charles. When Monmouth's rebellion had filled the West-country gaols with prisoners, there was no fitter man than Jeffreys to clear them in the only way the Crown meant them to be cleared.

With an escort of soldiers Jeffreys opened his commission at Winchester, when the only trial connected with Monmouth's rebellion was that of Alice, Lady Lisle, the widow of one of the judges of Charles I. This lady had given shelter to two refugees from the rebel army after the battle of Sedgemoor, and had denied them, when Colonel Penruddock, one of the king's officers, came to search her house. The men were found concealed on the premises (the event furnishes a subject for one of the beautiful frescoes on the walls of the entrance to the House of Commons); she was arrested for having harboured known traitors, and was indicted as a participator in their guilt. Her case was, that she did not know the men had been concerned in the rebellion; that she understood one of them, a minister, was merely persecuted for non-conformity; and she made this capital point herself—for no legal assistance was in those days allowed to prisoners on trial for treason—that it was unreasonable to try her for complicity in treason, when the person implicated as the traitor had not been proved one, seeing that he had not been tried at all, and that "peradventure he might afterwards be acquitted as innocent after she had been condemned for harbouring him." This very reasonable objection was overruled by the judge, who himself examined adversely to the prisoner the witnesses for the prosecution, and then summed up in violent language against her. Some accounts, written at the time, report that the jury three times refused to find a verdict, and that it was only in consequence of the threats of the judge that they at length found her guilty. It is but right to say that the account given in the State Trials says nothing about this, though it gives enough to show the disgraceful bias of the judge against the prisoner, and the unjudicial part, and that a violent one, which he played. He expressed the greatest surprise that the jury should have hesitated so long about their verdict, adding, "If I had been among you, and she had been my own mother, I should have found her guilty." He then passed sentence, the sentence of the law be it observed, not of the judge, "That you be conveyed hence to the place from whence you came, and from thence you are to be drawn on a hurdle to the place of execution, *where your body is to be burnt alive till you be dead.* And the Lord have mercy on your soul."

This horrible sentence to death by fire was changed by the royal clemency—save the mark—to death by beheading, the utmost King James could be induced to grant to a woman. When James himself was sent into exile, an Act of Parliament reversed the attainder of Lady Lisle, on the ground that "the verdict was injuriously extorted by the menaces and violence, and other illegal practices of George, Lord Jeffreys, Baron of Wem, the Lord Chief Justice of the King's Bench."

At Salisbury, the next town on the circuit, various punishments, including flogging and imprisonment, were passed on rebel sympathisers, who had wished "the cause" good speed; but there were not any actual rebels for trial till the judge came to Dorchester, where the real campaign began. He charged the grand jury to the effect, that he would punish with the extreme rigour of the law, not only principals, but all aiders and abettors, all who had encouraged traitors, whether by word or deed, and all who had helped any of them to escape. Several hundreds of "true bills" were found, when the meshes of the net were declared to be so ample, and Jeffreys, alarmed for his own convenience if so many prisoners were tried singly, announced that those who would plead guilty "should find him to be a merciful judge; but that those who put themselves on their trial, if found guilty, would have very little time to live; and, therefore, that such as were conscious they had no defence, had better spare him the trouble of trying them." To show that he was in earnest, he ordered thirteen out of twenty-nine of those first convicted to be hanged in thirty-six hours after sentence, and the remainder the next morning. To one man who objected to the competency of a witness, he exclaimed, "Villain! rebel! methinks I see thee already with a halter about thy neck;" and this poor man he ordered specially to be hanged first. Two hundred and ninety-two were condemned to death at this town, and seventy-four of them were actually hanged; the others were sold as slaves, and sent to the plantations in the West Indies. Cruel floggings took place, in addition to these severities, on those who had taken smaller part in the rebellion; one poor wretch was sentenced to be whipped through every market town in the country for seven years, that is to say, once a fortnight for seven years.

At Exeter the first man convicted was sent to instant execution. Thirty-seven more suffered death at the same place, and 206 were condemned to whipping, slavery in the West Indies, or imprisonment. At Taunton 500 prisoners awaited their trial, and Jeffreys observed, in his address to the grand jury, that "it would not be his fault if he did not purify the place." One hundred and forty-three were ordered for execution, 284 were to be sent to the plantations, and, in order that the rebellious county might be duly warned for the future, Jeffreys ordered some of the condemned men to be executed in the surrounding villages. At Wells the scenes enacted at Taunton were repeated with

sickening iteration, and then Jeffreys went on to Bristol, where, however, he had but three victims. Two men of the same family having been convicted in Somersetshire, one of them was condemned to death, and the other procured a pardon; but before his release, the other man escaping, Jeffreys ordered execution to be done on the pardoned one, because "his family owed a life."

A large sum of money was made by the judge in the sale of pardons, notwithstanding the quantity of blood actually shed. As much as £15,000 was given in one case, £3,000 was refused in another, and by the time the circuit was over, Lord Jeffreys found himself rich enough to support the dignity of lord-chancellor, a post which was the reward of his zealous services in the west.

Neither king nor judge profited in the end. The former lost his throne, which has been ever since barred against the return of any of his dynasty, and the memory of his work at the Bloody Assize sat heavily on the soul of the judge, and pressed it down to death. As soon as it was found that King James had fled on the approach of the Prince of Orange, in 1688, the people demanded with loud voices that his ill advisers should not escape. The chief one for whose punishment they thirsted was Jeffreys, and search was made high and low for him. He almost escaped. Steps to ensure his departure from England had been "secretly taken, and, disguised as a seaman, his eyebrows shaven off, the better to conceal his features, he had arrived on board the collier which was to take him to Hamburg, when he took it into his head to go on shore. At an alehouse in Wapping he was recognised by one to whom he had, as judge, behaved brutally; a mob surrounded the house, and would have torn the fugitive to pieces, had not some soldiers rescued him and taken him to the Lord Mayor. By order of the temporary Government he was sent to the Tower, where he died miserably, before he could be brought to trial on a charge of high treason."

In the West of England the man's memory is still preserved as that of an incarnate fiend, the true representative of perfect injustice, the fit sign of brutal cruelty and oppression. Probably some inventions to his disadvantage have been made by the fertile brains of angry foes, and possibly some traits of goodness may have been forgotten amidst the universal execration which has been his historical epitaph; but there are few even now-a-days who think the epithet "bloody," which is usually prefixed to Jeffreys' name, too strong for the man who presided over the special commission after Monmouth's rebellion, and who, in his capacity of judge, "played such fantastic tricks before high Heaven, as made the angels weep."

Synopsis of the Life and Reign of James II.

James II. was the third son of Charles I. by his Queen, Henrietta Maria of France. He was the twenty-seventh sovereign of England after the Norman Conquest, and the fourth of the Stuart dynasty.

Born at St. James's,	Oct. 14, 1633	Test Act Suspended	1686
Began to Reign	Feb. 6, 1685	The King goes to Mass	1686
Rising in Scotland in favour of the Duke of Monmouth	1685	The Universities compelled to admit Papists	1687
Monmouth lands at Lyme,	June 11, 1685	Birth of the "Old Pretender,"	June 10, 1688
Battle of Sedgemoor,	July 6, 1685	Trial of the Seven Bishops,	June 29, 1688
Execution of Monmouth,	July 15, 1685	William of Orange lands at Torbay	Nov. 5, 1688
The "Bloody Assize"	1685	Abdication of James,	Dec. 11, 1688
Revocation of the Edict of Nantes, in France,	Oct. 12, 1685	Died at St. Germains,	Aug. 6, 1701

Sovereigns Contemporary with James II.

Denmark, King of.	*Portugal, King of.*	*Turkey, Sultans of.*
Christian V. . . 1670	Peter II. (previously *Regent*) . 1683	Mahomet IV. . 1649
France, King of.	*Rome, Pope of.*	Soliyman III. . . 1687
Louis XIV. . . 1643	Innocent XI. . . 1676	*United Provinces of the Netherlands, Stadtholders of.*
Germany, Emperor of.	*Russia, Czars of.*	William Henry (afterwards William III. of England) . 1672
Leopold I. . . 1658	Ivan IV. and Peter I. (the Great) conjointly . . . 1682	
Poland, King of.	*Spain, King of.*	
John Sobieski . 1674	Charles II. . . 1665	
[*This monarch was the last independent king of Poland. He defeated the Turks in many battles, and compelled them to raise the siege of Vienna, in* 1683.	*Sweden, King of.*	[*This prince married Mary, the daughter of James II.*]
	Charles VI. . . 1660	

LESSONS IN BOTANY.—XVI.

SECTION XXIX.—CUCURBITACEÆ, OR THE CUCUMBER TRIBE.

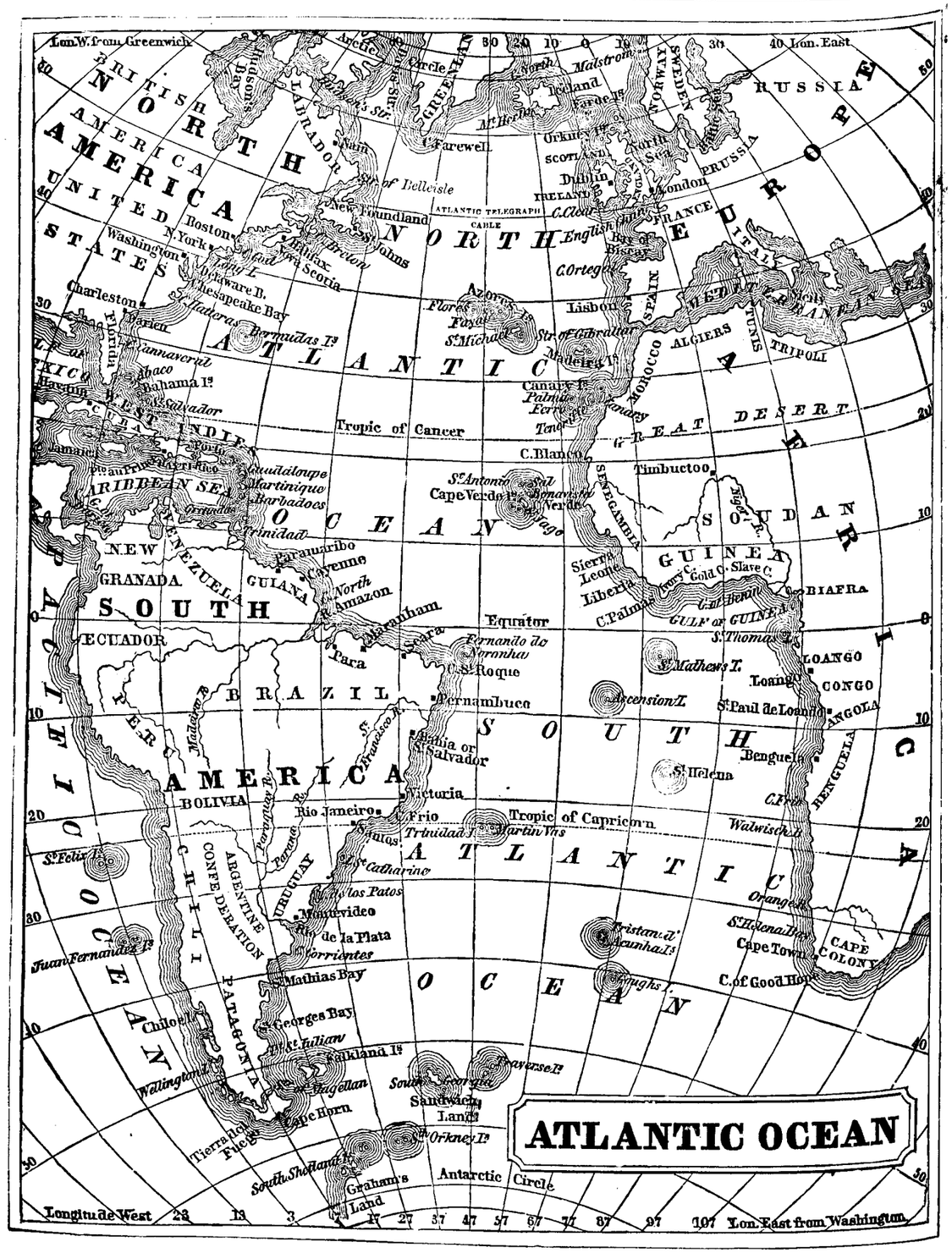
This natural order is allied by many characteristics to the passion-flower, for which reason we treat of it in this place.

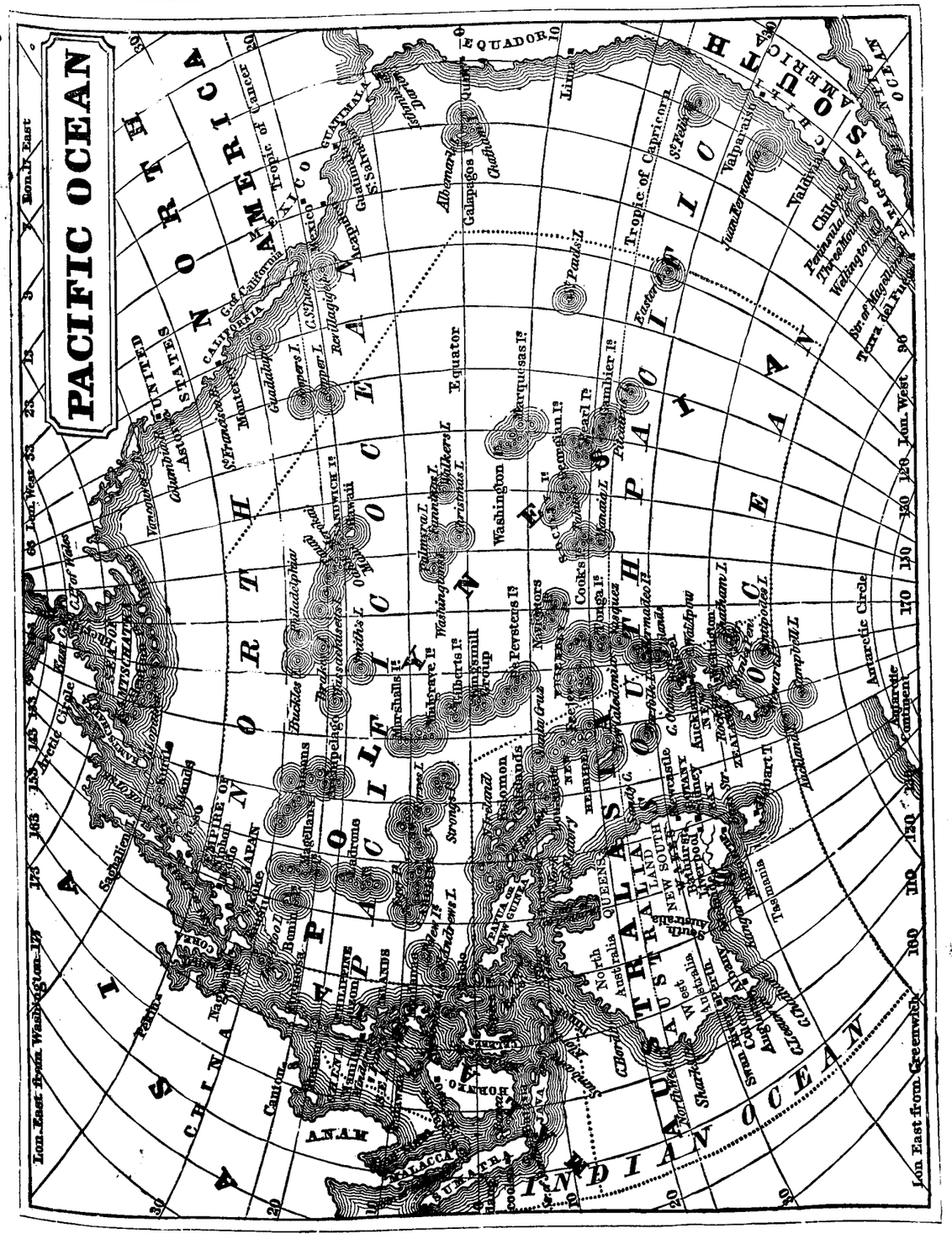
Characteristics: Flowers monœcious, diœcious, or polygamous; calyx with tube adherent to ovary; stamens free, or monadelphous, or triadelphous; anthers turning outwards; ovary three to five—rarely one-carpelled; seed dicotyledonous, exalbuminous; stem uniformly herbaceous, climbing leaves alternate, palminerved, each furnished with a lateral stipule; inflorescence, axillary.

If we compare the parts of the flower of a common cucumber flower with those of a passion-flower, a similarity in many respects will be found to hold good. Like the passion-flower, the calyx has the colour of petals; like the passion-flower, there is the same growing together of stamens; like the passion-flower, the ovary has usually one cavity, and the arrangement of ovules within the ovary is similar. Moreover, both orders yield fruits which are juicy. These are strong resemblances. Let us now examine the parts in which the two natural orders are dissimilar. In the first place, then, on referring to our characteristics of the order, we find that the flowers in the tribe *Cucurbitaceæ* are monœcious, or diœcious, or polygamous, which means that some flowers are male and others female; the male and the female flowers sometimes exist on the same plant, sometimes on different plants, and at other times on both. In this important particular, then, the *Cucurbitaceæ* differ from the natural order we have just been considering. Moreover, the cucumber has very rough leaves, which the passion-flower has not; the cucumber has an inferior ovary, the passion-flower a superior; the passion-flower has rays, the cucumber flower has none. Nor does the distinction between the two natural families end with a mere difference of form and parts. The chemical character of their secretions, as we shall find by-and-by, differs also. The passion-flower tribe are uniformly harmless as regards every part except their root, whereas every member of the cucumber order contains a poison. The cucumber or gourd family, occurs naturally in all tropical and sub-tropical regions; its members are more rare in temperate climes, but the shortness of their life, usually limited to one summer, admits of the cultivation in Europe of many tropical species.

The greater number, if not all the members of the tribe *Cucurbitaceæ*, contain a bitter poisonous principle presenting many degrees of intensity. In the colocynth it attains its maximum, and, being extracted, furnishes us with a valuable medicine. In the ordinary cucumber the poisonous bitter principle is usually but little developed; never to the extent of being dangerous, although frequently enough to be disagreeable. In the melon, sugar is the principal secretion; nevertheless, the bitter principle so prevalent in the family is not wanting; it exists in the outside rind of the fruit, and to a still greater extent in the roots, which are violently emetic. Colocynth has already been mentioned. White bryony, another species, is still more violent in its action. The common cucumber (*Cucumis sativus*), although capable of growing in the open air of our climate, is a native of India and Tartary. The species called *Dudaim* is cultivated in Turkey on account of the delicious odour of its fruit, which, however, is possessed of an insipid taste. Gourds are certain species of *Cucurbitaceæ* with very large fruit. Although our garden cucumber possesses no great claims to beauty, it is otherwise with certain species. The *Cucumis Momordica*, for example, is a very beautiful Indian plant, the leaves and fruit of which differ in external appearance from almost every species of the *Cucurbitaceæ* (Fig. 153). Less beautiful than extraordinary is the species called *Trichosanthes colubrina* (Fig. 156), the fruit of which resembles huge serpents hanging from the parent stem. It is a native of Central America; its leaves are more than a foot in diameter, and its flowers disposed in corymbs; the corolla is white, and bordered by a long hair-like fringe; hence the specific term *Trichosanthes*, which means, in Greek, *hairy-flowered*.

The *Ecbalium agreste*—a plant better known as the wild cucumber, or squirting cucumber—is cultivated at Mitcham, in Surrey, for the sake of a peculiar drug called elaterium, which is yielded by its fruit. The fruit, after it has fallen from its stalk, possesses the curious property of expelling its seeds through the hole in which the stalk was inserted. The drug


Lon. W. from Greenwich
40 Lon. East
NORTH AMERICA
UNITED STATES
BRITISH
RUSSIA
EUROPE
PRUSSIA
FRANCE
SPAIN
ITALY
MEDITERRANEAN
ATLANTIC
OCEAN
Tropic of Cancer
GREAT DESERT
SOUDAN
GUINEA
WEST INDIES
CARIBBEAN SEA
SOUTH AMERICA
ECUADOR
BRAZIL
PERU
BOLIVIA
CHILI
CONFEDERATION
ARGENTINE
URUGUAY
PATAGONIA
Tierra del Fuego
Tropic of Capricorn
Equator
Lon. West
ATLANTIC OCEAN
Longitude West
Lon. East from Washington


PACIFIC OCEAN
NORTH AMERICA
SOUTH AMERICA
EQUADOR
Tropic of Capricorn
Equator
Lon. East
Lon. West
Lon. East from Greenwich
Lon. East from Washington
ASIA
AUSTRALIA
INDIAN OCEAN
JAPAN
CHINA
Antarctic Circle
Antarctic Continent

itself is obtained from a thick green mucus that surrounds the seeds. This mucus is collected from the fruit when it is nearly ripe, and after being allowed to stand for a short time, it becomes turbid and deposits a sediment, which, when it has been dried, is known as elaterium. It is a powerful purgative and irritant, and has an acid taste. The *Bryonia dioica*, or common bryony, is a plant which furnishes one of the principal medicines used in homœopathy. It is indigenous to England, and is found in almost every hedgerow in the southern and western counties, attracting notice by its pretty-looking bunches of scarlet berries and its beautifully-formed cordate palmate leaves. It must not be confounded with the black bryony, or *Tamus communis*, another plant used by homœopathic practitioners. This belongs to a different natural order, namely, *Dioscoreaceæ*. It has long, twining stems and bunches of red berries; but its leaves, although they are cordate, are not divided into lobes like those of the common bryony. They are of a dark-green colour, almost approaching to black.



153. ELATERIUM-LIKE GOURD (CUCUMIS MOMORDICA).

SECTION XXX.—SOLANACEÆ, OR THE NIGHTSHADE TRIBE.

Characteristics: Calyx free; corolla regular, in five divisions; stamens inserted on the tube of the corolla, their number equal to that of the divisions, and alternating with them. Anthers bursting longitudinally, rarely by pores, at the apex; ovary two-celled; style continuous; stigma simple; pericarp with two, four, or many cells; either a capsule with a double dissepiment parallel with the valves, or a berry with placentæ adhering to the dissepiment. Herbaceous plants or shrubs; leaves alternate, undivided, or lobed; inflorescence variable, often axillary; pedicles without bracts.

In the above description of the characters of plants belonging to the tribe *Solanaceæ*, the term "dissepiment," from the Latin di or dis, *apart*, and sepes, *a hedge*, is applied to the partitions that divide the cells of the ovary from one another.

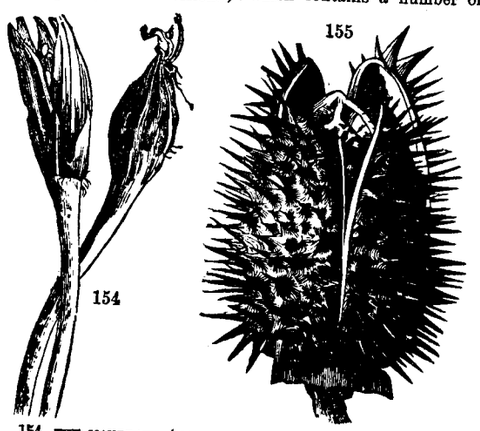
When we inform the reader that the nightshade, henbane, tobacco, stramonium, and the mandrake plant, all belong to this natural order, we state enough to convey to him a general impression concerning the *Solanaceæ*. It is a highly dangerous family, although one that ministers to our sustenance in the potato, and to the comfort of many in the tobacco.

The best flower the reader can select for making himself acquainted with the characteristics of the *Solanaceæ* will be that of the common deadly nightshade. Let it be procured with leaves attached, for they merit observation. The leaves, it will be seen, are alternate, which, in this family, constitutes an important generic distinction.

Let us now observe the flowers (Fig. 159). We find them to consist of a calyx in one piece or sepal; hence the flower is monosepalous. We find, moreover, that the calyx is furnished with five tooth-like projections, which would have resulted in the generation of five different sepals, had the progress of indentation gone far enough.

The corolla, also, consists of one part or petal; hence the flower is said to be *monopetalous*. Our second diagram (Fig. 158) represents one of these flowers cut open in such a manner that the mode of insertion of the stamens is evident. Like the calyx, the corolla is also five dentated. Remark, now, how the stamens are attached. They spring from between the dentated processes or lobes of the corolla; and this is invariable for all the genera and species of the *Solanaceæ*, serving to distinguish their members from those of the *Primulaceæ*, or the primrose tribe. If the reader examine the construction of a primrose, he will find what we say to be true.

If we now proceed from the flower to the ovary, and transversely divide it, two separate cells may be observed, each of which contains a number of ovules (Fig. 160). This ovary, when ripe, constitutes the fruit, a small two-celled black berry.



154. THE MANDRAKE (MANDRAGORA OFFICINALIS.)

155. FRUIT OF THE STRAMONIUM.

If a seed be transversely divided, the embryo will be observed coiled up within it, and is therefore said by botanists to be curved (Fig. 161). Finally, the most essential characteristics of the Nightshade tribe are *superior two-celled ovary, regular flower*, and *alternate leaves*. The latter peculiarity distinguishes them from the Gentian tribe, with which their appearance in other respects corresponds.

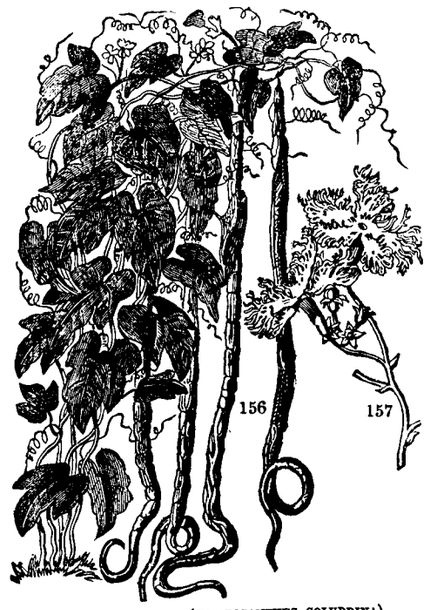
Numbers of the numerous family of the *Solanaceæ* belong to the tropics, very few species being natives of temperate regions, and none existing in either northern or southern frigid zone. Nearly all, if not all, the species of the *Solanaceæ* contain a poison of a narcotic kind. Even that useful solanaceous plant, the potato, is not entirely free from poison. The fruits are notoriously poisonous, and even the juice of raw potatoes is injurious. Nevertheless, the potato, as we all know, is highly nutritious. This arises from the starch and gluten which it contains being mingled with so little of the poisonous principle that the latter is destroyed by the cooking process to which potatoes are subjected before being eaten. The egg-plant is one of the *Solanaceæ*, so in like manner is the tomata; both are occasionally eaten; the latter, indeed, frequently; by the Spaniards, almost universally. They are both, however, injurious if eaten raw. We may here remark, in connection with the potato, that the vegetable substance, starch, is largely diffused throughout many poisonous plants, and, when separated from them, it is invariably harmless. Of this we have a remarkable example in tapioca, which is nothing else than the baked starch extracted from the large fleshy roots of the *Jatropha Manihot*. The juice of the tree is so poisonous that arrows are poisoned with it; nevertheless, tapioca is a delicate article of food.

The common deadly nightshade (*Atropa Belladonna*) grows in shady places, and is an elegant, though dangerous-looking plant.

The belladonna bears a cherry-like fruit, which has been sometimes incautiously eaten by children, and too often attended with a fatal result.

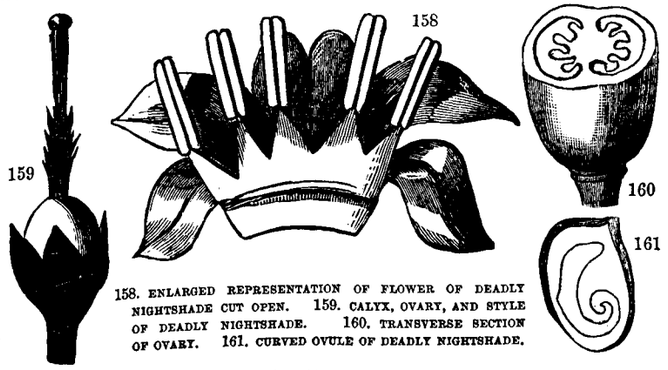
In 1793, some orphans, brought up at the Hospice de la Piété, at Paris, were employed in weeding a botanical garden. They happened to be attracted by the tempting-looking fruit of a belladonna plant, of which they ate a considerable quantity. Fourteen of those unfortunate children died in consequence of this only a very few hours afterwards.

This fact justifies the generic name *Atropa*, from *Atropos*, one of the Fates, who was supposed to cut the thread of life. The specific name, *Belladonna*, signifies *beautiful lady*, and is dependent on the circumstance that the Italian ladies use the distilled water of this plant as a cosmetic. They fancy it improves their complexions. The active principle of belladonna chiefly resides in the leaves and in the root. Chemists term it *Atropine* or *Atropia*.



156. SNAKE GOURD (TRICHOSANTHES COLUBRINA).
157. BLOSSOM OF THE SNAKE GOURD.

The mandrake (Fig. 154) is a species very nearly allied to the belladonna: and it grows in the south of Europe, and in dark places. This plant, known and celebrated from times of very great antiquity, was employed by the so-called sorcerers of ancient times to produce narcotism and disordered visions. Its roots are large, often two-pronged, whence the fancied resemblance to the lower limbs of a man. It is supposed that the mandrakes mentioned in the Old Testament were not the same as the plant which is known to us by this name, but that, under this term, reference is made to the fragrant but insipid fruit of the *Cucumis Dudaim*, which, as we have already said in our remarks on the *Cucurbitaceæ*, is cultivated in the gardens of the East for the odour it exhales. The mandrake is also confounded by some with the sleep-apple, a mossy excrescence on the wild rose, which, when laid under the pillow, was supposed not to allow any one to awake until it was taken away.



158. ENLARGED REPRESENTATION OF FLOWER OF DEADLY NIGHTSHADE CUT OPEN. 159. CALYX, OVARY, AND STYLE OF DEADLY NIGHTSHADE. 160. TRANSVERSE SECTION OF OVARY. 161. CURVED OVULE OF DEADLY NIGHTSHADE.

Henbane, or *Hyoscyamus niger*, is another European plant belonging to this genus. It is biennial, and grows amidst the ruins of buildings or in the neighbourhood of habitations. Its stem is studded with a cotton-like substance, and it constantly exhales a repulsive odour. Its corolla is palish-yellow, veined with purple. The *Hyoscyamus*, or henbane, owes its narcotic properties to the presence of a peculiar alkali. The action of henbane is far less powerful than that of belladonna; nevertheless, it may cause death if eaten. A German physician relates that, on a certain occasion, the Benedictine monks of the convent of Rhinon were presented with a salad in which the sliced root of chicory, as was thought, had been placed. Instead, however, of chicory, the root was of henbane. After the repast, the monks went to bed. Symptoms of poisoning soon commenced; the monks were all stupefied. The time for matins or morning prayers arrived, and one monk was so fast asleep that his fellows supposed him to be dying, and under this impression administered to him extreme unction. The other monks went to chapel, but they had much better have stayed away; some of them could not even open their eyes, much less read. The vision of others was so disordered that they thought insects were crawling over their books, and employed themselves in blowing and brushing the intruders off. Others, instead of praying, uttered nonsense. In the end, all the monks got well, even the one supposed to be dead; but one poor individual, a tailor, could not thread his needle for a long time afterwards, so disordered was the state of his vision. Instead of one needle the tailor saw three, and as he could not tell the real needle from its ghost-like duplicates, there was slight chance of threading it. This anecdote makes known better than any formal description the physiological action of henbane.

The stramonium (Fig. 155) is another of the Nightshade tribe (*Datura Stramonium*). It is an annual, and was unknown to the ancient Greeks and Romans, although now common enough, having been brought from Central Asia in the Middle Ages by that wandering race, the Gipsies. Its active principle is called *daturine*, which exists in the leaves and the seeds. This principle is a potent narcotic alkaloid, resembling in its quality and the effects it produces the alkaloids *hyoscyamia* and *atropia*, yielded by the henbane and belladonna. It is a deadly poison, and among the most striking of its properties may be named the effect it produces on the pupil of the eye—namely, that of causing it to dilate strongly. Nevertheless, the stramonium, or thorn-apple as it is sometimes called, like many other poisonous plants, has its beneficial uses. In Cochin China, a decoction made of its leaves is considered an effectual remedy for hydrophobia, the terrible disease resulting from the bite of a mad dog; but this is very doubtful. In small quantities *daturine* is useful as an anodyne or pain-soother, and as an anti-spasmodic. Persons suffering from asthma have found relief in smoking the dried leaves of the plant, or inhaling an infusion made by pouring boiling water on the seeds or leaves. Great care, however, should be taken lest the patient take an overdose.

natural divisions of the earth's surface, we have given two maps, one of the Atlantic Ocean and the other of the Pacific Ocean, which will be found useful in showing on a larger scale than that on which our Map of the World was drawn, the shores of the countries that are washed by these great bodies of water, and their mutual position with regard to each other. These maps are arranged in such a manner that the student may ascertain the longitude East or West from Greenwich or Washington of any place that is marked in them. In the map of the Atlantic Ocean the meridians are marked according to their position east and west from Greenwich along the top, and from Washington along the bottom. In the map of the Pacific Ocean the distance of each meridian from Greenwich is marked along the bottom of the map, and from Washington along the top. A representation of by far the greater part of the surface of the globe between the Arctic and Antarctic Circles is given in these maps. The part which does not appear in them is that portion of the Indian Ocean which washes the southern coast of Asia and the eastern shore of Africa, with the whole of Central and Western Asia and the east part of Africa.

LESSONS IN ARITHMETIC.—XXX.

DECIMALS IN CONNECTION WITH COMPOUND QUANTITIES —REDUCTION OF DECIMALS.

1. *To reduce any given Compound Quantity to the Decimal of another given Compound Quantity of the same kind.*

This is the name given to the process of finding, in the form of a decimal, what fraction the one quantity is of the other; or, in other words, of expressing the *ratio* of the two quantities as a decimal fraction.

Hence, clearly, all we have to do is to find the ratio of the two quantities expressed as a vulgar fraction, and then to reduce that fraction to a decimal.

Thus 4s. is $\frac{1}{20}$, and $\frac{1}{5} = \cdot2$.

Hence 4s., reduced to the decimal of a pound, is £·2.

Again, 14s. 6d. $= £\frac{29}{40}$.

And we find, as in the margin, that $\frac{29}{40}$, expressed as a decimal, is ·725.

40) 29·000
·725

Hence, 14s. 6d., reduced to the decimal of a pound, is £·725.

2. But instead of reducing the whole of the one compound quantity to the fraction of the other, and then reducing this fraction to a decimal, we can, in many cases, obtain the result more conveniently by reducing the separate portions successively to decimals of the next higher denomination.

Thus, if it be required to reduce £3 4s. 4½d. to the decimal of a pound, we may proceed as follows:—

½d. = ·5 of a penny.
Therefore 4½d. = 4·5 "
And 4½d. = $\frac{4\cdot5}{12}$ of a shilling = ·375 of a shilling.
Therefore 4s. 4½d. = 4·375 of a shilling.
And 4s. 4½d. = $\frac{4\cdot375}{20}$ of a pound.
= ·21875 "

Hence £3 4s. 4½d., reduced to the decimal of a pound, is £3·21875.

In practice we should arrange the process thus:—

4) 2·0 farthings.
12) 4·5 pence.
20) 4·375 shillings.
3·21875 pounds.

Writing down the two farthings and dividing by 4, we get ·5 pence, before which we place the 4d. of the given sum. Dividing this again by 12, we get ·375 shillings, before which we place the 4s. of the given sum; and, similarly, dividing this by 20, we get ·21875 pounds, before which we place the 3 pounds of the given sum.

3. EXAMPLE.—Reduce 5 days 3 hours 36 minutes to the decimal of 3 weeks.

60) 36·00 minutes.
24) 3·60 hours.
7) 5·150000 days.
3) ·73571428 weeks.
·24523809 decimal of 3 weeks.—Answer.

4. *To reduce a Decimal of any Compound Quantity to successive lower Denominations.*

For instance, suppose it be required to reduce £3·21875 to pounds, shillings, and pence.

This is the reverse process to that already explained in Art. 2.

Now £·21875 $= £\frac{21875}{100000} = \frac{21875 \times 20}{100000}$ shil. $= \frac{437500}{100000} = 4\cdot375$ shil.

·375 shil. $= \frac{375}{1000}$ shillings $= \frac{375 \times 12}{1000}$ pence $= \frac{4500}{1000} = 4\cdot5$ pence.

And ·5 pence $= \frac{5}{10}$ pence $= \frac{5 \times 4}{10}$ farthings $= \frac{20}{10} = 2$ farthings.

Hence, £3·21875 = £3 4s. 4½d.

An examination of the above will sufficiently explain the following method of arranging the work:—

£3·21875
20
4·37500
12
4·500 (leaving out unnecessary
4 ciphers.)
2·0 £3 4s. 4½d.—Answer.

Notice that the *decimal part* only of each line is multiplied.

5. Hence we get the following

Rule for finding the Value of a Decimal of any one Denomination in successive lower Denominations.

Multiply the decimal part by the number of units of the next lower denomination which makes one of the denomination in which the decimal is expressed, and cut off from the result a number of decimal places equal to the number in the multiplicand. The integral part in this result will express the number of units of the lower denomination. Proceed to reduce the remaining decimal part to the next lowest denomination exactly in the same way, and continue the process until the lowest required denomination is arrived at.

6.—EXAMPLE.—Reduce ·4258 days to hours, minutes, etc.

·4258
24
17032
8516
10·2192 hours.
60
13·1520 minutes.
60
9·1200 seconds.

Hence ·4258 days = 10 h. 13 m. 9·12 s.

7. It is evident that, since each of the two processes we have explained is the converse of the other, we can prove the correctness of our operations in any case by reducing the result to the original form.

Thus we showed that £3 4s. 4½d. was £3·21875, and then, by the converse process, we proved that £3·21875 = £3 4s. 4½d.

8. EXAMPLE.—Reduce ·2173 of a pound to shillings, pence, etc. This may be performed in two ways.

·2173
20
4·3473
12
4·1692
4
·6772 farthings.

Hence £·2173 = 4s. 4d. and ·6772 farthings.

Here, in multiplying we are obliged to take in additional figures of the recurring period, in order to obtain the recurring period after the multiplication correctly; and this might give rise to considerable trouble if the number of figures in the recurring period were large. It will be often better, therefore, in such cases, to reduce the recurring decimal to a vulgar fraction, and proceed to perform the operation as follows:—

$£\cdot2173 = \frac{£2173 - 21}{9900} = £\frac{2152}{9900} = £\frac{538}{2475}$.

$£\frac{538}{2475} = \frac{538 \times 20}{2475}$ shillings $= \frac{2152}{495}$ shillings $= 4\frac{172}{495}$ shillings.

$\frac{172}{495}$ shillings $= \frac{172 \times 12}{495}$ pence $= \frac{688}{165}$ pence $= 4\frac{28}{165}$ pence.

$\frac{28}{165}$ pence $= \frac{28 \times 4}{165}$ farthings $= \frac{112}{165}$ farthings.

165) 112·000 (·678
990
1300
1155
1450
1320
130

Hence £·2173 = 4s. 4d. and ·678 farthings.

EXERCISE 49.—EXAMPLES IN REDUCTION OF DECIMALS.

Reduce—

1. 4s. 9d. to the decimal of £1.
2. 10s. 9d. to the decimal of £1.
3. 17s. 7d. to the decimal of £1.
4. 6½d. to the decimal of a shilling.
5. 2 furlongs 2 rods to the decimal of a mile.
6. 3 hours 3 minutes to the decimal of a day.
7. 5 lbs. 4 oz. to the decimal of a cwt.
8. 15 minutes 30 seconds to the decimal of an hour.
9. 7 ounces 8 drachms to the decimal of a pound.
10. 1 guinea to the decimal of a moidore, and 2s. 6d. to that of 1 guinea. Deduce from your results what decimal 2s. 6d. is of a moidore.
11. 2 roods 10 perches to the decimal of an acre.
12. 18s. 10½d. to the decimal of a guinea.
13. What decimal is a day of a year, and 8s. 7¾d. of 18s. 2¼d.?
14. What decimal is a pound of a cwt., and 2s. 9¼d. of 13s. 10½d.?
15. Express $\frac{3}{5}$ of 3 lbs. 8 oz. as a decimal of 2 qrs. 15 lbs. 7 oz.
16. Reduce ·43 of £2 17s. 6d. to the decimal of £5 15s.

Find the value of—

17. £·725 in shillings, etc.
18. £·1325 in shillings, etc.
19. ·825s. in pence, etc.
20. ·435 lbs. in ounces and drachms.
21. ·275 miles in rods, yards, etc.
22. ·4258 days in hours, etc.
23. ·845 hours in minutes, etc.
24. Reduce 4s. 7½d. to the decimal of ·01 of £1.
25. Find ·3 of a pound in shillings, pence, etc.
26. Reduce $\frac{\frac{1}{2} + \frac{2}{3\frac{1}{2}} + \frac{1\cdot3}{2\frac{1}{2}}}{\frac{1}{2} + \frac{2}{3\frac{1}{2}} + \frac{1\cdot3}{2\frac{1}{2}}}$ of £1 to the decimal of a guinea.

Find the value of—

27. ·890625 of £1 in shillings, pence, etc.
28. ·27 × ·1 of 2s. 9½d., and reduce the result to the decimal of a pound to 4 places.
29. ·23 of £2 + ·345 of 8s. 6d. — 1·35 of 5s.
30. $\frac{3 + \cdot125 - \frac{5}{16}}{\cdot235 - \cdot03}$ of a cubic yard.

KEY TO EXERCISE 48, LESSON XXIX. (Vol. II., page 198).

N.B. The fractional parts of a farthing are neglected in these results.

	£	s.	d.		£	s.	d.		£	s.	d.
1.	220	1	0½	9.	5375	0	0	17.	865	4	7½
2.	1625	9	9	10.	12951	18	9	18.	1358	0	6¾
3.	212	4	4	11.	318	1	7¾	19.	1810	3	3½
4.	411	13	10½	12.	691	0	10	20.	144	7	3¾
5.	2290	6	0	13.	962	18	2	21.	1895	0	11¾
6.	135	12	8	14.	214	5	5½	22.	163	9	0
7.	78742	2	6	15.	388	3	1	23.	2226	8	5¾
8.	3456	16	8	16.	569	6	3½				

LESSONS IN CHEMISTRY.—VIII.

WATER (*continued*).—PEROXIDE OF HYDROGEN.

THE purest water in nature is rain-water. The sun evaporates moisture, which is condensed in the upper regions of the atmosphere, and descends again as rain—thus undergoing the process of distillation. The only impurities rain-water can contain are small quantities of the gases which compose the atmosphere—oxygen and nitrogen, and carbonic acid gas; and in passing through the air which overhangs towns, it dissolves sulphurous acid gas and ammonia, but of these only the slightest trace.

When rain-water percolates through the earth, it dissolves various salts which it finds in its course. These are most usually calcium carbonate, $CaCO_3$ (chalk); common salt, NaCl. (sodium chloride); calcium sulphate, $CaSO_4$; magnesium sulphate and carbonate, $MgSO_4$ and $MgCO_3$. The water in the neighbourhood of London contains about eighteen grains of chalk in each gallon.

Mineral Waters are waters impregnated with a large proportion of any one of these salts. Generally their temperature is higher than the surface of the earth where they make their appearance, and most usually they occur in volcanic neighbourhoods.

Chalybeate springs contain iron, which they deposit on their channel, making the water-course red with iron-rust. The Cheltenham springs are of this kind, but they are of frequent occurrence in the neighbourhood of iron beds.

Seltzer water, and those of a kindred nature, owe their effervescence to the escape of carbonic acid gas, of which they contain large quantities.

Harrogate water owes its offensive smell to the presence of sulphuretted hydrogen gas.

Saline springs, such as those at Epsom, abound in magnesium sulphate. The Cheltenham springs also contain saline matter—sodium sulphate, Na_2SO_4—and common salt.

The presence of these salts may be readily detected by the tests given under the various substances.

Most of these waters are medicinal, but none of their contents are pernicious. This is, however, not the case with *organic matter*, which some "surface" waters contain. We shall take London as an instance. The city is built on gravel, below which is a bed of clay, known as the "London clay." The rain percolates through this gravel, and is arrested by the clay; a well which is sunk down to the clay is soon filled with this water. The liquid is bright, sparkling, very refreshing, and in about the same proportion as its apparent good qualities recommend it, so are its contents deleterious. Animal and vegetable matters as they decompose give rise to the formation of nitrates, which are readily soluble, and the water becomes impregnated with these salts, and it also holds some of the animal matter in solution. Those impurities are classed under the name of "organic matter." To the use of such water the origin of the malignant epidemics which sometimes scourge our towns is frequently traced. Water containing organic matter, when evaporated to dryness, leaves a brown residuum, which chars when sufficiently heated. It may, also, be tested for by *permanganate of potash*. If a dilute solution of this salt be added to distilled water which has been acidulated with a few drops of sulphuric acid, and then raised to 60° Cent. for half an hour, it will be found to retain its pink colour; but if water containing organic matter be used, the solution is rendered colourless in a few minutes. The water with which the companies supply London is got from the chalk which lies beneath the clay.

The reader must have frequently noticed that it is a disagreeable and indeed difficult matter to wash in some waters. These are termed "hard waters." Their peculiarity arises from the fact that they contain salts whose bases are lime and magnesia. When soap is dissolved in them, these mineral salts and the soap act upon each other, or, in chemical language, undergo a double decomposition, the result of which is the formation of insoluble compounds of the fatty acids of the soap (oleic and stearic) and the bases of the salts. These oleates and stearates of lime and magnesia, being insoluble, are, of course, precipitated, but they are of a stringy nature, and adhere to any kind of textile fabric, rendering it difficult to wash clothes in such waters.

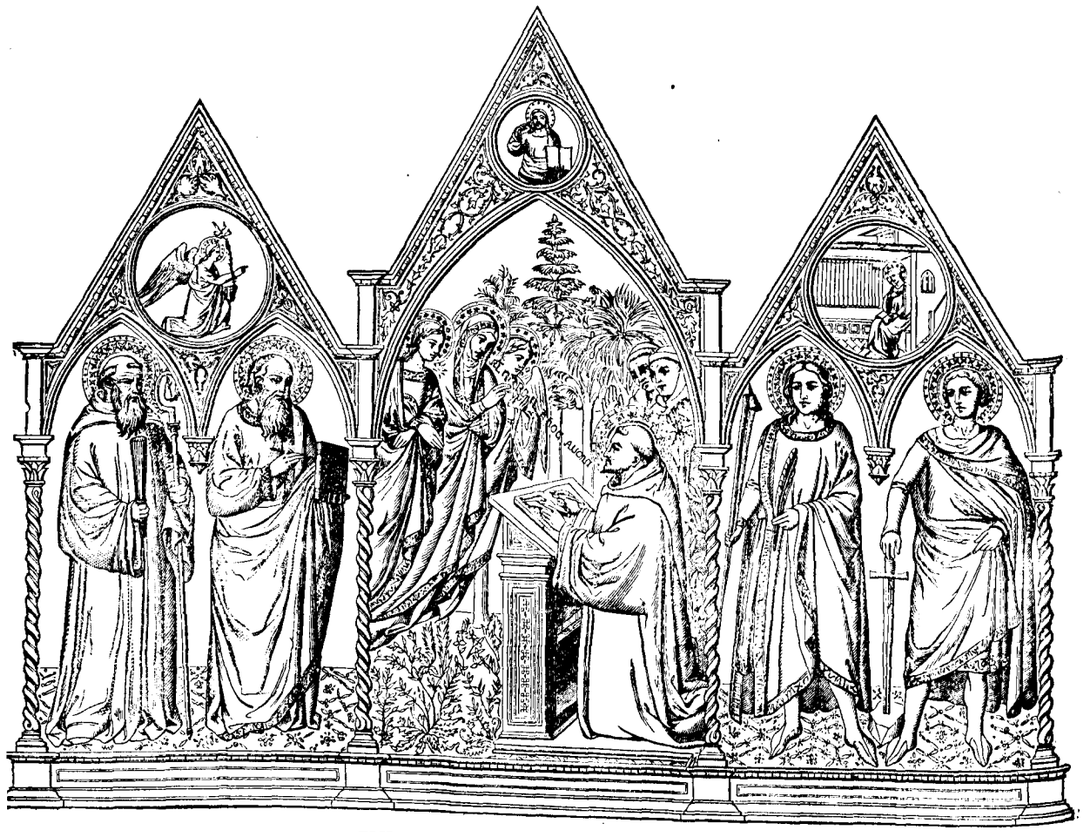
Various ways have been proposed to "soften" water, the object of which will be at once comprehended when we state that these salts are not by nature soluble in water, but are rendered so by the presence of carbonic acid gas. If, for instance, some powdered chalk be shaken up in a bottle of water, the liquid will become milky, but if the experiment be repeated with a bottle of "soda-water" freshly opened, the chalk will dissolve, and the water retain its transparency. If by any means the carbonic acid gas can be driven out of the hard water, its salts will be precipitated, and it will become soft. This may partially be effected by boiling; hence the explanation of the calcareous deposit found at the bottom of boilers. This fact may be readily exhibited by boiling a flask of hard water; after some minutes it

THE HISTORY OF ART.

VII.—THE EARLY ITALIAN REVIVAL.

ROMAN art declined slowly but steadily from the palmy days of the Empire onward. The Roman system was too artificial to last: it was based upon slavery and conquest; it was kept up by the tribute and the degradation of the subject nations; it concentrated all the wealth of the civilised world upon Rome alone; and it thus fostered a cruel and selfish luxury in the capital, while leaving the provinces crushed and impoverished by the absolute centralisation upon which it insisted before everything else. Accordingly, the Empire began to decay from within even before it began to be attacked from without; and Art, as always, reflected this decay in its handicraft. Already under the emperors of the second century it had lost much of its original vigour and life; it had degenerated into fixed and somewhat conventional forms, into a hardness and rigidity very different from the old Greek freedom and naturalness. By the time of Constantine the change had become very marked. His triumphal arch may be regarded as the last dying effort of the real antique Roman art. There is nothing spontaneous in it, nothing fresh, nothing original; it is a mere struggling attempt on the part of second-rate workmen to copy and imitate the great and vigorous triumphal arches of the earlier age.

When Constantine removed the seat of government from Rome to his new capital of Constantinople on the Bosphorus, the whole tone of art became utterly different. Constantinople was the administrative centre of a great crystallised and solidified empire. All its habits and customs were those of the most extravagant court ceremonial and etiquette. As the Empire grew narrower and narrower, the emperors grew grander and grander in their own esteem. They were surrounded by numerous officials; they had endless chamberlains and stewards and secretaries; they were preceded by lictors with emblematical rods and axes; they lived in a perpetual ceremony of trumpets and uniforms and titles and genuflexions. Their palaces were adorned with Eastern and despotic gorgeousness; their churches were decorated with gilt mosaics and Moorish wealth of barbaric colouring. To suit such a court and such a style of life as this, there naturally grew up a peculiar school of artists, who remind one in many particulars of the old Egyptian school, though, of course, their inheritance of the higher Greek methods necessarily placed them on a very different level from the primitive painters of Thebes and Memphis. Nevertheless, there was much similarity in their position, and this induced a certain resemblance in their style as well. At Constantinople, as in Egypt, art was directly and immediately dependent upon the court. There was no wealthy and instructed class outside the official body and the emperor's household; all artistic handicraft was produced solely for the imperial family or its dependents. Palaces and churches were adorned with painting and mosaic; rich manuscripts were illuminated; beautiful miniatures were produced, and exquisite carvings performed for the court ceremonial. But there was no class of independent artists or independent art-patrons. Hence Byzantine work (as the art of Constantinople is usually called) was very wooden and artificial, a mere stiff representation of conventional emperors and patriarchs, in gorgeous robes and splendid colouring, performing various ceremonies of a properly stiff and dignified character. It has a certain grand and semi-barbaric impressiveness of its own, in its peculiar ceremonial fashion, something like our own pomp of heraldry



TRIPTYCH OF THE EARLY ITALIAN PERIOD.

and mediæval blazons, but it is wholly wanting in all the higher qualities of freshness, originality, or fidelity to nature. The typical Byzantine craft was the gorgeous ecclesiastical mosaic work, representing colossal solitary figures in large squares of bright colour on a background of gold. It pleases all childish and half-developed minds by its glitter and its brilliancy, but it cannot please any higher taste, because of its utter lifelessness and its conventionality of representation.

Meanwhile, after the seat of the Empire was removed to the East, Rome itself, with Italy and the West, had been overrun by the Teutonic barbarians of Germany—the Goths and others —who had settled down in every part of the old provinces, from Britain to Carthage, and from Spain to Venice. Thus in these countries the Roman civilisation died away to a great extent, being wholly lost in England, largely overwhelmed in Gaul, and much diluted even in Italy itself. Accordingly, Constantinople, as the seat of that part of the Empire which still retained its independence and carried on the traditions of Greek and Roman culture, became the natural centre of civilisation, of literature, and of art. A brisk traffic in pictures, jewellery, and metal-work was carried on by Venice and Amalfi between Constantinople and Rome. From the East, Byzantine paintings were imported into Italy and the Western countries during the early middle ages (A.D. 500 to 1200), and Byzantine models were copied at Rome by the half-barbarised Romans, whose own art had all but utterly died out during the Teutonic invasions. Of course, these Western copies of Byzantine art were even more wooden, lifeless, and conventional than their Eastern originals. They often show all the worst types of art—that art which is a mere degradation of higher styles, and is wanting even in the natural freshness and originality of the veriest savage sketches.

But as the effects of the Teutonic invasions began to pass away, as the conquerors and the conquered began to fuse into a single people, new industrial centres arose in Italy, and with them arose a new and more genuinely native art. Italy, indeed, had suffered less than any other part of the Empire from the barbarian invaders, and throughout the middle ages it remained far more civilised than any other part of Western Europe. In architecture the new movement produced the style known as Romanesque, with its graceful rounded arches directly recalling the old Roman modes, but more distinctly subordinated to the necessities of Christian worship and of modern life. In painting the movement produced yet more important results—results which have had immense weight in the whole subsequent development of art. The name of Giotto (A.D. 1276—1336) is closely connected with this revolution.

The accompanying engraving (which represents a triptych, if not by Giotto himself, at least by some member of the school that he founded) will give a very good idea of the characteristics of the new style. The devotional spirit remains the chief spring of all art, but Giotto ventured to introduce a freedom of treatment, a comparative correctness of drawing, and a truthfulness to life, which were wholly wanting in the Byzantine and early Italian paintings. Giotto's draperies were still a little stiff, his attitudes were still a little angular and unreal, his features were still a little devoid of emotional expression, but in every respect he shows a great advance upon any previous artist since the older Roman period. In the side panels of this triptych we can see in part a survival of the Byzantine treatment, with its solitary figures in partially conventional attitudes, and its ornamental rather than truly pictorial character; and this survival is very marked in the decorative presentation of the floors, the halos around the heads, and the general nature of the accessories. But in the figure of the monk who occupies the central panel of the triptych we have a real and immense advance upon anything that Italian art had previously produced. The fall of the drapery in every case, the pose of the hands, the faces of the personages, are all free from the Byzantine stiffness and conventionality. The engraving, however, cannot give any idea of one among Giotto's chief excellences—his admirable colouring. Disregarding the purely decorative colours of the older school, Giotto ventured to introduce a new system, which endeavoured to dispense to some extent with gilding and dark heavy hues, and to substitute for them a purer, more luminous, and more natural scale of tints. If we judge Giotto's workmanship by a modern standard, we shall be compelled to admit that his pictures often show us heavy and ungainly figures, oblique eyes, and cumbrous drapery; but if we compare him with those who went before him, we cannot fail to recognise him as a great and genuine genius. His advance in movement, liveliness, truth to Nature, and dramatic effect, constitutes him the real beginner of the modern school, and his abandonment of the old system of colouring enabled him to give the proper expression to his novel conceptions. His powers, indeed, were almost universal, for he was not less remarkable as a sculptor and an architect than as a painter. Giotto's life was mainly spent in Florence, and through his influence Florence became the chief artistic centre of mediæval Italy. Works of the school which he founded are to be met with, however, not only in Florence, but in Pisa, Padua, Siena, and many other Italian towns. Our own National Gallery possesses a few examples. But, in fact, the style of painting introduced by Giotto was so dependent upon church architecture that it can hardly be judged with fairness except in the original positions.

READING AND ELOCUTION.—XVI.

ANALYSIS OF THE VOICE (*continued*).

IX.—JUST STRESS.

THE next characteristic of good reading and speaking is just "stress." This word is meant to designate a peculiar modification of force, which distinguishes speech from music. A long-drawn musical sound has its most forcible part—in consequence of "swell" and "diminish"—at the middle portion of the note. The tones of speech, on the contrary—although, in a few cases, they approach to this mode of voice—usually have the chief force of each sound at the opening or the closing part. In music, the increase of force is comparatively gradual; in speech and reading it is frequently abrupt. To these distinctive modes of voice the term "stress" is applied.

To understand the application of this term in detail, it becomes necessary to advert to the mode of creating vocal sounds. In vocal music the result is obtained by full "inspiration" (inhaling or drawing in the breath), and comparatively slight "expiration" (giving forth the breath). In this mode, much breath is drawn in, much retained or withheld, and little given out at a time; and thus are produced those smooth, pure, and gradually-increasing tones which are appropriate to music—all the breath that is given forth being converted into sound, and none escaping that is not vocalised. In notes of very short duration, singing and speech are, it is true, brought nearer to a resemblance. But this resemblance is more apparent than real; as may be observed in the execution of every good singer, which, in the most rapid passages, still produces the genuine effect of song, as differing from speech. The resemblance is owing solely to the brevity of sound, in such cases, which does not afford time for broad and marked distinctions to be drawn by the ear.

The modes of voice which constitute speech, or are exemplified in reading, are the following:—

I. RADICAL STRESS.—This form of force includes two modes —"explosion" and "expulsion."

1. "Explosion" is an abrupt and instantaneous burst of voice —as, for example, in violent *anger*.

This being an instinctive, unconscious, involuntary, impulsive emotion, does not allow time or disposition for any intentional or deliberate effect, but makes the creation of vocal sound seem an irrepressible, spontaneous, electric production of nature, lying equally out of the reach of the understanding and the will. This tone has its contrast in the deep, calm, and regular swell of the tone of *reverence*, or the ample volume, and deliberate force, of conscious *authority* and *command*, in which the speaker is self-possessed and self-directed, and controls his vocal effects for purposes understood or felt.

Contrast, for instance, the following angry shout of Douglas when enraged by the defiance of Marmion, with the examples of *reverential invocation* and *authoritative command* which occur in the subsequent paragraphs.

Example of "Explosion."

UP DRA'WBRIDGE! GROOM! What, WARDER, HO'!
Let the PORTCU'LLIS FALL!

The sounds of all the accented vowels in this style, fall upon

will become milky, owing to the precipitation of the salts. A simil-r effect may be produced by adding a little lime-water; the lime appropriates the carbonic acid, and consequently the salts originally in the water and the newly-made carbonate of lime are precipitated together.

The formation of stalagmites and stalactites in caverns, and likewise the petrifaction of bodies placed in the water of many wells—for example, the "Dropping Well," at Knaresborough, in Yorkshire—is due to this suspension of calcium carbonate by carbonic acid gas. When the water is distributed over the surface of the body undergoing petrifaction, or as it drips from the roof of the cavern, the carbonic acid gas escapes, and the calcium carbonate, being no longer capable of existing in solution, is deposited.

When water is required for delicate experiments, for photographic purposes, or for making solutions for laboratory use, distilled water must be used.

To distil water, the glass tube in Liebig's condenser should be replaced by a metal one lined with block tin; and to be quite sure that the water in the retort is not acid, it is safer to add a little carbonate of soda. Acidulated water, after the process of distillation has been continued for some time, begins to become acid.

Water should never be kept in a lead cistern; for if it contain any carbonic acid gas, a lead carbonate would be formed, which renders the water poisonous.

Water is a perfectly neutral body, being capable of combining with acids and likewise with alkalies. When it enters into chemical combination with a substance it forms a *hydrate*, while a body which contains no water is said to be *anhydrous*. Crystals also contain water, which is necessary to their existence; it is called the "water of crystallisation," and when driven off by heat the crystal falls to powder. It is thus expressed in symbols—

$$Na_2O,CO_2 + 10\ HO_4 = \text{soda crystals};$$

that is, sodium carbonate and ten atoms of water of crystallisation.

Water is a great solvent; being capable of holding in solution, more or less, almost all bodies As a general rule, more of the body is dissolved by hot than by cold water. When a quantity of water will not take up any more of a substance, the solution is said to be "saturated." If it be warm water, then, on cooling, the dissolved substance will be deposited in crystals; if cold, the crystals will appear on evaporating. This may be interestingly shown by adding alum or salt to boiling water until the water will dissolve no more; then suspend a bunch of thread, etc., in the vessel, and set it to cool in a dark, quiet place. The greater the quantity of the solution the larger will be the crystals on the thread.

The ocean is the great reservoir of water. But sea-water holds in solution a great number of salts. The effect of this is to increase its density; hence ships can bear much greater cargoes in salt than in fresh water. As we shall find that some elements are always got from sea-water, we give an analysis of that in the British Channel:—

Water	963·74372
Sodium Chloride	28·05948
Potassium Chloride	0·76552
Magnesium Chloride	3·66658
Magnesium Bromide	0·02929
Magnesium Sulphate	2·29578
Calcium Sulphate	1·40662
Calcium Carbonate	0·03301
Iodine	traces
Ammonia	traces
Oxide of Iron, Silver } in some seas.	
	1000·00000

Ships are now fitted with apparatus for distilling sea-water; but the fresh water thus procured is insipid; if, however, it be filtered through charcoal it is "aërated," and assumes the refreshing taste of spring water.

All water contains air; but the air in water has double the proportion of oxygen in it than in atmospheric air. This is one of the chief uses of aquatic plants—they give off oxygen to the water. Fish, which require oxygen for their existence, pass the water through their gills, which apparatus retains the gas. If oxygen were in the same proportion in the *air* in the water as in the atmosphere we breathe, the fish would have to pass through their gills double the quantity of water—thus entailing much greater wear and tear of life. The fact that fish require air may be shown by boiling water, which expels the air from it, allowing it to cool, and then putting some "gold and silver" fish into it The animals will come to the surface to breathe, and endeavour to "aërate" the water by agitating it with their tails.

The last form we shall notice in which water is given to the earth, is *dew*.

During the day, as we have seen, the sun evaporates moisture, filling the air with water-vapour—steam. When the sun sets all bodies begin to radiate off their heat into the sky. The leaves of the vegetation are good radiators of heat, and therefore the grasses, etc., soon lose their heat and become cold. But not only are they good radiators, but they are also bad conductors, and therefore they receive no further addition of heat from the earth out of which they grow; upon their cold surfaces the moisture in the air is condensed, forming dew.

No dew is found on the bare earth, because it is never cold, heat being radiated from it all night; neither do we find dew under the overspreading branches of trees, nor on a cloudy night; for the branches and the clouds throw back the heat radiated from the earth, and thus the grasses beneath them are never cold. On a windy night the vegetation is warmed by "convection"—that is, the disturbance of the atmosphere brings in contact with the blades of grass, etc., warm particles of air, and by this means their temperature is kept up.

Thus, the conditions for a copious fall of dew are a hot day, a clear, still night. If the temperature be below freezing point during the deposition of the dew, the particles of water freeze, and hoar-frost is formed.

THE PEROXIDE OF HYDROGEN (H_2O_2).

It will be remembered that in procuring oxygen from the air, one method was to pass a current of air over barytes, BaO, this oxide, combined with another atom of oxygen, thus forming BaO_2. Upon raising the temperature, this peroxide of barium parted with the second atom of oxygen, assuming its original condition, BaO. But if we take this BaO_2, and dissolve it in dilute hydrochloric acid, the following equation will indicate the reaction:—

$$BaO_2 + 2HCl = BaCl_2 + H_2O_2;$$

that is, barium chloride and peroxide of hydrogen are formed The barium chloride, $BaCl_2$, is withdrawn from the solution, by submitting it to the low temperature of a freezing mixture, at which the $BaCl_2$ cannot remain in solution, and therefore it "crystallises out," and is thus removed. More peroxide of barium and hydrochloric acid are added to the solution, and the process repeated until we get an appreciable quantity of the peroxide of hydrogen; besides this, there will be a little barium chloride in the solution; by adding silver sulphate, a double decomposition takes place, thus—

$$BaCl_2 + Ag_2SO_4 = 2AgCl + BaSO_4;$$

and seeing that both the products, silver chloride and barium sulphate, are insoluble, they are precipitated. To separate the water from the peroxide of hydrogen, the mixture is placed under the receiver of an air-pump—the same arrangement as in the freezing of water by its own evaporation, given in the last lesson. The sulphuric acid absorbs the vapour formed by the rapid evaporation, and the H_2O_2 is left in the vessel. It is a transparent syrupy liquid, possessing a peculiar odour, and decomposes at even the low temperature of 20° Cent.; at high temperatures it decomposes with explosion. By its means fibrin may be distinguished from albumen—the two great components of flesh; the former decomposes it, the latter does not. It is remarkable that finely-divided gold, platinum, or silver are capable of decomposing this body into oxygen and water, without undergoing any change themselves. Some protoxides, such as that of lead, have the same effect, but in the process they become higher oxides, whilst the oxides of the noble metals not only are capable of causing the decomposition, but at the same time lose their own oxygen, and are reduced to the metallic state.

This substance has a powerful bleaching action, and should a process for producing it at a cheap rate be discovered, it would prove a great boon, for it does not destroy the fabric it bleaches; and the result after the bleaching is accomplished being only water, the necessity of great cleansing of the bleached material is precluded.

LESSONS IN FRENCH.—XXXIV.

SECTION LXXVI.—GOVERNMENT OF VERBS (§ 125).

1. Many verbs come together in French without prepositions, which are in English joined by them. Many others are connected in French by prepositions different from those connecting the corresponding verbs in English. No satisfactory general rules can be given on this point. We shall give in the Second Part of these Lessons [§ 126, 127, 128] copious lists of the verbs in general use, with the prepositions which follow them, when they come before other verbs. We have also hitherto noted the prepositions usually placed after the verbs introduced in our lessons.

2. The student will recollect, that a verb following another verb or a preposition (except **en**) must be in the infinitive when the two verbs have the same subject, or when the object of the first is the subject of the second.*

3. The following verbs, extracted from the list, § 126, although they, in English, take a preposition before another verb, do not take one in the French:—

Aller, 1. ir, *to go.*	Falloir, 3. ir. *to be necessary.*	Savoir, 3. ir. *to know.*
Compter, 1. *to intend.*	Mener, 1. *to lead, take.*	†Souhaiter, 1. *to wish.*
Courir, 2. ir. *to run.*	Penser, 1. *to think.*	Valoir mieux, 3. ir. *to be better.*
Daigner, 1. *to deign.*	Pouvoir, 3. ir. *to be able.*	Venir, 2. ir. *to come.*
Désirer, 1. *to desire.*	Préférer, 1. *to prefer.*	Vouloir, 3. ir. *to wish, will.*
Devoir, 3. *to owe.*	Prétendre, 4. *to pretend.*	
Envoyer, 1. ir. *to send.*		
Espérer, 1. *to hope.*		

MISCELLANEOUS EXAMPLES.

Comptez-vous dîner avec nous?	*Do you intend to dine with us?*
Je vais dîner chez mon père.	*I am going to dine at my father's.*
Ne voulez-vous pas donner à manger à ce chien?	*Will you not feed that dog?*
Désirez-vous monter dans ma chambre?	*Do you wish to go up to my room?*
Je préfère descendre chez votre père.	*I prefer to go down to your father's.*
Demeure-t-il en haut ou en bas?	*Does he live above or below?*
Préférez-vous demeurer au rez-de-chaussée?	*Do you prefer to live on the ground floor?*
Je désire demeurer au premier étage.	*I wish to live on the first storey.*
Nous préférons louer le second étage.	*We prefer to take the second storey.*
Nous espérons louer une chambre au second.	*We hope to rent a room on the second storey.*

EXERCISE 147.

Cabinet, m. *closet.*	En haut, *up stairs, above.*	Salle, f. *parlour.*
Compt-er, 1. *to intend, to reckon.*	Faisan, m. *pheasant.*	Touch-er, 1. *to touch, play.*
Déjeûn-er, 1. *to breakfast.*	Jou-er, 1. *to play.*	Troisième, *third storey.*
Demain, *to-morrow.*	Lou-er, 1. *to rent, let.*	Violon, m. *violin.*
En bas, *down stairs, below.*	Pinc-er, 1. *to play.*	
	Plaisir, m. *favour, pleasure.*	

1. Combien de chambres comptez-vous louer? 2. Nous comptons louer une salle au rez-de-chaussée et deux cabinets au troisième. 3. Ne préférez-vous pas louer une chambre à coucher au second? 4. Nous préférons demeurer au rez-de-chaussée. 5. Ne pouvez-vous rester à dîner avec nous aujourd'hui? 6. Je vous remercie, je préfère venir demain. 7. M. votre père viendra-t-il demain déjeuner avec nous? 8. Il compte venir demain, de bonne heure. 9. Que voulez-vous leur dire? 10. Je veux les prier de me faire ce plaisir. 11. Comptez-vous faire ce plaisir à mon frère? 12. J'espère le lui faire. 13. Préférez-vous demeurer en haut ou en bas? 14. Nous préférons demeurer en bas. 15. Que pensez-vous faire de ce jeune faisan? 16. Nous pensons l'envoyer à M. votre beau-frère. 17. Ne savez-vous pas jouer du violon? 18. Je sais en jouer. 19. Mlle. votre cousine sait-elle toucher du piano? 20. Elle sait toucher du piano et pincer de la harpe. 21. Ne savez-vous pas écrire? 22. Nous savons lire, écrire, et compter. 23. Savez-vous jouer de la guitare? 24. Nous ne savons pas en jouer. 25. Nous souhaitons trouver un appartement au rez-de-chaussée.

* This rule does not apply to impersonal verbs which may be followed by an infinitive, although their subject is not that of the infinitive. **Je leur dis: il faut partir.** *I told them: we must start.*

† May also take the preposition **de** before an infinitive.

EXERCISE 148.

1. Does your brother-in-law intend to rent the ground floor? 2. He intends to rent two rooms on the second storey. 3. How many rooms does your son intend to take? 4. He intends to take two rooms on the second storey. 5. Does he prefer to live on the second floor? 6. He prefers to live on the ground floor. 7. Does your father wish to come to dinner with us to-morrow? 8. He intends to come to-morrow at two o'clock. 9. Do you prefer to live up stairs or down stairs? 10. I prefer to live up stairs. 11. Does your sister know how to play on the piano? 12. She knows how to play on the piano. 13. Where do you intend to live (*demeurer*)? 14. We intend to live at your father's. 15. Will you go up to my room? 16. I will go down to your father's. 17. Do you wish to live on the ground floor? 18. I wish to live on the second floor. 19. Is it necessary to stay here? 20. It is not necessary to stay here. 21. What do you think of doing with (*de*) your book? 22. I think of giving it to my son. 23. What do you wish me to say to that gentleman? 24. I wish you to beg him to do me a favour. 25. Do you wish to send that pheasant to your mother? 26. I wish to send it to her, she is ill. 27. Cannot your sister play on the violin? 28. She cannot play on the violin, but she can play on the guitar. 29. Does your sister wish to live up stairs? 30. She prefers living down stairs. 31. Will you not do me that favour? 32. I will do it with pleasure. 33. Cannot your brother stay and dine with us today? 34. He has promised my father to come and dine with him. 35. Our friend knows how to read, write, and reckon.

SECTION LXXVII.—GOVERNMENT OF VERBS (*continued*).

1. Many verbs in French are joined with other verbs following, by means of the preposition **de**, *of*, where the corresponding verbs in English either take no preposition, or one other than *of*. Besides **avoir besoin**, &c. [Sect. 20, R. 4], the following verbs, extracted from list, § 128, belong to this class:—

Achever, *to finish.*	Dire, *to say.*	Prier, *to beg.*
Avoir tort, *to be wrong.*	Dispenser, *to dispense.*	Promettre, *to promise.*
Brûler, *to burn, to long.*	Empêcher, *to prevent.*	Proposer, *to propose.*
Cesser, *to cease.*	Éviter, *to avoid.*	Refuser, *to refuse.*
Commander, *to command.*	Jurer, *to swear.*	Se flatter, *to flatter one's self.*
Conseiller, *to advise.*	Manquer, *to fail.*	Supplier, *to entreat.*
Défendre, *to forbid.*	Menacer, *to threaten.*	Trembler, *to tremble.*
	Négliger, *to neglect.*	

MISCELLANEOUS EXAMPLES.

Pourquoi n'achevez-vous pas d'apprendre ce métier?	*Why do you not finish learning that trade?*
Nous brûlons de continuer nos études.	*We burn to continue our studies.*
Il ne cesse de nous tourmentor.	*He does not cease tormenting us.*
Me défendez-vous de faire du bien à cet homme?	*Do you forbid my doing good to that man?*
Ne négligez pas de lui faire une visite.	*Do not neglect paying him a visit.*
Me promettez-vous de faire une visite à mon ami?	*Do you promise me to pay a visit to my friend?*
Je vous prie d'aller tout droit chez vous.	*I beg you will go straight home.*
Je vous conseille de venir par le chemin de fer.	*I advise you to come by the railroad.*
Ne manquez pas de lui faire mes compliments.	*Do not fail to present my compliments to him.*
L'avez-vous menacé de le frapper?	*Have you threatened to strike him?*
J'ai refusé de lui faire crédit.	*I refused to give him credit.*
Me proposez-vous de lui confier cet argent?	*Do you propose to me to trust him with this money?*
Je vous conseille de le lui confier.	*I advise you to trust him with it.*
J'évite de lui reprocher ses fautes.	*I avoid to reproach him with his faults.*

EXERCISE 149.

Arros-er, 1. *to water.*	Gard-er, 1. *to keep.*	Se rend-re, 4, ref, *to repair.*
Arrosoir, m. *watering-pot.*	Jardinier, m. *gardener.*	Tout droit, *straight.*
Au contraire, *on the contrary.*	Lendemain, m. *next day.*	Veille, f. *eve, day before.*
Corrig-er, 1. *to correct.*	Oubli-er, 1. *to forget.*	Voie, f. *conveyance, way,* or *mode of travelling.*
Faire part, *to communicate.*	Rendre, 4. *to do, to render.*	

the ear with an instantaneous, clear, sharp, abrupt, and cutting force, at the initial or "radical" part of each.

2. "Expulsion"—a conscious, intentional, and deliberate force, coming upon the ear with great power; as, for example, in the language of *authoritative command*.

Example of "Expulsion."

Vanguard! to right and left the front unfold!"

In this style, bold and forcible as it is, and even sudden as is its commencement, the accented vowels do not startle the ear with the abrupt shock of the tone of anger, exemplified above. There is a partial, though very brief, swell, perceptible in the "radical," or initial part of each sound. Both of the preceding examples are classed under the head of "radical" stress; as their chief force lies in the "radical," or first part of each sound.

II. Medial Stress.—This mode of force is exhibited in

1. "Effusion"—a moderate, gentle, and gradual swelling of tone—as, for example, in the calm and tranquil utterance of *reverential feeling*, in which no disturbing impulse agitates or forces out the breath, but the voice, somewhat as in music, glides out, with a smooth effusive stream of sound, enlarging as it flows, but never bursting out into irregular violence.

Example of "Effusion."

But chiefly Thou, O Spirit! that dost prefer,
Before all temples, the upright heart and pure,
Instruct me, for thou knowest.

The "effusive" style avoids everything abrupt or sudden in the formation of sound, and swells gradually to its "acmé" (chief point), at the middle of each sound—in the manner of music; and from this point "diminishes," or decreases, to the close. This species of "stress" is accordingly denominated "medial," from the Latin word *medius*, the middle.

2. "Suppression"—a powerful force of "explosion" or "expulsion," kept down in the very act of giving forth the voice, and converted into the "medial" form, as in the case of a person communicating, in great earnestness of feeling, with another, standing at a distance, and yet exceedingly anxious not to be heard by a third person, still further off; or, as in the tone of extreme earnestness, uttered by the watcher in the chamber of a sick person.

Examples of "Suppression."

Hark! James, listen! for I must not speak loud. I do not wish John to hear what I am saying!

Step softly! speak low! make no noise!

This mode of voice may be termed a "half whisper;" it is the "aspirated" and "impure" tone, which lies half way between the ordinary tone of the voice and a whisper. It is caused by allowing a vast quantity of breath, not "vocalised," to rush out along with the sound of the voice. It is, in fact, "explosion," or "expulsion," merged, as it were, or drowned in a stream of "aspiration," and made to assume the style of "medial stress."

III. Vanishing Stress.—Besides the "radical," or initial, and the "medial," or middle, "stress," there is also a "vanishing," or final "stress," which begins softly, swells onward, and bursts out suddenly, and leaves off abruptly, at the very close of a sound, as in the jerking termination of the tone of *impatient feeling*.

Thus, in the language of maddened impatience, as uttered by Queen Constance, in her frenzy of grief and disappointment, at the overthrow of all her hopes for her son, in consequence of the peace formed between France and England:—

Example of "Vanishing Stress."

War! war!—no peace: peace is to me a war!

In tones of this class the voice withholds its force, and delays the explosion or expulsion till the last moment of the emphatic sound, and then throws it out with an abrupt, wrenching force, which resembles that of a stone suddenly jerked from the hand. This species of stress, as it lies at the "vanish," or last point of a sound, is termed the "vanishing stress."

IV. Compound Stress.—The designation of "compound stress" is applied to that mode of forming tones which throws out the force of the voice in such a manner as to mark, with great precision, the "radical" and the "vanish," or the beginning and the end, of each accented or emphatic sound.

Thus, in the tone of *surprise*, which is marked by a bold, "upward slide," beginning very low, and ending very high, the voice strikes with peculiar force on the first and last points of the slide, in order to stamp it more distinctly on the ear, as the vehicle of intense emotion. A striking example again occurs in the language of Queen Constance, in the situation mentioned before, when overwhelmed with astonishment at the news she has just received.

Example of "Compound Stress."

Gone to be married! gone to swear a peace!
Gone to be friends!

V. Thorough Stress.—This designation is applied to that species of force which marks all the forms of "stress"—"radical," "medial," and "vanishing"—with intense power, on the same sound, so as to cause the character of all to be deeply felt, as in a bold *shout*, or any other very impressive form of voice which indicates intense emotion.

Example of "Thorough Stress."

Awake! arise! or be for ever fallen!

In this shout of the arch-fiend to his fallen host, the tone, it will be perceived, is not that of mere volume or quantity, of mere loudness or physical force, as in the mechanical act of calling, or the voice of a public crier. It has the wide "falling inflection" of *authority* and *command*, and the forcible "radical" stress and "expulsive" utterance of *courage*; and to preserve the effect of all these, it must not only begin and close vividly, but exhibit a "medial" "swell," and a distinct "vanish." It must, in other words, give distinctive force and character to the beginning, the middle, and the end of each accented sound.

VI. Intermittent Stress, or Tremor.—The "tremor," (trembling) or "intermittent" stress, takes place in the utterance of all those emotions which *enfeeble* the voice, by their overpowering effect on feeling; as, for example, in *fear* and *grief*, and sometimes *joy*, when extreme. This mode of utterance characterises also the feeble voice of age, or the tone of a person shivering with cold.

Examples of the former will be found in the section on "Expressive Tones." Of the latter we have instances in the language both of the old woman and the farmer in Wordsworth's ballad, "Goody Blake and Harry Gill."

She prayed, her withered hand uprearing,
While Harry held her by the arm—
[*Tremor.*] { "*God! who art never out of hearing,*
{ *Oh! may he never more be warm!*"
No word to any man he utters,
Abed or up, to young or old;
But ever to himself he mutters,
[*Tr.*] "*Poor Harry Gill is very cold!*"

LESSONS IN GEOMETRY—XVI.

Problem XXXVIII.—*To describe a circle which shall touch three given straight lines.*

Let X, Y, Z (Fig. 57) represent the three given straight lines; it is required to draw a circle touching the three given straight lines X, Y, Z. If the given straight lines do not form a triangle, let them be produced both ways, if necessary, until they form the triangle A B C, as shown by the dotted lines in the figure. Bisect the angle A B C by the straight line B D, and the angle A C B by the straight line C D, and let these lines intersect in the point D. Then from the point D draw D E perpendicular to B C, and from D as a centre, with the radius D E, describe the circle E F G. The circle E F G touches the given straight lines X, Y, Z in the points E, F, G. The result would be the same no matter what two angles of the triangle are bisected in order to obtain the point D, or to what side of the triangle a perpendicular is drawn from D in order to obtain the radius of the required circle, as shown in the figure.

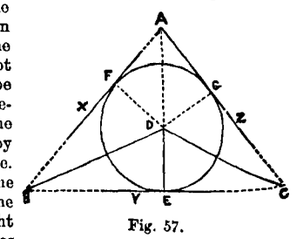


Fig. 57.

By this problem we are taught how to *inscribe* a circle in any given triangle, the construction adopted being precisely the same as that which has been described above; and by Problem XXXVI. in the last lesson (page 49), which teaches us how to draw the circumference of a circle through any three points that are not in the same straight line, it is plain that we are shown how to describe a circle about any given triangle; for to do this the circle must pass through the three points in which the three straight lines (which form the sides and angles of the triangle) meet.

In making drawings of machines and machinery, the geometrical draughtsman will find it necessary to know how to draw circles of different radii touching each other with the utmost nicety externally and internally, and to draw tangents to two circles, as when it is desired to represent in section the course of an endless band or belt of leather which passes round two wheels or drums, and transmits motive power from one to the other. This brings us to the next two problems.

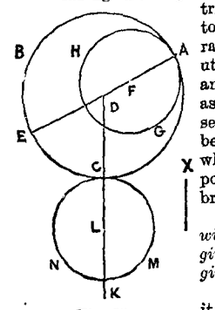


Fig. 58.

Problem XXXIX.—*To draw a circle with a given radius touching another given circle externally or internally in a given point.*

Let A B C (Fig. 58) be the given circle; it is required to draw two circles with the given radius X, one touching the given circle A B C internally in the given point A, and the other externally in the given point C.

First, let us take the circle that is to touch the given circle internally in the point A. Find D, the centre of the given circle A B C. Join A D, and produce it, if necessary, to meet the circumference of the given circle A B C in the point E. Along A E set off A F equal to the given radius X, and from the centre F, describe the circle A G H, which touches the given circle A B C internally in the given point A.

To describe a circle with the given radius X, touching A B C externally in the point C. Find D, the centre of the given circle A B C. Join D C, and produce it indefinitely towards K. Set off along C K the straight line C L equal to X, and from L as centre, with the distance L C, describe the circle C M N, which touches the given circle A B C externally in the given point C.

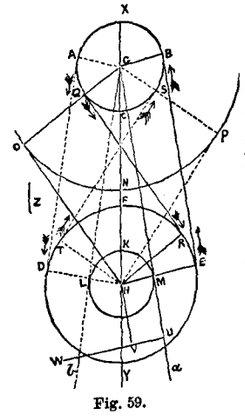


Fig. 59.

Problem XL.—*To draw a tangent to any two given circles.*

A straight line may be drawn touching any two given circles either on one side of the straight line that passes through and joins the centres of the circles, or crossing this line. First, let us take the case in which the tangent to the given circles is required to be on one side of the straight line that joins their centres.

Let A B C, D E F (Fig. 59) be the given circles. Draw an indefinite straight line X Y, passing through and joining the centres, G and H, of the given circles, and also passing through the point C in the circumference of the circle A B C, and the point F, in the circumference of the circle D E F. From the point F in the straight line X Y, set off F K equal to G C, the radius of the circle A B C. The remainder K H of the straight line F H, the radius of the circle D E F, is manifestly the difference of the radii of the given circles. With H K as radius, from the point H as centre, describe the circle K L M, and from the point G, the centre of the circle A B C, draw the straight line G M touching the circumference of the circle K L M in the point M. Join H M, and produce it to cut the circumference of the circle D F E in the point E, and through E draw E B parallel to G M. The straight line E B is a tangent to the two given circles A B C, D E F. The same result may be obtained by drawing G B through the point G, parallel to H E, and joining the points B and E. The straight line B E has been drawn as a tangent to the given circles A B C, D E F on the *right* of the straight line X Y that passes through their centres. The dotted lines G L, H D, D A, and A G show how the tangent may be drawn to the *left* of the straight line X Y. The straight lines A D, B E, with the arcs A X B, D Y E, show the position of an endless band passing over the wheels or drums A B C, D E F.

Now let it be required to draw a tangent to the given circles A B C, D E F, crossing the indefinite straight line X Y that passes through their centres G and H. From the point C in the direction of Y, set off along C Y the straight line C N equal to F H, the radius of the circle D F E. The straight line G N is then manifestly equal to the sum of the radii of the given circles, being made up of G C, the radius of the circle A B C, and C N, which has been made equal to F H, the radius of the circle D F E. From the centre G, with the radius G N, describe the arc O N P, and from H, the centre of the circle D F E, draw H O touching the arc O N P in the point O. Join G O, cutting the circumference of the circle A B C in the point Q; and through the point Q draw Q R parallel to H O. The straight line Q R is a tangent to the two given circles A B C, D E F. The same result may be obtained by drawing H R through the point H, parallel to G O, and joining the points Q and R. The straight line Q R has been drawn as a tangent to the given circles A B C, D E F, crossing the straight line X Y that passes through their centres, from *left to right*; the dotted lines H P, P G, S T, and T H show how the tangent may be drawn crossing X Y from right to left. The straight lines Q R, S T, with the arcs Q A B S, T D E R, show the position of a crossed endless band passing over the wheels or drums A B C, D E F.

The effect of crossing the endless band is to make the wheels or drums over which it passes revolve in contrary directions. In the first case, when the band forms tangents to the wheels on both sides of the line that joins their centres, the wheels revolve in the same direction, that is to say, by the action of the band the wheels revolve, so that a point B, on the circumference of the wheel A B C, is carried round towards A, and a point E on the circumference of the wheel D E F is carried round towards D, the strap being supposed to move in the direction of the arrows placed near the letters A, D, E, B. In the second case, when the band forms tangents to the wheels crossing the line that joins their centres, a point Q in the circumference of the wheel A B C would be carried round towards S, and a point T in the circumference of the wheel D E F would be carried round towards R, the strap being supposed to move in the direction indicated by the arrows placed near the letters Q, R, T, S.

The circles K L M, D E F are called concentric circles because they are described from the same centre, H, and for the same reason the arcs A C B, O N P are called concentric arcs.

Fig. 59 suggests the method of drawing a circle of a given radius to touch two given straight lines. Let L G, M G, produced indefinitely to *a* and *b*, represent the two given straight lines, and Z the radius of the required circle. In G *a* take any point U, and through U draw U W at right angles to G *a*. Bisect the angle *a* G *b* formed by the straight lines G *a*, G *b* (produced to meet in G if necessary) by the straight line G Y, and set off along the straight line U W, U V equal to Z. Then through V draw V H parallel to G *a*, and meeting G Y in H. Then from the point H as centre, with a radius equal to Z, describe the circle K L M. This circle touches the given straight lines G *a*, G *b* in the points M and L.

Problem XLI.—*To draw a tangent through any point in a given arc, when it is inconvenient to determine the centre of the circle of the circumference of which the given arc is a part.*

Let A B C (Fig. 60) be the given arc, and C the given point through which it is required to draw a tangent to the arc A B C. Through C draw any straight line or chord C A, cutting the arc in the points A and C. Bisect A C in D, and through D draw D B at right angles to A C. Join B C, and at the point B in the straight line C B make the angle C B E equal to the angle D C B or E C B. Then through C draw the straight line X Y parallel to B E. The straight line X Y is a tangent to the arc A B C, and it is drawn through the given point C, as required.

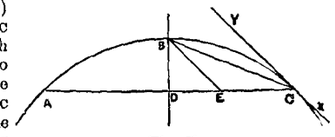


Fig. 60.

1. Pourquoi ne cessez-vous pas de lire ? 2. J'aurais tort de cesser de lire avant de savoir ma leçon. 3. Avez-vous défendu à votre jardinier d'arroser ces fleurs ? 4. Au contraire, je lui avais commandé de les arroser. 5. Pourquoi a-t-il négligé de le faire ? 6. Parce qu'il a oublié d'apporter l'arrosoir. 7. Que désire faire M. F. ? 8. Il brûle de continuer l'étude de la médecine. 9. N'avez-vous pas tort de faire des visites à ce monsieur ? 10. J'aurais tort de le négliger. 11. N'avez-vous pas refusé de rendre ce service à votre ennemi ? 12. J'aurais eu tort de refuser de le lui rendre. 13. Quelle voie nous avez-vous conseillé de prendre ? 14. Je vous ai conseillé de prendre la voie du bateau à vapeur. 15. Avez-vous menacé de frapper cet enfant ? 16. Je l'ai menacé de le corriger. 17. Avez-vous refusé de vendre des marchandises à mon frère ? 18. J'ai refusé de lui en vendre à crédit. 19. Avez-vous dit à mon fils de se rendre à la maison ? 20. Je l'ai prié d'y aller tout droit. 21. Vous proposez-vous de venir la veille de Noël ? 22. Nous nous proposons de venir le lendemain. 23. Votre compagnon se propose-t-il de garder le secret ? 24. Il se propose de faire part de cela à tout le monde.

Exercise 150.

1. Have you forbidden my cousin to speak to the gardener ? 2. I have not forbidden him to speak to him. 3. Has your mother ordered the gardener to water her roses (*roses*) ? 4. She has ordered him to water them. 5. Has he forgotten to do it ? 6. He has neglected to do it, he has not forgotten it. 7. What conveyance will you take to go to Paris ? 8. I advise you to take the railroad. 9. Have you told (*à*) your son to take the steamboat ? 10. No, Sir, I have told him to take the stage (*diligence*, f.). 11. Is not your brother wrong to neglect paying a visit to his brother-in-law ? 12. He is wrong to neglect it. 13. Does not that young German long to read that letter ? 14. He longs to continue his studies. 15. Do you propose to trust him with that money ? 16. I propose to trust him with it. 17. Do you neglect to reproach him with his faults ? 18. I avoid to reproach him with them. 19. Have you threatened to punish your son ? 20. I have threatened to strike him. 21. Do not fail to present my compliments to my sister's friends. 22. I will not fail (*je n'y manquerai pas*). 23. Have you refused to sell him goods ? 24. I have refused to sell him goods on credit. 25. Which mode of travelling do you advise me to take ? 26. I advise you to take the railroad. 27. Do you forbid him to come ? 28. I have forbidden his writing. 29. Have you failed to pay your gardener ? 30. I have not failed to pay him. 31. I have forgotten to pay you. 32. Do not neglect to write to me. 33. Tell him to go to my father. 34. Do not cease to work. 35. Tell him to come on Christmas Eve. 36. I have told him to come the day after.

KEY TO EXERCISES IN LESSONS IN FRENCH.

Exercise 32 (Vol. I., page 131).

1. Cette cannelle est-elle bonne ? 2. Cette cannelle est meilleure que la vôtre et que celle de votre frère. 3. Quel jour du mois avons-nous aujourd'hui ? 4. Nous avons le six. 5. Votre père a-t-il vingt francs ? 6. Non, Monsieur, il n'a que six francs cinquante centimes. 7. Combien de volumes votre ouvrage a-t-il ? 8. Il en a beaucoup, il en a quinze. 9. Le menuisier a-t-il lu le deuxième volume de l'histoire de France de Michelet ? 10. Oui, Monsieur, il en a lu le deuxième volume. 11. Votre ami a-t-il les œuvres de Molière ? 12. Il n'en a que deux volumes. 13. Avez-vous mon habit de drap ou mon habit de velours ? 14. Nous avons l'un et l'autre. 15. Nous avons celui-ci et celui-là. 16. Combien de cannelle avez-vous ? 17. Nous en avons deux kilogrammes. 18. Combien de centimes le marchand a-t-il ? 19. Il en a vingt-six. 20. Avez-vous la troisième ou la quatrième place ? 21. Je n'ai ni la troisième ni la quatrième, j'ai la dixième. 22. N'avez-vous pas honte aujourd'hui ? 23. Non, Monsieur, je n'ai pas honte, mais j'ai peur. 24. Avez-vous vingt-cinq centimes ? 25. Non, Monsieur, mais j'ai cinquante centimes. 26. Avons-nous le six juillet ? 27. Non, Monsieur, nous avons le quatre mars. 28. Votre oncle a-t-il six enfants ? 29. Non, Monsieur, il n'en a qu'un. 30. Avez-vous dix kilogrammes de viande ? 31. Je n'en ai que cinq kilogrammes. 32. La viande du boucher est-elle bonne ? 33. Elle n'est pas très-bonne. 34. Combien de kilogrammes en avez-vous ?

Exercise 33 (Vol. I., page 132).

1. Is your brother-in-law older than mine ? 2. Yours is younger than mine. 3. How old is your mother-in-law ? 4. She is nearly fifty years old. 5. What o'clock is it now ? 6. It is past six. 7. Are you certain of that ? 8. Yes, Sir, I am certain of it. 9. Is it more than two by your watch ? 10. It is only twelve by my watch. 11. Are you more than five years old, my child ? 12. I am not yet four. 13. Have you more than six yards of printed calico ? 14. I have less than three yards. 15. How many ells of ribbon has your father-in-law ? 16. He has but little ribbon, he has but half an ell. 17. Is it a quarter to twelve ? 18. It is later, Sir, it is a quarter after twelve. 19. What day of the month is it ? 20. It is the sixth of October. 21. Is it not the eighth of February ? 22. No, Madam, it is the eighth of March. 23. How many gardens has your first cousin ? 24. He has only one, but it is very beautiful. 25. He has more than ten.

Exercise 34 (Vol. I., page 132).

1. Quel âge votre beau-frère a-t-il ? 2. Il a cinquante ans. 3. Votre belle-sœur est-elle plus âgée que la mienne ? 4. Non, Monsieur, ma belle-sœur est plus jeune que la vôtre. 5. Votre fils a-t-il vingt-cinq ans ? 6. Non, Madame, il n'en a que seize. 7. Quel jour du mois avons-nous aujourd'hui ? 8. Nous avons le onze. 9. Avez-vous le vingtième volume des œuvres de Châteaubriand ? 10. Non, Madame, nous en avons le onzième. 11. Quelle heure est-il, Monsieur ? 12. Il n'est que midi. 13. N'est-il pas plus tard ? 14. Il est une heure moins un quart. 15. Il est cinq heures et quart. 16. Combien de mètres de cette toile d'Hollande avez-vous ? 17. J'en ai dix aunes et demie. 18. J'en ai six yards, et seize yards de soie italienne. 19. Votre belle-mère est-elle plus jeune que votre beau-père ? 20. Elle est plus jeune que lui. 21. Avez-vous vingt ans ? 22. Non, Monsieur, je n'ai que dix-neuf ans et demi. 23. Êtes-vous sûr qu'il est dix heures ? 24. Oui, Madame, j'en suis sûr. 25. Est-il dix heures moins vingt minutes ? 26. Non, Monsieur, il est midi moins un quart. 27. Combien de maisons avez-vous ? 28. Je n'en ai qu'une, mais ma belle-sœur en a deux. 29. Avez-vous la mienne ou la vôtre ? 30. Je n'ai ni la vôtre, ni la mienne, j'ai celle de votre beau-fils. 31. Votre belle mère a-t-elle cinq mètres de cette indienne ? 32. Elle n'en a que deux. 33. Quelle heure est-il à votre montre ? 34. Il est quatre heures et demie à ma montre. 35. Il est plus de sept heures à la mienne.

Exercise 35 (Vol. I., page 132).

1. Has your mother-in-law anything to do ? 2. She has nothing to do. 3. Has she two pages to write ? 4. No, Sir, she has only one. 5. Do you intend to read this newspaper ? 6. Yes, Madam, I intend to read it. 7. Are you right to buy a velvet coat ? 8. I am right to buy one. 9. Does your little girl want to sleep ? 10. Yes, Sir, she wants to sleep, she is tired. 11. Are you afraid of falling ? 12. I am not afraid of falling. 13. Has the gardener time to work in the fields ? 14. He has no wish to work in the fields. 15. Are your fields as large as mine ? 16. They are larger than yours. 17. Are you ashamed to walk ? 18. I am not ashamed to walk, but I am ashamed to dance. 19. How old is your son ? 20. He is sixteen. 21. Is it the second of March or the fifth of June ? 22. It is the twenty-eighth of July. 23. Is it noon ? 24. No, Sir, it is not yet twelve, it is only half-past eleven. 25. It is early yet.

Exercise 36 (Vol. I., page 132).

1. Qu'est-ce que votre beau-frère a à faire ? 2. Il a des lettres à écrire. 3. A-t-il besoin de travailler ? 4. Oui, Monsieur, il a besoin de travailler. 5. A-t-il l'intention de lire mon livre ? 6. Il n'a pas l'intention de lire votre livre, il n'a pas le temps. 7. Votre sœur a-t-elle honte de marcher ? 8. Ma sœur n'a pas honte de marcher, mais mon frère a honte de danser. 9. Votre cousine a-t-elle quelque chose à dire ? 10. Ma cousine n'a rien à dire, elle a peur de parler. 11. Est-il tard ? 12. Non, Madame, il n'est pas tard, il est de bonne heure. 13. Avez-vous envie de lire la lettre de ma sœur ? 14. Avez-vous le courage d'aller à la guerre ? 15. Je n'ai pas le courage d'aller à la guerre. 16. Votre sœur a-t-elle raison d'acheter une robe de soie ? 17. Oui, Monsieur, elle a raison d'en acheter une. 18. Cet enfant a-t-il besoin de dormir ? 19. Non, Monsieur, cet enfant n'a pas besoin de dormir, il n'est pas fatigué. 20. Le jardinier de votre frère a-t-il envie de travailler dans mon jardin ? 21. Il a envie de travailler dans le mien. 22. Quel âge cet enfant a-t-il ? 23. Cet enfant a dix ans. 24. Quel jour du mois avons-nous ? 25. Nous avons le neuf mars. 26. Avez-vous peur de marcher ? 27. Je n'ai pas peur de marcher, mais je suis fatigué. 28. Avez-vous le temps de lire le livre de mon frère ? 29. J'ai le temps de lire son livre. 30. Le menuisier a-t-il envie de parler ? 31. Il a envie de travailler et de lire. 32. Votre fils a-t-il peur de tomber ? 33. Il n'a pas peur de tomber, mais il a peur de travailler. 34. Quelle heure est-il ? 35. Il est midi.

Exercise 37 (Vol. I., page 147).

1. Who wants bread ? 2. Nobody wants any. 3. Do you not want your servant ? 4. Yes, Sir, I want him. 5. Does your gardener take care of your garden ? 6. Yes, Madam, he takes care of it. 7. Does he take good care of his old father ? 8. Yes, Sir, he takes good care of him. 9. Is your boy ashamed of his conduct ? 10. Yes, Sir, he is ashamed of it. 11. Are you afraid of this horse or of that. 12. I am neither afraid of this nor of that. 13. Does our servant take care of your things ? 14. He takes good care of them. 15. Are you afraid of speaking or reading ? 16. I am afraid neither of speaking nor of reading. 17. Are you astonished at that affair ? 18. I am not astonished at it. 19. Are you sorry for it ? 20. Yes, Sir, I am very sorry for it. 21. Do you want that boy ? 22. Yes, Madam, I want him. 23. Do you not want his book ? 24. I do not want it. 25. Have you a wish to work or to read ? 26. I neither wish to work nor to read, I wish for rest, for I am tired.

RECREATIVE NATURAL HISTORY.

THE SWALLOW.

In our present paper on the swallow we must limit our remarks to the four British species : the Chimney Swallow, House Martin, Sand Martin, and Swift. The Alpine, or white-breasted swift, the spine-tailed swallow, and the purple martin, cannot be considered British birds, though they may have been seen in our island. Scientifically speaking, the swifts and swallows are included in a group to which the name *Hirundonidæ* has been given, from the Latin *hirundo*, a swallow. This group is subdivided into two lesser groups, under one of which all the swifts are classed, while all the various kinds of swallows and martins are placed in the other. Swifts are distinguished from swallows by the extreme length of the first two primary feathers of the wing.

The *Chimney Swallow* is one of the earliest arrivals, coming from Africa over the English Channel about the middle of April. Of course the birds do not travel direct from Africa in one journey. Italy, Spain, and France become so many stages on the road, where food is picked up, and some rest obtained. There appears to be a little self-will or caprice about some of the birds, a few having been known to show themselves in January, and others waiting till May.

Every one seems glad when the first swallow flits across the village green, but we sober English have never kept a "swallow holiday" on the 15th of April, which is, in some parts of Europe, called "swallow day." In ancient Greece the children might well clap their tiny hands when the birds of spring appeared; a holiday being then given to little boys and girls. They danced in the market-places, wove garlands of the early flowers, and shouted in the luxury of childish joy. That was a capital plan for making children love the birds.

Why do we call it chimney swallow ? Simply from its tendency to build in hollow places, such as old mine-shafts, disused wells, or chimneys. Some of these birds show very odd tastes in selecting a family home. A table drawer had been left open in a room seldom occupied, and, a window-pane being broken, a pair of these swallows appropriated one corner of the drawer for their nest. When the human owner wished to use the table, most emphatic were the remonstrances of the birds. Depart they would not ; the hen fluttered her wings, screamed angrily, and plainly intimated that the corner had become her property by right of occupation. This bird logic prevailed ; the little family was brought up in safety, and all parties were satisfied.

The chimney swallow is easily known by its deeply forked tail, the ruddy hue on its throat, and its lightish tinted breast. The rapid movements of the bird—its sudden darts and turns, now up, now down, over the observer's head, and then skimming the ground in long, arrow-like flights—present a specimen of a living machine in beautiful and perfect action. But, notwithstanding this power of flight, the birds are sometimes completely exhausted by their journeys across the sea. They can battle for a long time with the mere force of a tempest, but when the blast is both cold and strong, the winged voyagers are almost paralysed. A whole army of swallows will then crowd the rigging of some lonely ship, clinging for hours to ropes and spars, until recovered strength again enables them to obey the "forward" impulse. No wonder if these beings of summer climes sometimes marvel at the rough treatment received in our ruder latitudes. A cutting "north-easter" is no smiling reception for a creature which has been basking for months in the sun of Egypt. The result may amaze the swallows, but human philosophy can explain it all. They perish by thousands in such years. On one bitter spring day, a gentleman picked up in the course of his morning's walk ninety-two chimney swallows, not dead, but benumbed by the cold. Being placed in a warm hamper, they all recovered, and flew off the next day. On another occasion numbers were found on the window-sills of a country house, heaped on each other five or six deep. Instinct had clearly led them to seek aid from man. Some may naturally ask, why do the swallows so eagerly rush from the warm regions of the south to battle with the storms of the north ? We cannot answer the question ; guessing might, of course, be carried to a great extent, but guessing on such subjects is trifling. That there is some wise purpose in the habit we may be sure, or it would not exist. Another remarkable feature about chimney swallows is their courage. Look at these birds fighting with a hawk, and then say whether they are cowards. Of course they suffer for their daring ? Not in the least ; the hawk gets the worst of it, and retreats in a fury from the inglorious contest. What can the hawk do ? He is a brave fellow, but the swallows are too quick for him, darting down on his back, and up again with a speed which baffles the clutch of his talons. He resembles a heavy seventy-four man-of-war surrounded by a fleet of steam gunboats ; strength is beaten by speed.

The chimney swallow does not come to the British Isles for a holiday, that is certain, but for downright hard work. The building of a house, and the bringing up of two families in one short season, are enough to tax the energies of the most enterprising bird. The parents are so hard pushed for time that the first family often receives warning to quit before its education is quite complete. But the little things soon manage to provide their own food without the aid of the mother bird. The second family sometimes fares the worst, being forced to join in the great autumnal migration as soon as they are able to fly.

The assembling of these birds is a well-known sight. How closely they crowd on the house-tops, trees, and railway wires. How silently they sit for awhile, as if reflecting on past errors, or speculating on future mishaps. Then what a sudden burst of chattering is there, as if every bird were determined to force his own particular hobby on his neighbour.

Some naturalists have suggested that a few of these birds remain here in a sleeping state during the winter, and reappear, lean and hungry, in the spring. Others laugh at this notion as "absurd," and pooh-pooh the opinion altogether. We venture, however, to agree with those who refuse to believe in the swallow's winter sleep. If some of the birds remain behind, they probably perish from want of insect food, except in those rare winters when frost is almost unknown.

The *House Martin* is easily distinguished by its snowy breast, and noted for the trusting confidence in which it builds its nest above our doors and against our houses. It arrives here somewhat later than the chimney swallow, and is a surer prophet of sunny skies. In this light the ancient poets regarded the martin, singing its praises as the loved herald of flowery meads and laughing hours. Have swallows a good memory ? Do the martins really find their way back to the parent nest over African deserts, ocean waves, and Spanish mountains by memory ? If so, the organ of locality must be large in their little brains. But then we are cautioned against applying phrenology to the heads of birds, and we therefore pause in the midst of a tempting speculation. The same nest is often used year after year by surviving members of a family, and sometimes a little bird village of nests is formed by the labours of several generations. How do the little builders make the materials of the nest so adhesive that the work adheres not only to a brick wall but to a smooth window-pane ? Here, again, the answer comes, "we know not." See, too, how careful the birds are to build up little by little, allowing each day's work to harden before a fresh layer is added. All this looks very much like the skill of Devonshire workmen when building the "cob-wall"—a composition of mud and chopped straw, used for the upper part of the walls of barns, and even cottages, in some parts of that county. We call this instinct in the birds, but we really *know* nothing of the matter.

Our pretty martin is not always very honest in its notions, even taking possession of a neighbour's house, and then fighting desperately in defence of the wrong. "Just like human beings," some satirists will, perhaps, say. Honesty, however, is found in the long run to be the best policy, even among martins ; a series of battles, the loss of pretty

LESSONS IN GERMAN.—XXVI.

SECTION XLIX.—VERBS REQUIRING THE DATIVE.

MANY verbs compounded with the particles ab, an, auf, bei, ent, er, nach, ver, vor, zu, and wider; as also, danken, to thank; drohen, to threaten; folgen, to follow; gehorchen, to obey; schmeicheln, to flatter, etc. (§ 129. 4), govern the *dative*, as:—Er entsagte dem Glück und der Hoffnung, he resigned (the) happiness and (the) hope. Den besten Menschen kleben Fehler an, faults cleave to the best of men. Der Feldherr gehorchte dem Befehle des Kaisers, the commander-in-chief hearkened to the command of the emperor. Nur ein Sclave schmeichelt dem Herrn—kein Freier dem Freien, only a slave flatters the master—no freeman, a freeman.

VOCABULARY.

Acht, *f.* outlawry, ban.
An'gehören, to belong.
An'hangen, to adhere.
Auf'fordern, to summon.
Bay'ern, *n.* Bavaria.
Beeh'ren, to honour.
Bei'kommen, to get at.
Bei'stehen, to assist.
Bei'stimmen, to assent.
Bei'wohnen, to be present at.
Besuch', *m.* visit.
Braten, *m.* roast meat.
Drohen, to threaten.
Ehre, *f.* honour.
Entsa'gen, to resign, renounce.
Erlie'gen, to succumb.
Erwei'sen, to render.
Fliehen, to flee.
Fluchen, to execrate.
Fügen, to submit, conform.
Gebie'ten, to command.
Gebre'chen, to want, need.
Gebühren, to be due.
Gefal'len, to please, to like.
Gelten, to be of value.
Genü'gen, to suffice.
Gewach'sen sein, to be a match.
Gleichen, to be like.
Herzog, *m.* duke.
Her'zogshut, *m.* ducal coronet.
Hoffnung, *f.* hope.
Kaiser, *m.* emperor.
Klingeln, to ring (the bell).
Kriegszug, *m.* warlike expedition.
Krone, *f.* crown.
Läuten, to toll, ring.
Leuchten, to light.
Löwe, *m.* lion.
Magd, *f.* servant-girl.
Mißlin'gen, to fail.
Nachdem', after.
Ort, *m.* place.
Rath, *m.* council, advice.
Schmecken, to taste, relish.
Schmeicheln, to flatter.
Schweben, to wave, hover.
Trotzen, to dare, defy.
Trübe, gloomy.
Ue'belwollen, to wish ill.
Ueberzie'hen, to invade.
Un'umschränkt', paramount.
Umge'ben, to beset.
Ur'sache, *f* cause.
Verlan'gen, *n.* demand.
Vernunft', *f.* reason.
Vor'haben, *n.* purpose.
Weg'kommen, to get away, be lost.
Widerstre'ben, to struggle against.
Wunsch, *m.* wish.
Zu'gehören, to belong to.
Zürnen, to be angry at one.
Zuvor'kommen, to anticipate.

RÉSUMÉ OF EXAMPLES.

Der'jenige, welcher einer bösen Gesell'schaft nicht entsa'gen kann, kann keiner guten an'gehören.
He who cannot renounce an evil company, can belong to no good one.

Ihr Freund begeg'nete mir gestern, aber mir wollte sein Name nicht einfallen.
Your friend met me yesterday, but I could not remember his name (his name would not occur to me).

Fürsten entsa'gen nicht so leicht dem Throne.
Princes do not resign the throne so easily.

Was nützt es dem Menschen, dem Schick'sale zu widerstre'ben?—stets muß er der Macht dessel'ben unterlie'gen.
What avails it for man to struggle against (the) his destiny?—he must always succumb to its power.

Traue nicht jedem Menschen, und am allerwe'nigsten den'jenigen, die dir schmeicheln.
Trust not every one; and least of all, those who flatter thee.

Die Ermah'nung eines Freundes gilt mir viel, und ich folge ihr gern.
The admonition of a friend is of much value to me, and I follow it gladly.

EXERCISE 94.

1. Wenn in alten Zeiten ein Mächtiger dem andern feind war, so erklärte er ihm den Krieg. 2. Aus allen Orten, die ihm angehörten, sammelte dieser mächtige Herr die Männer, die ihm anhingen. 3. Nachdem sie seinem Vorhaben beigestimmt hatten, verpflichteten sie sich, ihm beizustehen, und ihm in den Krieg zu folgen. 4. Solch ein (Sect. XL. 6.) mächtiger Herr war Heinrich der Löwe, Herzog von Bayern, welchem große Länder zugehörten, und Tausende von Kriegern gehorchten. 5. Doch die Krone eines Kaisers schwebte ihm immer vor Augen. 6. Der Herzogshut genügte ihm nicht. 7. Er traute seiner eigenen Kraft und trotzte dem Kaiser. 8. Der Kaiser forderte ihn auf, sich seinen Befehlen zu fügen, und drohte ihm mit der Acht. 9. Doch dem Herzoge, der einem Löwen glich, galt weder Vernunft noch guter Rath. 10. Da er bisher alle seine Feinde überwunden hatte, glaubte er Jedem gewachsen zu sein. 11. Er widerstrebte dem Verlangen, den Kaiser die Ehre zu erweisen, die demselben gebührte. 12. Der Kaiser, der dem Herzoge schon seit langer Zeit übel wollte, und ihm wegen seines Stolzes zürnte, kam ihm zuvor, und überzog ihn mit Krieg. 13. Der Kriegszug mißlang dem Kaiser nicht. 14. Der Herzog konnte der feindlichen Macht nicht widerstehen, und erlag dem Kaiser in der Schlacht. 15. Er mußte nach England fliehen, und nur seine Familie und einige Freunde folgten ihm. 16. Hier entsagte er jeder Hoffnung, und fluchte dem Stolze, als der Ursache seines Elends. 17. Ihrem Wunsche entsprechend, werde ich Ihnen beim Suchen des Pferdes helfen, das Ihnen weggekommen ist. 18. Gar leicht gehorcht man einem edlen Herrn, der überzeugt, indem er uns gebietet. 19. Dieser Braten schmeckt mir nicht.

EXERCISE 95.

1. I flatter myself that you will honour me with a visit. 2. He would certainly harm me, if he could get at me. 3. The star of hope lights man even in the gloomiest night. 4. I shall assist my friend for the assistance which he has rendered me. 5. The teacher has told me he was contented with his scholars; they were diligent and anticipated all his wishes. 6. I know no one who flatters the passions of others as he does. 7. It were to be wished that everybody might assist the poor. 8. Do not flatter your children too much. 9. Napoleon collected around him the best of his generals. 10. After he had made known to them his purpose, they volunteered to assist him. 11. He trusted to his own power, invaded Europe with hostile troops, and defied every danger. 12. According to his own opinion his power was paramount, and he thought not of the difficulties which beset him.

SECTION L.—VERBS REQUIRING AN ACCUSATIVE OF A PERSON, AND A GENITIVE OF A THING.

Verbs signifying "to accuse, to acquit," and some others (§§ 126, 127) govern the *accusative* of a *person*, and the *genitive* of a *thing*, as:—Er klagt seinen Diener des Diebstahls an, he accuses his servant of theft. Der Feind bemächtigte sich der Festung, the enemy took possession of (mastered) the fortress. Sie beraubten mich meines Geldes und meiner Ehre, they robbed me of my money and of my honour. Die Richter sprachen ihn des Mordes los, the judges declared him (spoke him free) innocent of the murder. Er entledigte sich seines Auftrags mit großer Pünktlichkeit, he delivered his commission with great punctuality. Der Landmann rühme sich des Pflugs, the husbandman may pride himself of the plough. Wohl dem, der sich des Dürftigen annimmt, Ps. xli. 2, Blessed is he that considereth the poor (needy), Ps. xli. 2.

VOCABULARY.

An'schuldigen, to accuse of.
An'wesend, present.
Augenblick'lich, instantly, at once.
Bad, *n.* bath.
Befleißen } (sich), to
Befleißigen } be studious of.
Bege'ben (sich), to resign, give up.
Belch'ren, to teach, instruct.
Bemäch'tigen (sich), to seize, take possession of.
Berau'ben, to rob, deprive of.
Bereits', already.
Beschul'digen, to accuse of.
Bet'teln, to beg.
Bezüch'tigen, to charge with.
Bitten, to beseech.
Entblö'ßen, to deprive, strip of.
Enthe'ben, to free from
Entle'digen, to release, discharge.
Entschla'gen (sich), to get rid of, banish.
Entsetz'en, to remove, dismiss from.
Erbar'men (sich), to commiserate, have pity on.
Fessel, *f.* fetter.
Flehen, to supplicate.
Frei'sprechung, *f.* acquittal.
Freuen, to rejoice.
Freundschaft, *f.* friendship.
Gedan'ke, *m.* thought.
Geden'ken, to think of.
Geschwei'ge, much less, to say nothing of.
Gnade, *f.* grace, favour.
Handlung, *f.* action.
Jedoch', nevertheless.
Kerker, *m.* dungeon, prison.
Kloster, *n.* cloister, convent.
Krone, *f.* crown.
Lachen, to laugh.
Land'straße, *f.* highway.
Leer, empty.
Pflegen, to cherish, indulge in.
Raub, *m.* robbery.
Räuber, *m.* robber.
Rühmen (sich), to boast, pride one's self in.
Schämen (sich), to be ashamed of.
Sorge, *f.* solicitude, care.
Spotten, to scoff at, deride.
Ueberführen, to convict.
Un'schuldig, innocent.
Vieh'händler, *m.* dealer in cattle, drover.
Vielmehr', much more, rather.
Voll, full.
Vorig, former, last.
Wür'digen, to vouchsafe, deign.

RÉSUMÉ OF EXAMPLES.

Des Hoch'verraths an'geklagt, entging' er dem Kerker nur durch die Flucht.
Accused of high treason, he escaped the prison only by flight.

Beleh're mich eines Bessern, wenn du kannst.
Teach me (convince me of) a better, if you can.

Sie bemäch'tigten sich des Räubers, der den Kaufmann seines Geldes beraubt' hatte.
They seized the robber who had robbed the merchant of his money.

Er besann' sich eines Bessern, um nicht einer Un'wahrheit bezüch'tigt zu werden.
He bethought himself of a better course in order not to be accused of an untruth.

Mein Sohn hat mich alles Geldes entblößt'.
My son has stripped me of all (my) money.

Entbe'bet mich dieser trau'rigen Pflicht!
Relieve me of (from) this sad duty.

Der Gerech'te erbarmt' sich seines Viehes.
The righteous (man) is merciful to his beast.

Erin'nere dich der vielen Wohl'thaten, die ich dir erwies'.
Remember the many good deeds (favours) that I have shown you.

Geden'ke deines Freundes selbst in weiter Ferne!
Remember thy friend even in remote distance.

Drohe, wie du willst, ich lache deiner.
Threaten as thou wilt, I will laugh at thee.

Nach gesche'hener Arbeit kann man der Ruhe pflegen.
After completed (taken place) toil, we can indulge in (the) repose.

Viele rühmen sich großer Thaten, die sie niemals vollbracht' haben.
Many boast themselves of great deeds which they have never accomplished.

Ueberhe'be mich der Noth'wendigkeit, dich zu strafen.
Exempt me from the necessity of punishing thee.

Ehe ich mich eines Schlages versch'en hatte, lag ich schon zu Boden gestreckt'.
Before I had expected a blow, I was already felled (lay stretched) to the ground.

Er war so stolz, daß er mich keines Blickes wür'digte.
He was so proud that he did not vouchsafe to me a look.

EXERCISE 96.

1. Sie erinnern (§ 86. 1, 2) sich wohl noch des jungen Mannes, der im vorigen Jahre des Raubes angeklagt war. 2. Er war beschuldigt, einen reichen Viehhändler auf der Landstraße seines Geldes beraubt zu haben. 3. Man konnte ihn jedoch dieses Verbrechens nicht überführen. 4. Er hatte sich bereits aller Hoffnung einer Freisprechung begeben, und sich des Gedankens entschlagen, für unschuldig erklärt zu werden. 5. Der Richter jedoch enthob ihn aller Sorge. 6. Nachdem er den Angeklagten aufgefordert hatte, nur gutes Muths zu sein, und sich alles Kummers zu entschlagen, erklärte er: Ich bin der vollen Meinung, daß man diesen jungen Mann nicht des Raubes bezüchtigen kann. 7. Denn nicht Jeder, der sich des Bettelns schämt, und aller Mittel entblößt ist, wird ein Räuber. 8. Ich kann seines Betragens lobend erwähnen, denn er hat sich immer eines ordentlichen Lebens befliſſen. 9. Ich erinnere euch aber an seine Thaten im letzten Kriege, deren er sich mit Recht rühmen kann. 10. Freuet euch seiner Freisprechung, und würdiget ihn eurer Freundschaft. 11. Spottet seiner nicht, weil er im Kerker war, sondern erbarmt euch vielmehr seiner, und gedenket seiner Leiden. 12. Jeder, der seiner lacht, schäme sich seines eigenen Betragens. 13. Alle Anwesenden freuten sich dieser Rede, und man entledigte augenblicklich den Angeklagten seiner Fesseln. 14. Lehre uns deine Wege, o Herr! und beraube uns nicht deiner Gnade! 15. Ich bin Willens (§ 128), im nächsten Sommer ein Bad zu besuchen. 16. Ich kann durchaus nicht der Ansicht sein, daß man nach Tische der Ruhe nicht pflegen sollte. 17. Wer sich des Lebens freut, soll sich auch des Sterbens erinnern. 18. Als General Tilly sich der Stadt Magdeburg bemächtigt hatte, lachte er der Flehenden, welche ihn baten, sich ihrer zu erbarmen.

EXERCISE 97.

1. In former times the people knew not how to read, much less to write. 2. I am willing to visit next summer the baths of Homburg and Laubach. 3. When Louis Philippe, King of the French, had abdicated his throne, he went with his whole family to England. 4. Some kings have little reason to boast of their reigning. 5. The Emperor Charles V. gave up his crown and went into a convent. 6. It becomes a man better to be studious of his actions, than to boast of his abilities. 7. I will relieve myself of all business, and enjoy a quiet life. 8. He rejoiced at the acquittal of the innocent, and vouchsafed to them the greatest friendship. 9. The enemy (*say*, enemies) stormed the town and laughed at the supplicants, who besought them to have pity on them.

KEY TO EXERCISES IN LESSONS IN GERMAN.

EXERCISE 11 (Vol. I., page 68).

1. Is your friend, the captain, still a young man? 2. Yes, he is still young, but his good friend, the Dutchman, is old. 3. Have you a beautiful great dog? 4. No, I have a beautiful great horse. 5. Has your little child my new knife? 6. No, but your good son has your new stick. 7. Has the butcher a fat sheep? 8. Yes, and his good son has a beautiful white lamb. 9. Is your friend, the young Dutchman, rich or poor? 10. He is not rich, but he is contented. 11. A contented man is also rich. 12. A rich man is not always a contented man. 13. Your great house has a steep roof and a deep cellar. 14. From whom have you your new sofa? 15. I have it from a good friend. 16. The pig is a lazy fat animal. 17. A true friend is a strong protection.

EXERCISE 12 (Vol. I., page 94).

1. Have you my ripe fruit? 2. No, I have your silver fruit-knife, and your old friend, the teacher, has the ripe fruit. 3. Have you my silver pencil? 4. No, the good teacher has it. 5. Has the old cook my wooden table? 6. No, the joiner has it, but the cook has a marble table. 7. Has he also a wooden cask? 8. Yes, and this diligent scholar has a beautiful leaden inkstand. 9. Has he also a silver cup? 10. Yes, and he has also a copper kettle and an iron mortar. 11. Have you my young friend's new knife? 12. No, I have a new knife from the good merchant. 13. Has this diligent scholar the old friend's good book, or his good cousin's silver pencil? 14. He has neither a good book nor a silver pencil—he has only a wooden pencil. 15. Where is the cook's copper kettle? 16. The poor man has only an iron kettle.

EXERCISE 13 (Vol. I., page 94).

1. Hat sie mein reifes Obst? 2. Der alte Koch hat meinen silbernen Bleistift. 3. Hat er auch ein neues Messer? 4. Der gute Kaufmann hat einen alten marmornen Tisch. 5. Er hat weder ein goldenes Obstmesser, noch einen silbernen Becher. 6. Der Sommer ist eine goldene Zeit. 7. Der fleißige Tischler hat den eisernen Kessel des Kochs.

EXERCISE 14 (Vol. I., page 94).

1. Is this young lady's young sister in Germany? 2. No, she is in France, but her brother is in America. 3. Where is my new gold pen? 4. Your young friend Miss S. has it. 5. Has your mother the beautiful silk of your aunt? 6. Yes, and also the beautiful fine linen. 7. Where are [ist] your gold spectacles? 8. I have no gold spectacles. 9. Have you a silver or gold watch? 10. I have a silver watch. 11. Is it a good watch? 12. Yes, but it is not very beautiful. 13. Where is your watch? 14. It is in my watch-pocket. 15. Has your sister a gold watch? 16. Yes, and she has also a beautiful gold chain. 17. Where are my new scissors? 18. I have them, but they are not very sharp. 19. Where is your sister? 20. She is with her mother in the library. 21. Where is my glass lamp? 22. I have it. 23. Who has my new opera-glass? 24. I have it, and your new spectacles.

EXERCISE 15 (Vol. I., page 94).

1. Die Mutter dieser Dame ist in Frankreich. 2. Hat die schöne Tochter der guten Tante eine goldene Uhr? 3. Mein fleißiger Bruder hat weder eine goldene Uhr noch ein gutes Opernglas. 4. Meine gute Schwester hat keine feine Leinwand, aber sie hat eine neue gläserne Lampe. 5. Mein Vetter mit der goldenen Brille ist bei meinem schönen Bruder in der Bibliothek.

EXERCISE 16 (Vol. I., page 102).

1. Has the Frenchman the German's wine? 2. Yes, and the German has the Frenchman's cloth. 3. What has the Russian? 4. He has the country of the Pole. 5. This Greek is no friend of the Turk. 6. Who has the sharp knife of this boy? 7. The friend of this Greek has it. 8. Have you your nephew's writing-desk? 9. No, I have my father's writing-desk. 10. Have you this boy's book, or his nephew's paper? 11. I have the boy's book, and my niece has the nephew's paper. 12. Is our friend, the captain, a Frenchman or a Greek? 13. He is a Frenchman, and a great enemy of the Russian. 14. Is this child a son of our neighbour, the merchant? 15. No, he [it] is the son of a Jew, and his father is the neighbour of a Christian. 16. A lively countenance is not always the sign of a quiet conscience. 17. Have you the count's book? 18. No, but the prince has the book. 19. The life of a soldier is fatiguing and unsafe. 20. Have you a monarchy or a republic? 21. America has no prince, but liberty. 22. I have a gold watch, and you have a silver pencil.

feathers, and addled eggs being more grievous than the trouble of making an honest nest. The martins are sometimes strict enough on this matter when an impudent sparrow seizes on one of their nests. Often have all the martins in a neighbourhood united to drag out the intruder and to execute him on the spot. "Serve him right" must be the verdict of all right-feeling birds. As the martins sometimes hatch four broods in a season, the last family is not unfrequently abandoned when the time comes for the migration. It is very sad and very unromantic; but what can the poor bird-mother do? Food fails; if she stops she dies with her young; by going she preserves her own life at least. Poor thing! it is very hard for her, but she cannot resist the impulse which so strangely bids her go. Sometimes, on returning to the deserted nest in spring, she has actually to remove her dead children from the home in which they were reared. "Sad, but unavoidable," is all we can say, and that is, perhaps, just what the house martin feels.

The *Sand Martin* is the least known, though travellers may often see its nest-holes driven into the sandy slopes and sides of railway cuttings. These holes are usually two feet deep, but sometimes three or even four, the nest being safely hidden in the darkness at the far end. How does this small, greyish-coloured bird pierce such holes in the rock? The beak is the only tool used, serving for both "pick and borer," the claws being partly employed as shovels to clear the loosened sand away. The little workman first drives its beak into the sand, dislodges some earth, then another beak-drive follows, and so on till an excavation is made. The opening is then tunnelled to the required depth by the beak working *from the centre of the hole outwards*. The whole work is finished in about a fortnight. Some curious people may here ask, why does this little bird not build its nest in the manner of its cousins, and escape all this mining work? Answer again, "cannot tell;" natural history is, all may see, full of mysteries. The sand martins are not without their share of troubles. An enemy gets into the snug nests in the form of a flea, which seems to be *peculiar* to this bird. Such is the lesson which the microscope teaches, and we cannot disbelieve that clever little instrument. The martin is often worried out of its house by these determined fleas.



THE CHIMNEY SWALLOW.

The *Swift* is the latest of all our swallow visitors, not generally reaching Britain until May, and bidding us "good-bye" about the middle of August. The peculiar habits and appearance of this bird have suggested the various names of swift, black martin, screech, screamer, squealer, and footless swallow (*Cypselus apus*). Its rapid flight, strange scream, dark body, and feeble feet will explain the origin of all those appellations. What is the most remarkable quality of the swift? Its marvellous power of wing. For sixteen successive hours will this bird continue aloft in the air, not quietly poising itself, but darting and wheeling at a speed which would leave the swiftest express train behind. Its velocity of flight has been estimated at ninety miles the hour, and it is not, therefore, surprising that the swift defies the hawk and the eagle, darting with exulting cry almost in the face of the exasperated falcon. Those who examine the black martin will not be much surprised at its power in the air. The extended wings measure eighteen inches, yet the whole bird weighs little above one ounce. Such a living machine may really find it more difficult to descend to the earth than to wander at will on high. The structure of the swift well illustrates what is called the *law of compensation*; the feebleness of the feet being combined with amazing power of wing. On the other hand, the ostrich has weakness of wing balanced by power of leg and claw.

The swift seldom rejoices in a numerous family, two being the usual number, and even these are frequently hurried away in the autumn, almost immediately after leaving the nest. The return of these birds to the same locality, year after year, was fully proved by Dr. Jenner, who cut off two claws from each of twelve swifts, and at the end of seven years some of these marked birds were found in the neighbourhood. Even the injury received was not sufficient to overcome the intensity of local attachment.

Do the swallows render any service to mankind? Yes; they keep the insect myriads within safe limits. If one of these birds should eat but a hundred insects a-day, the number consumed in a summer by the whole swallow family might puzzle a calculating machine to enumerate. Many a farmer can ruefully remember the ravages which "the fly" has often made among his turnips or in his hop-grounds. He may well look upon the swallows as most useful though unpaid labourers. What a fearful plague some insects might become without such checks, may be inferred from the calculation of Réaumur, that one aphis fly might produce in a single year 5,904,900,000 of its voracious progeny. A pretty family to feast at man's expense!

The swallows, could they speak, would have a serious complaint to make against humanity. They would say that boys are sometimes guilty of damaging their nests, pelting their wives, and knocking down their children by "switching" at them with long rods. The house martins would be loud in their complaints; but we trust that, after this public notice, every boy will repent of his past rudeness and behave better for the future. It is equally wanton and cruel to destroy the wonderful structure which instinct has taught the bird to build for the shelter of itself and its young.

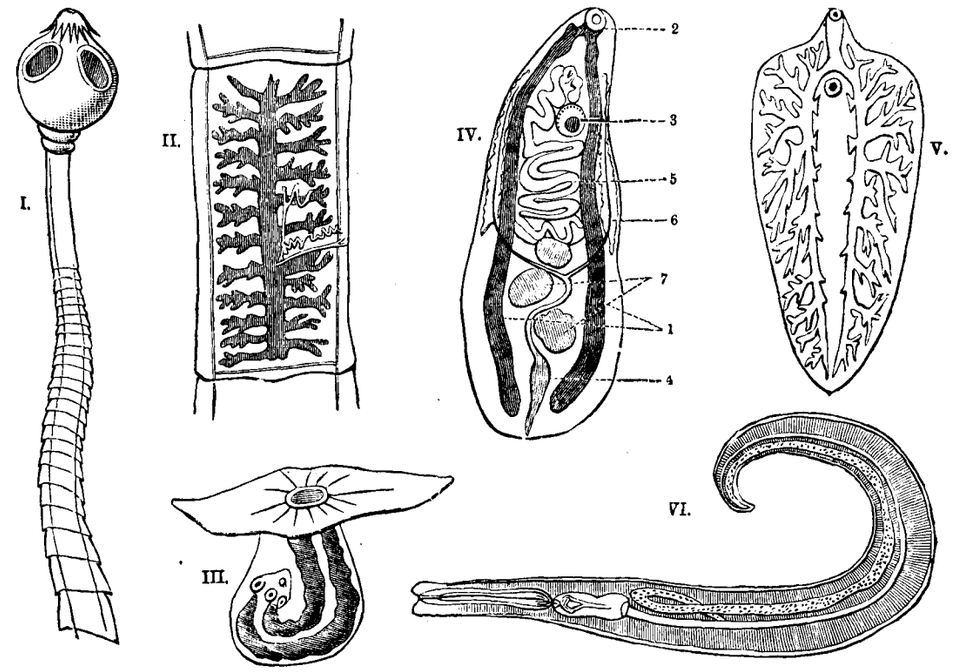
Let us now, with one consent, welcome in hamlet, village, and town these confiding summer visitors, wishing them much happiness while here, and giving them a regretful "good-bye" at their departure.

COMPARATIVE ANATOMY.—VII.

HELMINTHOZOA.

All the animals of which we have hitherto treated have been inhabitants of the water. Those which form the subject of the present lesson have a very strange habitat. They, for the most part, take up their abode in the interior of other animals, being found in the alimentary canal when they have become completely developed, but occupying all the several soft structures of the bodies of the higher animals when in an immature condition. Some writers have been disposed to treat of them not as a division or class in the animal kingdom, but as a peculiar fauna or assemblage of animals occupying a peculiar locality. Just as we might describe the animals of Europe, dividing that continent into natural districts, and stating what kinds of animals are confined to the Alpine region, what kinds are partial to the plains, etc.: so would these authors consider the bodies of the higher animals as the continents in which these strange creatures have their range; and state how some are prone to take up their abode in the liver, some are lodged in the brain, and others find their home in the muscles. This, however, is certainly not a scientific view of the subject, and the facts of the case do not compel us to adopt it. For though there is doubtless much diversity in the structure of these animals, and they show relationships to two if not more classes, yet those included under the class we name *Helminthozoa* are so far distinguished as to make up a definite class, which, however, does not quite run parallel with the class *Entozoa*, inasmuch as it includes some animals which never take up their abode in the interior of others. The class *Entozoa* was never a good designation, as many of these animals that are the most typical of their class, as intestinal worms, pass some of their stages of existence in water, etc., outside the bodies of animals.

These creatures offer to the speculative faculties many enigmas. Those who believe that animals were introduced to the globe, created, or derived from one another in the order of their development or position in the scale of Nature—the simplest animals coming first in time—are at a loss to account for the appearance of these animals. Standing next above the Echinodermata, they should precede all the higher grades of animals, and yet their very existence and history implies the presence of animals of a higher grade, who act towards them as hosts. Again, these animals offer strange exceptions to the harmony of Nature. It is true that all animated Nature is a battle-field, in which species carry on their unrelenting hostilities towards one another; but this very strife results in an admirable harmony, there being a place for each species, while each is held in check by the others. The sickly and wretched make way for the robust, and strong, and joyous. On the other hand, that an otherwise strong and robust animal should become the prey of internal parasites, which do not strike it down and put it at once out of its misery, but cause emaciation and slow and painful death, seems strange, when we consider that the whole of creation was fashioned to one design by a supreme and benevolent Being. These remarks are, of course, only offered to show how impossible it is for us to understand or account for all the works of the Infinite.



I. Head and forepart of the body of Tænia Solium, showing the hooks and suckers. II. One joint of the same taken from near the tail-end of the Animal, showing the central reproductive organs with their ducts leading to the side, and also the water-vascular system. III. Head of the Larva of Tænia Solium (Cysticercus) projecting into the bladder-like cyst. IV. Distoma Conjunctum. V. Liver Fluke (Fasciola Hepaticum), showing the branching alimentary canal and the two suckers. VI. Oxyuris Vermicularis (male).
Refs. to Nos. in Figs.—IV. 1, double alimentary canal; 2, mouth sucker; 3, ventral sucker; 4, water-vascular system; 5, female organ; 6, glands which form the egg-yolk; 7, male organs.

One of the best known and most typical forms of the lowest sub-class of *Helminthozoa*, is the common tapeworm, called *Tænia solium*. The name *Tænia* means a band, and is given because of the long, flat, strap-shaped character of the animal's body. The specific or trivial name, *solium*, meaning solitary, was given because it was at first imagined that only one of these animals were ever found in one person at once. This, however, has been proved to be a mistake.

This disgusting creature is found in the alimentary canal of man. It is often many feet or even yards in length. Its head is armed with two kinds of organs for effecting its adhesion to the

LESSONS IN BOOKKEEPING.—VII.

In our last lesson we gave an example of the principle of posting the entries from the *Journal* to the *Ledger*; let us now suppose that an entry similar to the following occurred in a Merchant's *Journal*:—

(Page 5.)

Date.	Fol.	March, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
31	3	Cash Account, *Dr.*						
		To Sundries, as per C.B., fol. 1.	273	17	9			
17	5	To Richard Watson				100	6	8
25	6	To Alexander Brown				75	3	4
31	7	To Thomas Smith				98	7	9

The single entry of these transactions in the *Journal* will occasion the making of *four separate entries* in the *Ledger*; and yet it will only be an example of *Double Entry*; for, as we have already seen, the *first* entry in the *Ledger* will be to *Debit Cash* for the whole amount of the sums in this entry, in the following manner:—

Fol. (3). *Dr.* CASH ACCOUNT. Fol. (3).

1881.				£	s.	d.	Cr.			
March	31	To Sundries . . .	5	273	17	9				

The *second* entry in the *Ledger* will be *threefold*, that is, it will be to *Credit each of the accounts* for its respective part of the whole amount of the sums in this entry, in the following manner:—

Fol. (5). *Dr.* RICHARD WATSON. Cr. Fol. (5).

1881.				£	s.	d.
March	17	By Cash	5	100	6	8

(6). *Dr.* ALEXANDER BROWN. Cr. (6).

1881.				£	s.	d.
March	25	By Cash	5	75	3	4

(7). *Dr.* THOMAS SMITH. Cr. (7).

1881.				£	s.	d.
March	31	By Cash	5	98	7	9

Thus you see from the above examples that the sum of £273 17s. 9d., received in Cash from different parties in March, is *entered once* on the *Dr. side of Cash Account*, and that the same sum is *entered once* on the *Cr. side* of the *different accounts* to which they belong; but that it is apportioned out into the respective sums received from each of the parties in whose account they are entered. Thus you will see also that these *three* latter entries on the Cr. side of the Ledger account are but an equivalent to the *one* entry on the Dr. side of the same.

Thirdly, we shall only suppose another example of a Journal entry to be posted into the Ledger, as follows:—

(Page 6.)

Date.	Fol.	April, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
21	3	Sundries, *Dr.*						
		To Cash Account, as per C.B., fol. 1.						
10	8	Hugh Williams				429	16	6
21	9	John Tillotson	250	0	0			
			179	16	6			

This single Entry in the Journal will occasion *three separate entries* in the *Ledger*, as follows; but it is plain that in this case the *two Debit* entries in the account of *Hugh Williams* and *John Tillotson* will only be an equivalent for the *single Credit* entry in the *Cash Account*; and thus it is still an example of *Double Entry*:—

Fol. (3). *Dr.* CASH ACCOUNT. Cr. Fol. (3).

1881.				£	s.	d.
April	21	By Sundries . . .	6	429	16	6

(8). *Dr.* HUGH WILLIAMS. Cr. (8).

1881.				£	s.	d.	Cr.			
April	10	To Cash	6	250	0	0				

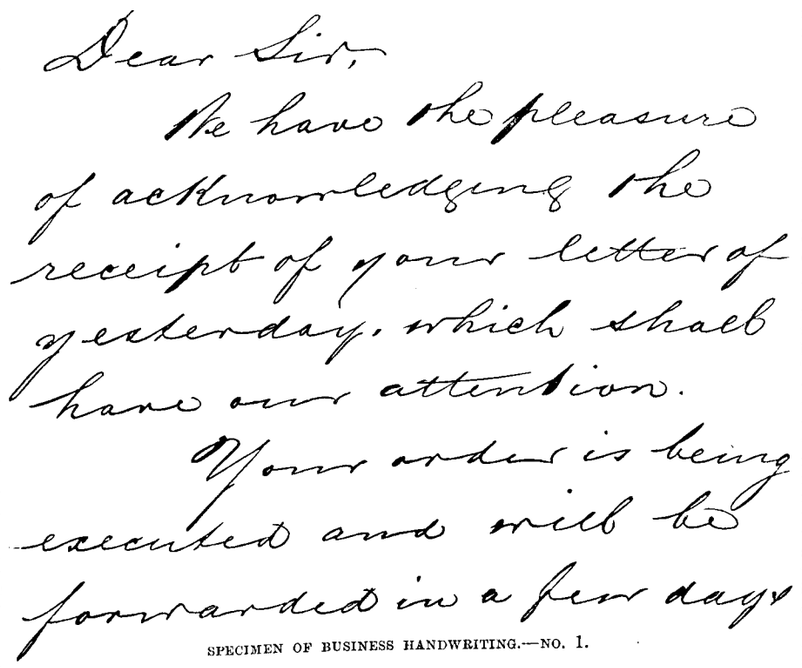
(9). *Dr.* JOHN TILLOTSON. Cr. (9).

1881.				£	s.	d.	Cr.			
April	21	To Cash	6	179	16	6				

LESSONS IN PENMANSHIP.—XXIX.

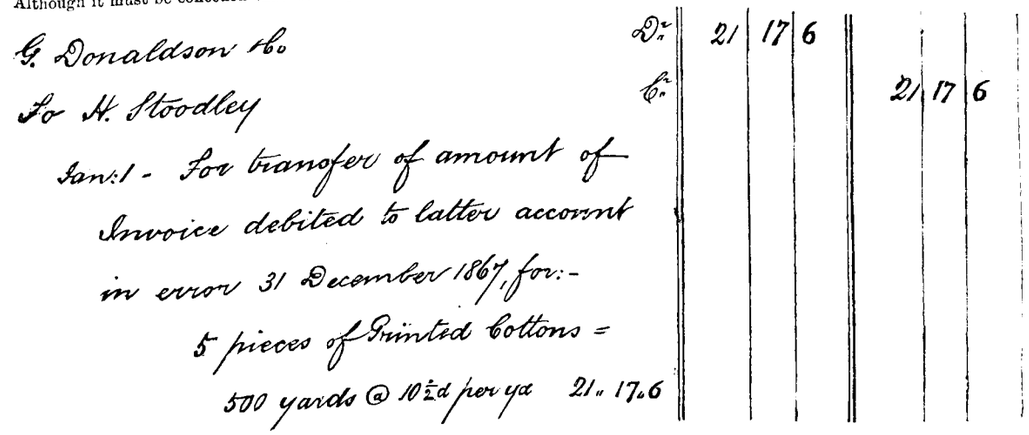
BUSINESS HANDWRITING.—I.

In our present Lesson on Penmanship, we bring before our readers two excellent models of business handwriting, one of which will give those who may be seeking a seat in a merchant's counting-house, a clear idea of the kind of writing suitable for mercantile correspondence, while the other exhibits the style best suited for entries in the day book, ledger, journal, and other account books used in every office where a rigid system of book-keeping is maintained, and the accountant's duties are efficiently carried out.



SPECIMEN OF BUSINESS HANDWRITING.—NO. 1.

It will be useful for our readers to mark the difference between the general character of the handwriting suitable for the business letter, and that which is better calculated for records of mercantile transactions. Although it must be conceded that both specimens of penmanship are perfectly satisfactory, as far as neatness and legibility are concerned, the former is marked by the ease and freedom that a good writer naturally imparts to his handwriting, when, with ready thought and practised hand, he uses the pen rapidly to get through the mass of business correspondence that must be cleared off and sent to the nearest post-office before the house of business is closed for the evening; while the latter exhibits in an equal degree unmistakable signs of the deliberation, method, and thoughtfulness that should always be exercised by the bookkeeper or accountant, to prevent errors and the disfigurement of the fair page neatly ruled in red and blue for the reception of facts and figures, by the use of the pen-knife or eraser to remove any mistake that may have unfortunately been made by undue haste on the part of the writer, or want of proper attention to the important task on which he is engaged. The reader will notice that while the loops and tails of letters in the specimens of business handwriting in this page are a little longer than those in the specimens of official handwriting given in previous lessons (see pages 33, 48), they are not carried above or below the body of the letter to the extent that was formerly insisted on in commercial handwriting, and that there is a total absence of all that obnoxious flourishing and redundancy of capital letters.



SPECIMEN OF BUSINESS HANDWRITING.—NO. 2.

which were once considered as combining to form the height of perfection in the penmanship of the commercial clerk. For business correspondence and the records of mercantile transactions, as well as for official handwriting, a plain, clear hand, devoid of flourishes and ornamentation of capital letters, is the most desirable, and will always command the preference of practical men.

sides of the intestines. It has a proboscis, and around this are two rows of hooks, which point backward, so that when the animal plunges its proboscis into the soft mucous coat it cannot be pulled away, and hence holds its position, notwithstanding the continued transmission of food and the constant motion of the alimentary canal by which it passes forward its contents. Besides these, four suckers are situated below the hooklets on the rounded head. An attenuated neck gradually enlarges as it proceeds downwards, and, at a little distance from the head, closely set and fine constrictions are observed, which become larger and more especially longer as we trace them downwards towards the tail-end. These constrictions become also more and more definite and deeper, dividing the animal into segments, which, being longer than wide and very flat, look like a series of oblong cards.

In each of these segments a complete set of reproductive organs, both male and female, are found, and each in course of time produces an immense brood of eggs. When this condition has been arrived at, the segment drops off and crawls about, making its escape from its host, and finally bursting from the increased growth of the contained eggs, it scatters an immense multitude of germs. At a first consideration, one would have thought that these germs, cast forth into the world, and dependent for development upon their admission to other hosts, would have but little chance of complete life; and this is no doubt true with regard to each single germ. In this case, however, Nature makes up by multitude for efficiency. If we consider that each tape-worm has many hundred segments or joints when found in the interior of man, and that these joints are continually renewed from above as they fall away, and that each segment contains thousands of ova which are cast into various situations—into garbage, water, etc.—it is not wonderful that some are taken into the interior of some suitable animal.

These animals, being constantly provided with digested food which has been elaborated by their hosts, do not need any food canal of their own to digest aliment, but absorb it when already dissolved through the walls of the body. In fact, their stomachs, so to speak, are external, and correspond to the skin of other animals. Running along each side of the animal is a narrow duct. Cross-branches unite the two ducts, one to each segment, and run across at the part farthest from the head. These two lateral canals were long considered as the alimentary system of the animal; but it was found that it had no opening forward—that is, it was without a mouth—and although there is an opening at the other end of the body, yet it is now considered to be the atrial system corresponding to the water-vascular or ambulacral system which we have described in the Echinodermata.

The egg with its contained embryo being swallowed by some animal, the latter does not remain in the food canal and become developed into a tapeworm, as might have been supposed, but immediately that the coatings of the egg are dissolved away, the embryo, which is armed with six boring-hooks, makes its way through the walls of the alimentary canal, and traverses the body in any direction until it reaches some structure suited to it, and there it rests and becomes more fully developed. The development is commenced by the formation of a bladder which is proper to the animal, while the soft organ in which the parasite is lodged forms a self-defensive cyst around this of common (areolar) tissue. Thus the creature is snugly ensconced in a cavity, through the walls of which the liquids penetrate, and are absorbed by the bladder-like animal. By the aid of this nutriment fresh changes occur with the growth of the larva. Thus on one side of the interior of the bladder a round body grows and so projects into the cavity, and in this the head and neck of the future perfect worm are formed. On this head the circles of hooks and the suckers are developed, so that the examination of the larval form when at an advanced stage will enable the examiner to determine to which species the creature belongs. When this process is completed, the larva has reached a stage beyond which it cannot become more developed unless it changes its position, and this change of position is not an active but a passive one. Hence multitudes of these creatures probably die and become disintegrated without ever attaining the perfect form. Those, however, whose life-circuit becomes complete, are transferred to the stomach of a carnivorous animal by the flesh in which they are lodged being devoured. Thus the animal has two different hosts, one of which entertains it in the immature condition, and the other when it becomes perfect and sexually capable of reproducing its species. Most of these *cystoid* animals, when in the cystoid or bladder-like state, inhabit the soft structure of herbivorous or grain-feeding animals, while when they arrive at the *cestoid* or tape-worm condition they are found in the carnivorous animals which feed upon their former hosts. It has been shown that the *Cysticercus fasciolaris* of the liver of a mouse becomes the *Tænia crassicollis* (the thick-necked tapeworm) of the intestines of the cat, and the *Cysticercus pisiformis* (the pea-shaped bladder-tail) of the rabbit becomes the *Tænia serrata* (notched tapeworm) of the dog. In the case of the species we have been describing, the host of the larva is usually the pig, and the host of the adult worm is man. As might be expected, it is found that the *Tænia solium* infects those most who are especially fond of ill-cooked sausages. In Germany this unfortunate taste for nearly raw pork has produced the most harmful results, not only by introducing this worm, but also another called *Trichina spiralis*, a worm of much higher organism, and belonging to an order to be referred to hereafter. When the flesh containing the encysted entozoa is being digested by the animal who has been unfortunate enough to swallow it, the digesting operation goes on not only so far as to liberate the creature, but also to dissolve away the bladder which encloses the head. Then the creature, like the liberated genius in the "Arabian Nights," begins to take revenge on its liberator for its long imprisonment. It fixes itself by its hooks and its suckers to the walls of the intestines, and its tail grows and becomes segmented as before described. As compared to the immense length and size of the chain of segments, the head is ridiculously small; and thus the simile of the genius, who, when liberated from his bottle, assumed such vast and formidable dimensions, is not inappropriate to the rapid development which follows the liberation of this worm from its cyst.

The effect upon the human system occasioned by a tapeworm is extremely distressing. The patient suffers not only from loss of appetite, emaciation, and lassitude, but the sympathetic nervous system is affected so as to produce convulsions and epilepsy. Distressing, however, as these effects are, they are not so fatal as are those produced by the presence of the immature form, because the adult worm is confined to the intestines, and is thus, so to speak, in a situation external to the body, while the larvæ, as we have seen, penetrate into all parts of the body, and their presence is more or less injurious as they take up their abode in the more or less vital organs. If they find their way to a position under the skin or in the muscles, they are comparatively harmless; but if they penetrate the eye or the brain, they occasion pain and sometimes death.

In tracing the circle of life of the *Tænia*, we find it runs through all the forms named, in the following order:—

1. The egg.
2. The embryo, actively travelling by a six-hooked boring apparatus.
3. The resting larva, consisting of a head enveloped in a terminal bladder.
4. Immature tapeworm liberated from its bladder.
5. Segmented and sexually mature tapeworm.
6. Free segment, called a proglottis, from its likeness to the tip of the tongue.

This creature belongs to the sub-class *Anenterelmintha*, which is distinguished from the sub-classes to which the other animals of the class belong, by having no alimentary canal of any kind. This animal, in common with all belonging to this sub-class, is entirely nourished by absorption, and for this reason we have taken the tapeworm as the type of an entozoon.

The animals of the sub-class *Sterelmintha* differ from these in having an alimentary canal channelled out in the substance of an otherwise solid body. Our best English writer on the *Entozoa*, Cobbold (whose books should be read by those who wish for a more intimate acquaintance with the class), takes the *Distoma conjunctum*, which he found in the intestines of the American red fox, as a type of the sub-class. The animal belonging to this sub-class, with which we are unfortunately best acquainted, is the liver-fluke, which occasions the disease called the *rot* in sheep. This creature is found abundantly in the liver of sheep so affected. Sometimes as many as a thousand have been found in a single liver. The animal is of considerable size, measuring from ¾ to 1 inch in length, and about ½ inch in breadth. It is flat, and shaped like a little sole. Its anterior extremity is extended into a nipple-shaped projection, at the end of which is the sucker, which is perforated by the mouth of the animal. Another sucker of larger size is situated on the under side of the body, at about a quarter of an inch from the mouth. This is similarly constructed, but is imperforate, and does not communicate with any internal organ. Locomotion, so far as it is needed to this animal, is effected by these suckers, which can be alternately attached, and also by the general flexibility of the body, which has a muscular layer beneath the epidermis. The mouth leads down into a short gullet, below which the alimentary canal divides into two main trunks, which run down to the tail-end of the animal, giving off blind branches in a way best explained by the engraving. There is no anus, and this perhaps is not needed, on account of the highly organised food which the animal ingests. The fluke, however, readily ejects the food from its branched stomach, by curling itself up like a little strip of heated parchment, and thus squeezing it out. Another system of vessels has a single opening towards the tail of the body, and runs forward, giving off branches on either side, and then, when it has arrived at a distance of about one-third of the length of the animal from the oral sucker, it splits into three branches. This system corresponds with the water-vascular system of the *Tænia*.

This animal is hermaphrodite, that is, it has both male and female organs. The development of these creatures is peculiar. It is supposed that when the animal containing matured eggs is voided from the sheep, it reaches some moist place or pool of water, and deposits its eggs, which emit a larva which swims about by cilia, and has a single X-shaped eye. This larva fixes on some fresh-water snail and penetrates its skin, and when it has arrived at the interior, is transformed into a large bag or *nurse*, containing in its interior many tadpole-shaped animals with long tails, called *cercariæ*. The *cercariæ* once more escape, not only from their foster-parent or nurse, but also from their molluscous host, into the surrounding water, and it is probable that they are imbibed with the water by sheep, and then penetrate to the liver, causing the rot. In accordance with these suppositions, some of which have been observed not in the liver-fluke, but in nearly allied species, it is found that sheep fed on dry land or on the great salt-water marshes are comparatively free from rot, while those fed up in fresh-water marshes are peculiarly subject to it. The disease associated with these creatures is of considerable economic importance, as in some years it has been reckoned that between one and two millions of sheep have died of the rot in Britain alone.

Besides the flukes there is another sub-class of *Helminthozoa*, called *Cœlelmintha*, or hollow-bodied worms. These have alimentary canals of the same type as the higher animals, being tubes within tubes. The alimentary canal consists of a strong œsophagus, a dilatation or bulb containing a comminuting apparatus, or gizzard, and then a stomach continued into an intestine. These creatures are not hermaphrodite, but the individuals are male and female. Some of these animals are not parasitic at all, and some of them only under certain circumstances. Thus, there is found in the tropical regions of Asia and Africa an intolerable pest, called the *Dracunculus Medinensis*. This troublesome parasite is always the female, and it gains access to the body from water through the skin, and then grows and emits its brood, to the great annoyance of its host, often occasioning death. When it reaches its full size it is many feet in length, though only $\frac{1}{10}$ of an inch in thickness. It will migrate beneath the skin from one part of the body to another. Some have supposed that these animals were the fiery serpents which attacked the Israelites in the wilderness. The only remedy seems to be to cut down to the worm, and having got hold of one end this is wound round a piece of stick. When thus secured the stick is left for a day or two, and then more of the worm's body is drawn out, and a further winding takes place, and so on until the whole is extracted entire. If the worm be broken, as it swarms with eggs, all the bad effects take place which would necessarily ensue if the creature were left unmolested.

The class *Helminthozoa* show, by their development within ciliated larval forms of utterly different form from the adult animal, by the possession of a water-vascular system, and a radial structure of their head-organs, an affinity for the Echinodermata. On the other hand, their elongated and transversely-striated or segmented forms, as well as the position of the scanty representatives of the nervous system, show an approach to the annelids or true worms. Doubtless they lie between these classes; but whether they are so much more nearly associated with the first-named as to be properly placed with them in a separate sub-kingdom, called Annuloida, may be doubted by some.

The class may be thus divided into sub-classes and orders:—

Class.	*Sub-class.*	
HELMINTHOZOA	I. Anenterelmintha	1. Cestoda = tapeworm. 2. Acantho cephala = thorn-headed worm.
	II. Sterelmintha	3. Turbellaria: non-parasitic. 4. Trematoda = flukes.
	III. Cœlelmintha	5. Nematoda = round worms.

THE HISTORY OF ART.

IX.—LIONARDO AND THE FULL RENAISSANCE.

THE end of the fifteenth century and the beginning of the sixteenth form the high tide of art in Italy. It was then that the last trammels of mediæval feeling were cast aside, and the Italian mind rose to its greatest achievements, in a way which it has never yet equalled, far less surpassed. The reasons for this change are too vast to be fully described in a brief sketch, but some small attempt may yet be made to account for it in part.

All through the Middle Ages, Italy, we have seen, had a far freer, wider, more cosmopolitan type of life than any other European country. Florence, Rome, Milan, Venice, Genoa, were all the centres of great mercantile enterprises and civic polity at a time when the remainder of Europe was still deeply steeped in feudal militarism. Towards the close of the fifteenth century, however, the civilisation of Italy, long growing and increasing in the comparative peace of the mercantile peninsula, reached its culminating point. The Mediterranean was still the great highway of commerce, and Italy still held all the keys of the Mediterranean. In the next century the discovery of America and of the route to India by the Cape of Good Hope was destined to revolutionise the whole state of Europe—to turn the world westward towards the new-found countries, instead of eastward towards the old civilisations, and so to transfer the really important harbours and trading-places of the European culture from the Adriatic or the Tyrrhene Sea to the Atlantic coast. As yet, however, Italy retained the first place, and the steady increase of wealth and knowledge throughout five centuries was followed by a steady improvement in art as well.

One peculiar fact which had a great deal to do with the rise of the Renaissance feeling in Italy was certainly the fall of Constantinople to the Turks in 1453. After that event, many of the learned Greeks retired to Italy, where they introduced much of the ancient Greek literature, which had long been lost in the west, and especially the works of Plato. But single causes of this sort, though important in their way, had doubtless less to do with the great wave of feeling which was slowly passing, first over Italy, and then over the rest of Europe, than the general growth of peace and industrial life. Men were beginning to have leisure to think for themselves—to move a little outside the fixed grooves of mediæval beliefs and conventions. In the social world, the change is seen as the decay of feudalism; in the religious world, it is seen as the Protestant Reformation; in the world of thought, it is seen as the revival of learning; in the artistic world, it is seen as the Renaissance. There was, in fact, a general uprising of the public mind everywhere against the petty, narrow, confined views and habits of the strictly military Middle Ages.

The great distinguishing characteristic of the Renaissance in Italy is its extraordinary boldness, freedom, and vigour. The new world of thought which was opening up before the eyes of men seemed to turn their heads, almost, in the first flush of liberty, and to make them look upon nothing as sacred, nothing as settled, nothing as certain A reaction from the dogmatic utterances of the Roman Catholic Church made the thinkers of Florence into the boldest sceptics and speculators, ready to inquire about the underlying truths of the universe, and to take nothing for granted in any way. A grand outburst of originality was the result of the new free spirit abroad in Italy; and this originality was not confined to any one department of

LESSONS IN GREEK.—IV.

CASE-ENDINGS OF THE DECLENSIONS.

I HAVE already said that there are, in Greek, three declensions; the essential forms of two of these three declensions are contained in the article, which was brought under your notice in the last lesson (page 66), thus:—

CASE-ENDINGS OF FIRST AND SECOND DECLENSIONS.

Singular.

	First. FEM.	*Second.* MAS.	*Second.* NEUT.	*English Equivalent.*
Nom.	η	ος	ον	
Gen.	ης	ου	ου	of.
Dat.	η	ω	ω	to, by.
Acc.	ην	ον	ον	
Plural.				
Nom.	αι	οι	α	
Gen.	ων	ων	ων	of.
Dat.	αις	οις	οις	to, by.
Acc.	ας	ους	α	
Dual.				
Nom. Acc.	α	ω	ω	
Gen. Dat.	αιν	οιν	οιν	of, to, by.

Learn these case-endings very carefully. You will then, as it were by anticipation, have acquired the chief forms of the first and second declensions. And observe, here, some general facts, the recollection of which you will hereafter find very useful. These endings are signs or tokens of the feminine gender, namely, η, ης, η, ην, αι, αις, ας. These are usually signs or tokens of the masculine gender, namely, οι, ου, ω, ον, οι, οις, ους. These are marks of the neuter gender, namely, ον, α. Then, in regard to the cases, observe that ης and ου are indications of the genitive singular, while the iota subscript is the mark of the dative singular, ις of the dative plural, and ων of the genitive plural.

In the article, as in nouns and adjectives, the nominative and accusative neuter in the singular, plural, and dual numbers are the same; thus:—

	Singular.	*Plural.*	*Dual.*
Nom.	το (ον)	τα (α)	τω (ω).
Acc.	το (ον)	τα (α)	τω (ω).

You will ascertain how much you have become master of, and be aided in fixing your acquirement in your memory, if, before you proceed to the declensions considered separately, you now study this

GENERAL VIEW OF THE THREE DECLENSIONS.

	First.	*Second.*	*Third.*
Singular.			
	MAS. FEM.	MAS. NEUT.	MAS. FEM. NEUT.
Nom.	ης ας	ος ον	α, ι, υ, ω, ν, ξ, ρ, ς, ψ
Gen.	ου	ης ας	ου ος
Dat.	η α	η α	ω ι
Acc.	ην αν	ην αν	ον α ν (one of some as the Nom. in some neuter nouns.)
Plural.			
	MAS. FEM.	MAS. NEUT.	MAS. FEM. NEUT.
Nom.	αι	οι α	ες α
Gen.	ων	ων	ων ων
Dat.	αις	οις	σι, εσι σι
Acc.	ας	ους α	ας α
Dual.			
	M. F. N.	M. F. N.	M. F. N.
Nom. Acc.	α	ω	ε
Gen. Dat.	αιν	οιν	οιν

These are the case-endings of the nouns of the three declensions. Knowing these, you can easily form a noun or give any case and number of a noun. Suppose the noun is τιμη, *honour*: τιμη consists of two parts, namely, the stem or crude form τιμ, and the nominative singular termination η. Take from τιμη the case-ending, you have the stem τιμ; add to the stem τιμ the case-ending, you have τιμη, the nominative singular. You will see this exemplified in this table.

STEM AND CASE-ENDINGS OF A NOUN.

τιμη, *honour.*

Singular.

	STEM.	CASE-ENDINGS.	THE TWO UNITED.
Nom.	τιμ	-η	τιμ-η.
Gen.	τιμ	-ης	τιμ-ης.
Dat.	τιμ	-η	τιμ-η.
Acc.	τιμ	-ην	τιμ-ην.
Plural.			
Nom.	τιμ	-αι	τιμ-αι.
Gen.	τιμ	-ων	τιμ-ων.
Dat.	τιμ	-αις	τιμ-αις.
Acc.	τιμ	-ας	τιμ-ας.
Dual.			
Nom. Acc.	τιμ	-α	τιμ-α.
Gen. Dat.	τιμ	-αιν	τιμ-αιν.

Let us throw away the hyphen, and then from the common form τιμ we have τιμη, τιμης, τιμη, τιμην, τιμαι, τιμων, τιμαις, τιμας, τιμα, τιμαιν. This explanation will in substance serve for the nouns and adjectives generally.

In the preceding tables the vocative case is not given; the reason is, that in the first declension there is no form peculiar to the vocative, the nominative form serving also as the vocative.

THE FIRST DECLENSION.

The first declension has four terminations in the nominative singular, namely, η, ᾱ (or ἁ), ης, and ας. Of these four terminations, two—namely, η and α—are feminine; and two—namely, ης and ας—are masculine.

CASE-ENDINGS OF THE FIRST DECLENSION.

Singular. *Plural.* *Dual.*

	MASCULINE.		FEMININE.			M. F.	M. F.
Nom.	ης	ας	η	α		αι	α
Gen.	ου		ης	ας	ης	ων	αιν
Dat.	η	α	η	α	η	αις	αιν
Acc.	ην	αν	ην	αν		ας	α
Voc.	η, α	α	η	α		αι	α

Nouns of the first declension may be divided into such as in the singular have η in all their cases, and such as in the singular have α in all their cases. I shall present specimens of both kinds, to be carefully learnt by heart.

FEMININE NOUNS.

1. Such as have η in all their cases.

Singular.

	Justice.	*Victory.*	*Honour.*	*Opinion.*	*A Fox-glove.*
Nom.	δικ-η.	νικ-η.	τιμ-η.	γνωμ-η.	συκ(εα)-η.
Gen.	δικ-ης.	νικ-ης.	τιμ-ης.	γνωμ-ης.	συκ-ης.
Dat.	δικ-η.	νικ-η.	τιμ-η.	γνωμ-η.	συκ-η.
Acc.	δικ-ην.	νικ-ην.	τιμ-ην.	γνωμ-ην.	συκ-ην.
Voc.	δικ-η.	νικ-η.	τιμ-η.	γνωμ-η.	συκ-η.
Plural.					
Nom.	δικ-αι.	νικ-αι.	τιμ-αι.	γνωμ-αι.	συκ-αι.
Gen.	δικ-ων.	νικ-ων.	τιμ-ων.	γνωμ-ων.	συκ-ων.
Dat.	δικ-αις.	νικ-αις.	τιμ-αις.	γνωμ-αις.	συκ-αις.
Acc.	δικ-ας.	νικ-ας.	τιμ-ας.	γνωμ-ας.	συκ-ας.
Voc.	δικ-αι.	νικ-αι.	τιμ-αι.	γνωμ-αι.	συκ-αι.
Dual.					
N.A.V.	δικ-α.	νικ-α.	τιμ-α.	γνωμ-α.	συκ-α.
G.D.	δικ-αιν.	νικ-αιν.	τιμ-αιν.	γνωμ-αιν.	συκ-αιν.

The circumflex over the case-endings of συκῆ denotes a contraction of two vowels into one.

FEMININE NOUNS.

2. Such as have α in all their cases.

α long. *α short.*

Singular.

	Shade.	*Country.*	*A Mina.*	*Hammer.*	*A Muse.*	*A Table.*
Nom.	σκι-ᾱ.	χωρ-ᾱ.	μνᾶ-(αα).	σφυρ-ᾱ.	Μουσ-α.	τραπεζ-α.
Gen.	σκι-ας.	χωρ-ας.	μν-ᾶς.	σφυρ-ας.	Μουσ-ης.	τραπεζ-ης.
Dat.	σκι-ᾳ.	χωρ-ᾳ.	μν-ᾶ.	σφυρ-ᾳ.	Μουσ-η.	τραπεζ-η.
Acc.	σκι-αν.	χωρ-αν.	μν-ᾶν.	σφυρ-αν.	Μουσ-αν.	τραπεζ-αν.
Voc.	σκι-α.	χωρ-α.	μν-ᾶ.	σφυρ-α.	Μουσ-α.	τραπεζ-α

Plural.

Nom.	σκι-αι.	χωρ-αι.	μν-ᾶι.	σφυρ-αι.	Μουσ-αι.	τραπεζ-αι.
Gen.	σκι-ων.	χωρ-ων.	μν-ῶν.	σφυρ-ων.	Μουσ-ων.	τραπεζ-ων.
Dat.	σκι-αις.	χωρ-αις.	μν-ᾶις.	σφυρ-αις.	Μουσ-αις.	τραπεζ-αις.
Acc.	σκι-ας.	χωρ-ας.	μν-ᾶς.	σφυρ-ας.	Μουσ-ας.	τραπεζ-ας.
Voc.	σκι-αι.	χωρ-αι.	μν-ᾶι.	σφυρ-αι.	Μουσ-αι.	τραπεζ-αι.

Dual.

N.A.V.	σκι-α.	χωρ-α.	μν-ᾶ.	σφυρ-α.	Μουσ-α.	τραπεζ-α.
G.D.	σκι-αιν.	χωρ-αιν.	μν-ᾶιν.	σφυρ-αιν.	Μουσ-αιν.	τραπεζ-αιν.

A mina is a Greek coin, equal to about £4 English. Its root is akin to the English *money*, the Latin *moneta*, and the Hebrew *maneh*.

In nouns ending in η, the η remains in all the cases of the singular number. In nouns ending in α two kinds are observable:—

1st. The nominative in ᾱ (*a* long) or ἁ (*a* short), and the α remains in all the cases when it is preceded by ρ, or the vowels ε and ι (in this last instance the α is called *alpha pure*): thus, χωρα, χωρας, etc.; ἰδεα, *form*, ἰδεας; σοφια, *wisdom*, σοφιας; χρεια, *utility*, χρειας: ευνοια, *benevolence, favour*, ευνοιας. Hereto belong contracted nouns in ᾱ, as μνᾶ: also αλαλᾱ, *a war-cry*; and some proper names in ᾱ, as Ανδρομεδᾱ, *Andromeda*; Ληδᾱ, *Leda*; Φιλομηλᾱ, *Philomela*.

2nd. The nominative ends in ἁ (*a* short); the α, however, remains only in the accusative and the vocative; in the genitive and dative it is changed into η when the α is preceded by λλ, σ, σσ, ττ, ζ, ξ, ψ, and (in general) ν.

When α is preceded by ε or α, a contraction takes place in some words, the εα being changed into η, and αα into ᾱ; the last syllable is then circumflexed in all the cases; see the declension of συκῆ (συκεα) and μνᾶ (μναα).

According to these paradigms, decline the feminine gender of adjectives of three terminations. The feminine gender of these adjectives ends in α when preceded by ι or ρ. The adjectives in ους have οα in the feminine when ο is preceded by ρ; otherwise they end in ουη; thus αθροα, *dense*; ογδοη, *eighth*.

NOUNS AND ADJECTIVES COMBINED.

FIRST DECLENSION.

Singular.

	Fair Honour.	*Just Opinion.*	*Hated Land.*
Nom.	καλη τιμη.	δικαια γνωμη.	εχθρα χωρα.
Gen.	καλης τιμης.	δικαιας γνωμης.	εχθρας χωρας.
Dat.	καλῃ τιμῃ.	δικαιᾳ γνωμῃ.	εχθρᾳ χωρᾳ.
Acc.	καλην τιμην.	δικαιαν γνωμην.	εχθραν χωραν.
Voc.	καλη τιμη.	δικαια γνωμη.	εχθρα χωρα.
Plural.			
Nom.	καλαι τιμαι.	δικαιαι γνωμαι.	εχθραι χωραι.
Gen.	καλων τιμων.	δικαιων γνωμων.	εχθρων χωρων.
Dat.	καλαις τιμαις.	δικαιαις γνωμαις.	εχθραις χωραις.
Acc.	καλας τιμας.	δικαιας γνωμας.	εχθρας χωρας.
Voc.	καλαι τιμαι.	δικαιαι γνωμαι.	εχθραι χωραι.
Dual.			
N.A.V.	καλα τιμα.	δικαια γνωμα.	εχθρα χωρα.
G.D.	καλαιν τιμαιν.	δικαιαιν γνωμαιν.	εχθραιν χωραιν.

Write out in full the following nouns:—Μηδεια, *Medea*; αληθεια, *truth*; μοιρα, *fate*; αρουρα, *arable land*; δοξα, *opinion*. Write out also, in pairs, as in the last table, these nouns and adjectives, namely, μικρα μανια, *slight madness*; μακρα λυπη, *long grief*; βραχεια ἡδονη, *short pleasure*; πασα κακια, *all wickedness*.

VOCABULARY.

Αγω, I lead, drive.	Γιγνομαι, I become, I arise.	Κακια, ας, ἡ, wickedness.
Αδικια, ας, ἡ, injustice.	Διαβολη, ης, ἡ, calumny.	Καρδια, ας, ἡ, the heart.
Αδολεσχια, ας, ἡ, garrulity, talkativeness.	Δικη, ης, ἡ, justice.	Καταφυγη, ης, ἡ, a refuge.
Αληθινη, true.	Εικω, I yield.	Αυμη, ης, ἡ, outrage.
Απεχομαι, I keep myself from, abstain from.	Επαγγελλομαι, I promise.	Λυπη, ης, ἡ, grief.
Αρετη, ης, ἡ, virtue.	Επαγω, I bring on.	Λυρα, ας, ἡ, a lyre.
Βια, ας, ἡ, force.	Ἡδονη, ης, ἡ, pleasure.	Λυω, I undo, loose, dissipate.
Βοηθεια, ας, ἡ, assistance.	Θεραπευω, I attend to, heal, court.	Μερμνα, ης, ἡ, anxious care.
	Και, and.	
Πειθομαι (with dat.), I am persuaded, I believe, trust, obey	Πολλακις, often.	Τικτω, I bring forth.
Πενια, ας, ἡ, poverty.	Συνηθεια, ας, ἡ, intercourse, companionship.	Τρυφη, ης, ἡ, luxury.
Πλεονεξια, ας, ἡ, avarice.	Τειρω, I rub (Latin, tero), grieve.	Φιλια, ας, ἡ, friendship.
		Χαλεπη, hard, troublesome.
		Ως, as.

EXERCISE 3.—GREEK-ENGLISH.

1. Μη εικε τῃ βια. 2. Ἡ λυρα μεριμνας λυει. 3. Ἡ φιλια επαγγελλεται καταφυγην και βοηθειαν. 4. Ἡ μεριμνα την καρδιαν εσθιει. 5. Θεραπευετε τας Μουσας. 6. Μη πειθου διαβολαις. 7. Ἡ δικη πολλακις τῃ αδικιᾳ εικει. 8. Πολλακις χαλεπη πενια τειρομεθα. 9. Την αδολεσχιαν φευγετε. 10. Ἡ κακια λυπην επαγει. 11. Τρυφη αδικιαν και πλεονεξιαν τικτει. 12. Φευγε την τρυφην ὡς λυμην. 13. Δια αρετης και συνηθειας αληθινη φιλια γιγνεται.

EXERCISE 4.—ENGLISH-GREEK.

1. Abstain from force. 2. He abstains from force. 3. He does not abstain from force. 4. They abstain from force. 5. Avoid injustice. 6. You avoid injustice. 7. I avoid injustice as madness. 8. Force brings grief. 9. Through justice pleasure arises. 10. True friendships arise through virtue. 11. The heart is grieved by poverty. 12. Anxious cares are dissipated by the lyre.

ETYMOLOGICAL VOCABULARY.

ΔΙΚΗ, justice, judgment.	Κακια, wickedness, baseness.	Κακοδαιμων, having an evil spirit, unhappy, wretched.
Δικησις, vengeance.	Κακιζω, I make wicked, revile.	ΦΙΛΟΣ, a friend.
Δικηφορος, bringing punishment, or retribution.	Κακισμος, reviling, blame.	Φιλια, friendship.
Δικιδιον, a (trumpery) lawsuit.	Κακοβουλια, bad counsel, folly.	Φιλικος, befitting a friend.
Δικογραφια, an indictment.	Κακογαμος, unhappily married.	Φιλιος, friendly, or friendlike.
Δικολογεω, I speak in a court of justice.	Κακογειτων, a bad neighbour.	Φιλιππια, fondness for horses.
Δικολογος, a pleader.	Κακογενης, of base origin.	Φιλογελοιος, fond of laughter, sportive.
Δικομαχεω, I litigate.	Κακογλωσσια, evil speaking.	Φιλοδημος, loving the people (Latin, publicola).
ΚΑΚΟΣ, bad, wicked.	Κακογλωσσος, an evil speaker.	Φιλοδικος, fond of law-suits.

N.B.—Observe especially, that when φιλος, *in compositione*, is a *prefix*, it is *active*; but when a *suffix*, it is *passive*, as:—Φιλοδιος is *loving God*; but θεοφιλος is *beloved by God*.

SECONDARY COMPONENTS.

Γαμος, marriage.	Γενησις, begetting, *from* γενναω, I beget	Ἱππος, a horse.
Γειτων, a neighbour.	Γλωσσα (*or* γλωττα), a tongue.	Μαχη, a fight, a contest.
Γελοιος, laughable.	Δαιμων, a divinity.	Φορος, bearing, *from* φερω, I bear, produce.
Γελως, laughter, mirth.	Δημος, the people.	

By the help of these "Secondary Components" and the Vocabulary, the learner ought to be able to give the meanings of the several *derivative* words. Words, the roots of which have occurred previously, as γραφια in δικογραφια, are not repeated under the head of "Secondary Components," unless for special reasons.

In επαγω you see a preposition prefixed to a verb; επαγω is made up of επι, *upon* or *to*, and αγω (Latin, ago), *I lead* or *conduct*. Hence επαγω means *I lead to*. Instead of επι, we might have had the preposition απο, as in απαγω. Now απο means *from, away from*; accordingly, απαγω is, *I lead away*. With ανα, which denotes *motion upwards*, αγω in the form of αναγω, signifies, *I lead up*; and with κατα, as in καταγω, the same root means, *I lead down*. You thus see how the prepositions are used as prefixes, and how, as such, they modify the signification and increase the vocabulary. A comparison of the English "meanings" with the Greek verbs as just given, will show that what we express by an uncombined verb and an adverb or preposition, the Greeks express by a verb and a prefix in combination.

It may be well distinctly to state, though it has been already implied, that the genitive in Greek is to be Englished by *of*, and the dative by *to*. Sometimes *from* is a better translation of

life or any one style of thought: it spread into every sphere of human action, and animated alike the political or religious thinker, the man of science, and the artist. The Renaissance was, in fact, a sudden shaking loose of the Italian mind from all the conventional trammels of mediævalism—a revelling of the emancipated human intellect in the perfect consciousness of freedom and individuality. This change was intimately bound up with the renewed study of Greek and Latin literature, the revival of philosophy, and the casting loose of the stricter doctrines of the Church of Rome.

Lionardo da Vinci sums up in his own person better than any other man the wide and varied culture of the Full Renaissance. Painter, sculptor, architect, anatomist, mathematician, and physicist, he turned his attention to every kind of science or art with equal ardour, and made important improvements or discoveries in all alike. No better example can therefore be found of the versatile genius which distinguished the great Italians of the Renaissance period.



LIONARDO DA VINCI.

Lionardo was born at a castle near Florence in 1452, just one year before the fall of Constantinople; and he died at Amboise on the Loire, in France, in 1519, just two years after Luther had affixed his theses to the church door of Wittenberg. As a mere boy he showed his aptitude for drawing, as is indeed the case with all great artists; for the artist above all men is not made but born. Training may do much, but it can only do much where the innate gifts already exist, and exist in a very high degree. Sent as a pupil to Andrea Verrocchio, one of the greatest and most versatile of the later pre-Raffaelites, Lionardo threw himself with ardour into all studies which bore directly or indirectly upon his art as a painter. In order to understand the human figure, he set to work to learn anatomy and physiology; and he pursued his researches in this direction so far that he became, in the emphatic words of William Hunter, "the greatest anatomist of his time." In order properly to design buildings, he became a master in mechanics and engineering; while his universal thirst for knowledge led him even to study botany, and to make some progress in Oriental languages. At thirty years of age, an accomplished painter, sculptor, and physicist, and a man of encyclopædic culture, he offered his services to the Duke of Milan, who made him a sort of fine-art minister in his ambitious capital. For this patron he performed his greatest work in sculpture, the model of a statue of Francisco Sforza, the duke's father and predecessor, never executed in bronze on account of the expense involved. It was at Milan, too, that he produced by far the best known of all his works, the famous "Last Supper," which has been reproduced in engravings of every sort oftener, probably, than any other picture ever painted. It was painted in oils, as a wall-piece for the refectory of a convent; but unfortunately we can now only judge of it by the numerous copies, for the original perished rapidly through decay, and in half a century was hardly recognisable. One of the many copies, however, is now in the English National Gallery, and affords a sufficient idea at least of Lionardo's general manner and the principles of his art, even if it does not convey to us any full conception of his touch or of his more minute peculiarities as a colourist.

Without disparagement to the great painters who had preceded him, it may fairly be said that Lionardo's "Last Supper" was the first perfect picture in the really modern style which was ever produced. Previous artists had possessed many and great merits; but these merits are most perceptible to connoisseurs, who can see the true artistic instinct even when veiled under comparatively stiff and conventional forms. For the general public, however, all painting before Lionardo is simply mediæval; ordinary people, as a rule, notice in it only the want of perfect naturalness, the quaint antiquated hardness and archaic conventionalism of the figures and attitudes. They cannot discover the real merits of high feeling and exquisite touch when presented in so unfamiliar a guise. But in Lionardo's work they recognise at once a modern picture—that is to say, one painted in accordance with that fuller anatomical knowledge, that truthfulness to nature, and that ease of attitude, which we now find even in the works of artists far inferior to those who drew the stiff Madonnas and saints of the earlier period. For in painting, as in all other departments of human effort, much depends upon the first initiative. After Watt, any man can make steam-engines; after Lionardo, any man, however little fancy and artistic power he may possess, can draw with a comparative correctness and naturalness which would have astonished the Florentines of the fourteenth century. Thus Lionardo da Vinci's remarkable picture of the "Last Supper" may be looked upon as one of the greatest epoch-making works in the whole history of modern art.

But it was not in painting and sculpture alone that Lionardo made himself useful at Milan. He assisted in building the great cathedral, that vast and somewhat over-decorated mass of spires and pinnacles, which marks the passage from mediæval to pure Renaissance architecture in Italy; and he also engaged in numerous practical engineering works. In the last year of the fifteenth century he was driven from Milan by the French invasion—one of the most famous epochs in modern European history—and returned to his native Florence as a state servant. Here he drew his famous cartoon, "The Battle of the Standard," a portion of a larger work never completed—for indeed Lionardo was unfortunate, as a rule, in the actual carrying out of his great undertakings, which were both too numerous and too vast for a single hand and mind to carry them all out successfully in one man's lifetime. In 1517 he went to France by invitation of Francis I., and there two years later he died. The catalogue of his actually existing achievements is shorter than might be expected from his universal energy and accomplishments. The "Last Supper" has disappeared, save in its copies; the model for the statue of Francisco was destroyed by the French at Milan; many other priceless works have unaccountably disappeared. The Louvre at Paris, however, possesses his portrait of Mona Lisa; our own National collection includes his cartoon of St. Anne and the Virgin; and his splendid portrait of himself still remains in the Galleria at Florence. Numbers of his drawings and rough studies have been preserved in Italy; and many of his anatomical sketches are among the collections at Windsor Castle. His manuscript notes on Hydraulics and other scientific subjects have also been handed down, and they serve to show the marvellous universality of his genius. Altogether, Lionardo may be regarded as the most remarkable man of a remarkable age, and as the real founder of modern, as distinguished from mediæval, painting. In his own person he sums up that wonderful grasp of subjects, that power of handicraft, and that freedom of thought which formed together the distinguishing characteristics of the Italian Renaissance.

GREAT BOOKS.

VIII.—THE ARABIAN NIGHTS.

UNTIL the beginning of the last century, the East was almost wholly unknown to Europe, except to a few recondite scholars. The Bible was the only book which opened the world of Asia to the Western mind, and this, of course, was consulted rather for doctrine than for manners or institutions. Even men of culture took their ideas of Oriental lands and people more from Herodotus and other classical writers than from native sources. Of the Mohammedan Empires, very little was known with exactness. The Crusaders depicted everything with a false colour; the early travellers were often credulous and prejudiced. The Turks made themselves a little better known than the Arabians and Persians had been able to do; but even they were not familiarly and sympathetically understood. For the literary class the "Bibliothèque Orientale" of D'Herbelot, first published in 1697, shortly after the author's death, did much; but it was not a book for general reading. That celebrated work, however, was issued under the editorship of Antony Galland, who, a few years later, rendered an important service to the popular knowledge of the East by his translation of the "Arabian Nights' Entertainments." Readers may perhaps have been in some degree prepared for the reception of any Oriental work by the curious set of fictitious letters written in Italian by the Genoese, Marana, and once familiar to Englishmen as "The Turkish Spy;" but if people really regarded that work as the genuine production of an Ottoman or Arabian, the fact shows still more conclusively how little was then known of the veritable East. Marana, who had lived several years in Paris, wrote his book towards the latter end of the seventeenth century. It is a miscellany of anecdotes, pretended revelations of court secrets, essays, and reflections on various subjects; but it soon became popular all over the continent of Europe, and may have created a taste for Oriental matters.

Galland, the first translator of the "Arabian Nights," was born of humble parents in 1646. Having received a good education, he went to Constantinople as an *attaché* to the embassy of Charles Edouard Ollier, or Olier, Marquis de Nointel, who made a fine collection of drawings from Greek antiquities. This was in 1673, and two years later Galland returned, but went again to Turkey on two subsequent occasions. He was appointed Royal Professor of Arabic in 1709; was also a member of the Academy of Inscriptions and Belles Lettres; and died in 1715. In his visits to the East he acquired an intimate knowledge of the Oriental languages and literature, and of Oriental manners; and no one was better qualified than he to superintend the publication of D'Herbelot's great work. But it is his French version of the "Arabian Nights" that has rendered him famous.

The original edition of this translation appeared at Paris in twelve volumes, issued in successive years from 1704 to 1717. In the dedication of his work, Galland stated that the original was by "an unknown Arabian author;" and this reticence of information, combined with a certain Parisian flavour which he imparted to the stories, induced many persons, especially among the scholarly, to suspect that the work was no translation at all, but a pure invention of the ingenious gentleman who put it forth. This, however, was a position which could not be maintained, and the "Thousand and One Nights" rapidly grew in general esteem, not only as a most fascinating collection of narratives, natural, supernatural, serious, and humorous, but as a truthful picture of Arabian life under the Caliphs. Several manuscripts of the original have since been discovered, and four editions of the Arabic text have appeared in Europe. Still, the date and authorship of the tales are unknown. The Sultan Haroun al Raschid, who reigned in the eighth and ninth centuries, is frequently mentioned in them, but as a person living in former times, and serving as an illustration of bygone heroism. It is held by some that the stories belong to a rather late period of the Saracenic dominion; that they indicate a decline in the national character and civilisation; and that their moral tone is not such as might be expected of an age nearer to that of the Prophet. Nevertheless, they cannot have originated in a very modern time, for they contain no allusion to tobacco, which was introduced in the sixteenth century, or to coffee, which seems to have come into use about the middle of the fifteenth. The Baron de Sacy, writing in 1829, gave it as his opinion that the original was composed in the vulgar dialect of Syria, and that it received additions in later days from a succession of imitators, some of them inferior to the first author. Most of the comparatively modern tales he believed to have been invented in Egypt; but, even if so, it was the Egypt of Saracenic manners and traditions. India is thought by Von Hammer to have furnished the groundwork of some of the fictions, and Persia of others. But all have passed through an Arabian mould, and it is the Moslem world of the Caliphs, even if reproduced under the Mameluke dynasty of Egypt, which is presented to us. This is the opinion both of Von Hammer and of Lane.

Men of great learning seldom condescend to write works of entertainment, and we ought therefore to be the more obliged to Galland for having applied his scholarship to the production of so delightful a collection of tales as the "Thousand and One Nights." He may, however, have justly considered that the work was not simply one of entertainment; for it does in truth add very materially to our knowledge of the East. Since the introduction of the "Arabian Nights" to the Western world, we have ceased to talk of "the false Mahound," and to speak of Moslems as if they were nothing but Pagans, idolators, and wretches. The ferocious spirit of the Crusades faded before the gay and airy wand of Galland. He set the fashion for Eastern tales, and Addison introduced some into the *Spectator* and *Guardian*. The "Arabian Nights" themselves were soon translated from French into English, and no more popular work exists. In 1839 the late Mr. Edward William Lane brought out a translation direct from the Arabic, with a large body of valuable notes; but, admirable as this work is, it has not yet superseded the older version.

Among the other valuable qualities of the "Arabian Nights" is the light which these stories throw upon the supernatural part of the Mohammedan faith—always a very important element in the mental history or constitution of any race. Much might be said on this topic, but we can here only indicate in the briefest manner the leading features of the system.

It is evident that the origin of these ideas is to be found in the old Zoroastrian religion of Persia, which regarded this world as the battle-ground of two great Deities—Ormuzd, the good Being, and Ahriman, the father of all evil. Each of these Powers is attended by a number of angels, or spiritual intelligences, who range far and wide in the execution of his commands. Hence the Genii of the "Arabian Nights"—the Deevs, or bad spirits, and the Peris, or good spirits. With these conceptions were mingled some others of Jewish origin. Throughout the whole West of Asia the great King Solomon has for ages enjoyed the reputation of being an enchanter; and we hear of him in the "Arabian Nights' Entertainments" as the powerful controller of the whole race of genii. It will thus be seen that these popular tales open many tracts of interesting study to those who are curious in such subjects.

the genitive, and *by* or *for* is required for the dative. The subject and direct object are generally without a preposition in English; and when the Greek verb has its object in the genitive or the dative case, the English idiom must be followed in the translation, and not the Greek, except when the two correspond. An English construction corresponding with the Greek construction is to be preferred, when it can be had with the preservation of perfect purity in the translation. After all, the idioms of the two languages vary considerably, and it is possible for a rendering in English to be too close to the original. Keep as near as you can to the Greek, but never forfeit correctness in the English.

LESSONS IN CHEMISTRY.—IV.

CHEMICAL APPARATUS.—In this lesson we shall give some practical hints concerning apparatus, and it will be found that the general idea that chemical apparatus, etc., is very expensive, is as erroneous as it is general. Indeed, most of the prominent experiments, even for a lecture-room, may be performed at the outlay of a few shillings. We shall enumerate the several things which are all but necessary; but the inventive student will soon find ways of adapting a very little apparatus to many purposes.

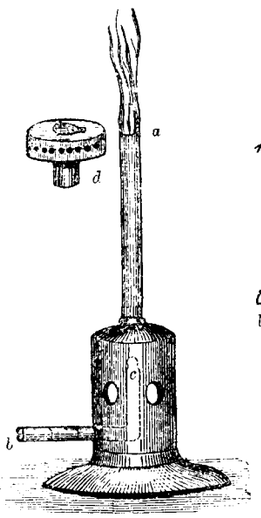


Fig. 6.

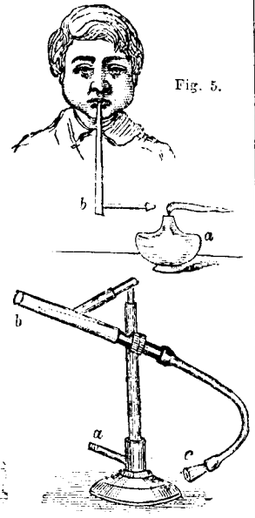


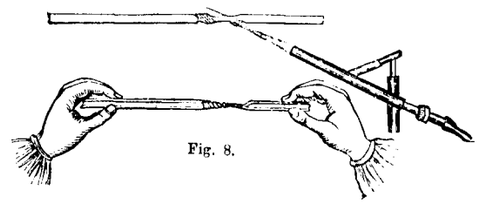
Fig. 7.

It is advisable that all bottles and breakable apparatus should be kept in a room which can be set apart as a laboratory, or, where this cannot be done, in a closet under lock and key.

BLOW-PIPES.—The most convenient mode of "heating" is either by a "spirit-lamp" or by a "Bunsen's gas burner,"—the flame of each being smokeless.

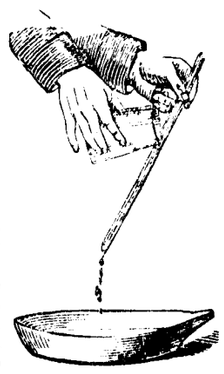
A Glass Spirit-lamp (Fig. 5*a*), with a ground-glass cap, which fits on the wick when the lamp is not in use, and prevents the evaporation of the spirit, costs 1*s.* 4*d.* The wick-holder is stoneware, which is preferable to brass, as it does not corrode; nor does it conduct the heat of the flame to the body of the lamp, as brass wick-holders do. A lamp of 5 or 6 oz. capacity is the most convenient size. The spirit used is "methylated spirit," the price of which is about 5*s.* per gallon.

Bunsen's Gas Burner.—In this kind of burner (Fig. 6) the gas enters by the horizontal pipe, *b*, and escapes from a jet a little above the holes in the neck into which the upright pipe *a* is screwed. The gas thus mixes with the air, and burns with a smokeless flame at the top of the pipe. When a broad surface is to be heated, which is generally the case in evaporation, a rose burner, *d*, is used. The smallest size of Bunsen's burner ($\frac{3}{8}$-inch bore) is 1*s.* 6*d.*; with the rose 1*s.* more. When a greater heat is required we use *a blow-pipe* (Fig. 5 *b*), which is merely a tube which ends in a very small hole through which a stream of air is blown upon a flame. A tin blow-pipe with brass nozzle costs 8*d.* Some practice is required before a steady, good flame can be maintained; this is accomplished by filling the mouth with air, and continuing the pressure with the cheeks, while


Fig. 8.

breath is taken through the nose. First practise without the blow-pipe in the mouth, inflating the cheeks, and while inflated breathe through the nose; then, without opening the mouth, force the blow-pipe between the lips, and it will be found that the escape of air from the blow-pipe is so little that the former process of breathing with inflated cheeks can be continued, and thus a steady flame procured.

Herapath's Gas Blow-pipe, the price of which is 7*s.* 6*d.* (Fig. 7), is more convenient, especially for blowing glass, and for fusions. The gas enters at *a*, and meets at *b* with a current of air which is blown from *c*. The flame, therefore, is like that of the Bunsen's burner, smokeless, but hotte and pointed.

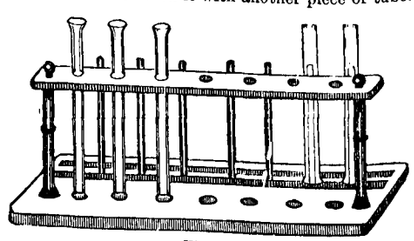

Fig. 9.

GLASS TUBING may be had any size, from 2*s.* a pound. The three smallest sizes will be found most useful. If the tube be wanted for combustion—that is, to stand heat without melting—"Bohemian hard glass" must be used; it is not dearer than the English.

To Cut Glass Tubing.—Take a key-file, which may be obtained for 4*d.*, and make a mark across the tube with the edge of the file at the place where the tube is required to be broken; take hold of it on each side of the mark, and it will snap when pressed. If the tube be large, the scratch must be continued round the tube.

To Melt or Bend Tubes.—Simply put them in the blow-pipe flame, being careful to do it by degrees; then turn the tube round, so that each part may be alike heated. The flame will soon become tinged with yellow, which is the burning of the soda in the glass, and proves that the glass is melting; then bend the tube to the shape required, but be careful not to allow the hot part, when removed from the flame, to touch anything cold, or it most probably will crack.

To Blow a Bulb.—Hold the end of the tube in the flame (Fig. 8), and when it is soft touch it with another piece of tube. The


Fig. 10.

two will adhere. Now twist the latter, and by this means the hole in the first tube will be completely closed, or the tube will be "hermetically sealed." Place this sealed end in the flame, and continually turn it round, so that all sides may be equally heated. Upon blowing through the tube this softened glass will expand into a bulb.

It is frequently required *to pass tubes through corks.* This may be done by making a wire—rather less than the tube—red-hot, and then burning a hole through the cork. But by far the best plan is to buy "cork-borers," which are pieces of thin brass tubing, the edge of which is sharpened at one end. They are made in sets which fit into each other. A set of two costs 10*d.*; three, 1*s.* 2*d.* There are sets of six, but those of two or three answer every practical purpose.

Test tubes are in constant requisition; their sizes range from two inches in length and a quarter of an inch in diameter, to eight inches in length and one and a-half inches diameter. Their prices vary usually from 4*d.* a dozen to 3*s.*

When they have been used—as with all chemical apparatus—they should be cleaned. This is best effected by a round brush, made of bristles held in twisted wire, which costs 3*d.*, or a piece of tow at the end of a wire will answer the same purpose.

It is convenient to have a stand, such as is shown in Fig. 10, in which to hold test tubes. The stand may be bought for 1*s.* 9*d.*

Flasks with flat bottoms are required, and these may be had for 4*s.* 6*d.* a dozen, having a capacity of 12 oz., 6*d.* less a dozen for each 2 oz. less in capacity, and 6*d.* more for every additional 4 oz.

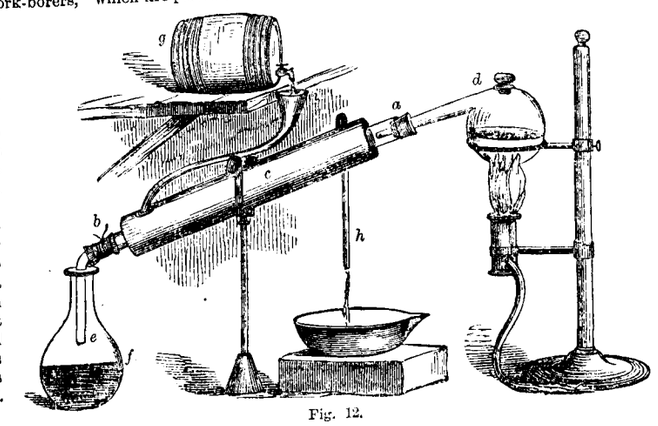


Fig. 12.

One of these latter flasks may make a very useful apparatus —*a wash bottle* (Fig. 11 *b*). By blowing down the open pipe at A, a jet of water issues from the other at B, which is a convenient mode of filling a test tube, or adding a little water to a solution. To make this bottle will be a good beginning for a student, as the tubes and cork must fit tightly.

A Ring Stand (Fig. 11 *c*), with three rings, is 5*s.*, and is indispensable in the laboratory. They may be had larger, but this is quite sufficient.

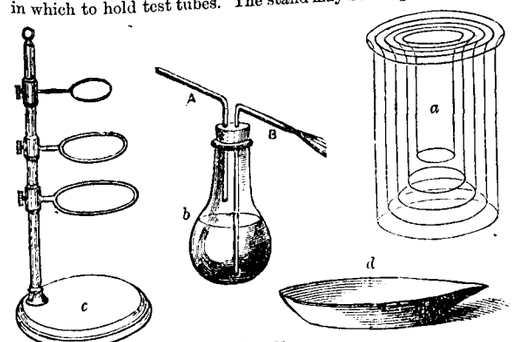


Fig. 11.

Of GLASS JARS (Fig. 11*a*), one ought to be graduated as a measure—an 8 oz. "measuring glass" is 1*s.* 8*d.* "Beakers" may be had with spouts, but if not, then a glass rod must be held at the place over which the liquid is to run, as in Fig. 9.

Jars are required for collecting gases; those in which confectioners keep their sweets are the best; wide-necked bottles also used by them are very cheap, and answer every purpose.

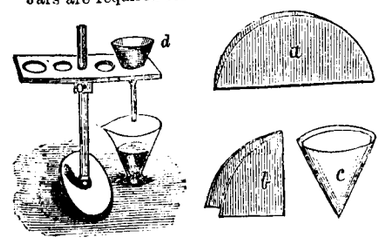


Fig. 13.

FLASKS, which also serve for retorts, may be had of any grocer or oilman, either for [illegible] Italy, and [illegible] Florence hence olive oil. The glass flasks are chiefly made at Flo[illegible]shes, not their name, Florence flasks; they are covered wi[illegible] be pro- only for their preservation, but that a flat botto[illegible]s are cut vided on which they stand. For chemical use th[illegible] in water. off, and the flask cleaned with a little soda a[illegible] 22555

Evaporating Basins (Fig. 11 *d*) are shallow basins of Berlin porcelain. A nest of seven, containing from 1½ oz. to 18 oz., may be had for 6*s.* 5*d.*

Thuringian porcelain is thinner, and basins of this, more shallow than the last, are in nests of nine for 6*s.*

Distillation is carried on by turning a liquid into vapour, and condensing this vapour again into liquid. A very useful condenser is the one shown in Fig. 12, *Liebig's Condenser*, price 14*s.* and upwards. *a b* is a glass tube, which passes through cold water held in the larger tin tube *c*; instead of the retort *d*, a Florence flask may be used, the tube which passes through a cork fitted into *a* being attached to its neck. The distilled liquid falls from the pipe *e* into the vessel *f*. The water in the condenser is kept cool by continually renewing it; the cold water entering from the barrel *g* by the funnel *i*; and, as warm water always rises, the warmest escapes by the pipe *h*.

Liquids are often purified by filtering (Fig. 13); for this funnels of glass or porcelain are used, and white blotting paper is cut into a round disc, then folded thus, *a*, and again into half, *b*, opened, *c*, and placed in the funnel, *d*. The arrangement in this figure is simple and convenient.

We advise students not to lay in a stock, but to get chemicals and apparatus as they are needed. The prices of preparations will be found in catalogues, which will be forwarded by any working chemist.

All acids must be kept in stoppered bottles, and *no bottle should be without a label descriptive of its contents.* 12 oz. bottles, with ground-glass stoppers, are 6*s.* a dozen; 1*s.* more per dozen for each additional 4 oz.

LESSONS IN ARITHMETIC.—XXVII.

COMPOUND DIVISION.

11. THE process of dividing a compound quantity may be regarded in two aspects.

(1.) We may divide a compound quantity by an abstract number; that is, we may divide the compound number into a given number of equal parts, and thus find the magnitude of one of these parts.

(2.) We may divide a compound quantity by a compound quantity; that is, we may find *how many times* one given compound quantity is contained in another.

Thus £14 10*s.* 6*d.* = 7 times £2 1*s.* 6*d.*

Therefore £14 10*s.* 6*d.* divided by the abstract number 7 [illegible] £2 1*s.* 6*d.* Here we have shown that if £14 10*s.* 6*d.* [illegible] divided into 7 equal parts, the magnitude of each part is £2 [illegible]

Again, £14 10*s.* 6*d.* divided by £2 1*s.* 6*d.* gives 7 as a quotient. This is the same as saying that £14 10*s.* 6*d.* contains £2 1*s.* 6*d.* 7 times.

Hence we see that a compound quantity divided by an abstract

LESSONS IN GERMAN.—XXXI.

SECTION LX.—PECULIAR IDIOMS (*continued*).

Als, when it follows the comparative, is translated by "than," as:—Die Eiche ist höher als die Buche, the oak is higher *than* the beech.

Sometimes, instead of a single word, als is made to refer to a whole clause introduced by daß; as:—Er bettelt lieber, als daß er arbeitet, he begs rather *than* work (literally, sooner or more readily than *that* he works).

Als, following the negatives kein, nichts, etc., is best translated by "but" (except), though the succeeding word may stand in the nominative, as:—Niemant, als du, kann ihn überwinden, no one, *but thee*, can overcome him. The same is also true of interrogative sentences when the like negatives are implied in the answer, as:—Was hat er sonst, als einen leeren Titel? what has he (else) *but* an empty title? In other positions, als often answers to our "as," as:—Ich erkenne keinen Menschen als meinen Herrn, I acknowledge no human being *as* my master. Ich betrachte ihn als einen Freund, I regard him *as* a friend. Er verlangt es als ein Recht, he demands it *as* a right. Er sieht aus, als ob er krank wäre, he looks *as* though he were sick. Als er dieses Zeichen sah, fiel er zu Boden, *as* (when) he saw this sign, he fell to the ground.

1. Wie often signifies "as," as:—Es ist heute wie gestern, it is to-day *as* yesterday. Er handelt wie ein rechtschaffner Mann handeln muß, he acts *as* an upright man must act. Wie answers also to our word "like," as:—Es glänzt wie Gold, it glitters *like* gold. Er beträgt sich wie ein Wahnsinniger, he behaves himself *like* a maniac. Socrates blühte als Jüngling wie eine Rose, lehrte als Mann wie ein Engel, und starb als Greis wie ein Verbrecher, Socrates bloomed *as* youth (young man) *like* a rose (as a rose blooms), taught *as* man *like* an angel (as an angel teaches), and died *as* old man *like* a criminal (as a criminal dies).

VOCABULARY.

Ab'reise, *f.* departure.	Fest'gesetzt, appointed, fixed.	Partei', *f.* party.
Bauart, *f.* architecture.	Fröh'lichkeit, *f.* joyfulness.	Pfeifer, *m.* piper.
Benach'bart, neighbouring.	Geistig, intellectual, spiritual.	Region', *f.* region.
Bewoh'ner, *m.* inhabitant.	Gelan'gen, to arrive to.	Sinnlich, sentient, sensual.
Dauernd, enduring, lasting.	Gewalt', *f.* force.	Ue'brigbleiben, to remain over.
Der wieviel'ste (§ 45. 5).	Grausam, cruel.	Undank, *m.* unthankfulness.
Dom, *m.* cathedral.	Hab'süchtig, avaricious.	Un'geduldig, impatient.
Ehr'geizig, ambitious, aspiring.	Hälfte, *f.* half.	Verdienst'voll, meritorious.
Entdec'ken, to discover.	Herher'kommen, to come hither.	Verlan'gen, to require.
Erlan'gen, to attain, reach.	Kuppel, *f.* cupola.	Vor'sichtig, cautious.
Ernten, to reap, harvest.	Landluft, *f.* country-air	Vortheil, *m.* advantage
Erschei'nen, to appear.	Landschaft, *f.* landscape	Weit, far, distant.
	Menge, *f.* multitude.	Werth, *m.* worth.
	Monat, *m.* month.	Wirken, to work, effectuate.
	Obschon', although.	

RÉSUMÉ OF EXAMPLES.

Bei dem Regen suchten die Feldarbeiter in dem benach'barten Walde Schutz.	During the rain the fieldlabourers sought protection in the neighbouring forest.
Der wieviel'ste ist heute?	What day of the month is to-day?
Der 24ste August.	The 24th of August.
Vier drei Jahren war ein großes Erd'beben.	Three years ago there was a great earthquake.
Obgleich' der Sturm nach'gelassen hat, so gehen die Wogen doch noch sehr hoch.	Although the storm has abated, the billows, notwithstanding, (still) run very high.
Unter den Bürgern selbst sieht man nichts als bleiche Gesich'ter.	Among the citizens themselves one sees nothing but pallid countenances.
Nur in der Stunde des Ab'schiedes weiß man, welch einen großen Schatz der Liebe unser Busen hegt.	Only in the hour of separation does one know how great a treasure of (the) love our bosom cherishes.
Obschon' die Jagd nur ein an'strengendes und barba'risches Vergnü'gen ist, so wird sie dennoch oft bei Manchem zur Lei'denschaft.	Although the chase is only a toilsome and barbarous pleasure, nevertheless, with many a one it becomes a passion.
Von Weitem sieht eine Landschaft schöner aus, als in der Nähe.	From afar, a landscape appears more beautiful than near at hand.

EXERCISE 114.

1. Ein geistiger Genuß ist dauernder als ein sinnlicher. 2. Der Habsüchtige erlangt nie so viel, als er haben will. 3. Je höher man in die obern Regionen gelangt, desto kälter wird es. 4. Je mehr ihn die eine Partei haßte, desto mehr liebte ihn die andere. 5. Je höher Napoleon stieg, desto ehrgeiziger wurde er. 6. Der nahe Fluß gewährt den benachbarten Bewohnern viele Vortheile. 7. Den wievielsten Theil Ihres Vermögens haben Sie verloren? 8. Ich habe mehr als die Hälfte verloren. 9. Den wievielsten reisen Sie von hier ab? 10. Meine Abreise ist auf den zwölften dieses Monats festgesetzt. 11. Den wievielsten wird Ihr Herr Bruder hierherkommen? 12. Ich erwartete ihn schon vor (Sect. XXXI. 1) drei Tagen. 13. Vor einem Jahre war ich noch in Deutschland. 14. In Weimar hatten vor wenigen Jahren die gelehrtesten und klügsten Männer ihre Wohnung. 15. Das Eisen ist nützlicher, als Gold und Silber, obgleich der Werth des Goldes und Silbers größer ist. 16. Die ganze Menge war nur Einer Ansicht. 17. Man sprach von nichts, als von der Zukunft. 18. Ich schrieb meinem Freunde nur wenige Worte. 19. Um die ganze Stadt herum lagerten nichts als grausame Feinde. 20. Nur Gewalt konnte hier wirken. 21. Obschon er nichts als Mühe und Arbeit hat, so (Sect. XLIII. 4) ist er doch immer heiteren Gemüthes.

EXERCISE 115.

1. Is your brother as cautious as your uncle? 2. He is not so cautious as my uncle. 3. Take neither more nor less than necessity requires. 4. Although he possesses a beautiful estate, nevertheless I will resign to him a part of mine. 5. They did nothing but complain of their last mishap. 6. I saw nobody in the saloon but the blind piper. 7. The longer he stayed with him, the more impatient he became. 8. On what day of the month will your friend take his departure from here? 9. His departure is fixed for the fourteenth of next month. 10. We will go this way, in order to see the landscape near at hand. 11. Nothing but joyfulness was in the whole family. 12. Only one wish remained over to him. 13. No one is so worthy of our kindness as the friend of my brother.

SECTION LXI.—REGIMEN OF NUMERALS, ETC.

Words denoting *quantity*, weight, or measure, are seldom put in the plural, though connected with numerals signifying more than one; as:—Ein Pfund, one pound; zehn Pfund, ten pound(s); drei Acker, three acre(s); zwölf Fuß, twelve foot (feet).

Feminine nouns, however, are usually excepted from this rule; as:—Sechs Ellen, six ells; sieben Meilen, seven miles, etc.

When, between the term of quantity and the thing whose quantity or measure is specified, there intervenes no qualifying word, both nouns stand in the same case; as:—Ein Pfund Zucker, one pound (of) sugar; zwei Pfund Zucker, two pounds (of) sugar; drei Paar Schuhe, three pair (of) shoes; neunzig Stück Rindvieh, ninety head (of) cattle. (§ 15. 2 *c*, § 123.)

1. Adjectives are formed by suffixing the word jährig, from Jahr, to the cardinal numbers; as:—Es ist einjährig, it is a year old. Dieses Pferd ist vierjährig, this is a four-year-old horse. Ein hundert-jähriger Mann, a hundred-year-old man (a centenarian).

Nouns are formed by adding er to the cardinals (§ 51. 2); as:—Ein Dreißiger (ein Mann von dreißig Jahren), a man of thirty years of age. Ein Achtziger, an octogenarian. Der Achtundzwanziger (Wein), the wine of the vintage of 1828.

Hundert (a hundred), and Tausend (a thousand), when placed before a noun, do not generally take the article before them; as:—Er hat hundert Schafe und neunzig Ochsen, he has (a) hundred sheep and ninety oxen. Used without a noun, they, as in English, assume the plural, as:—Hunderte von Menschen sterben vor Hunger, hundreds of men die of hunger. Tausende fallen in der Schlacht, thousands fall in (the) battle.

VOCABULARY.

April', *m.* April.	Ein'laden, to invite, to bid.	Halb, half.
Befehl', *m.* command.	Elle, *f.* ell, a measure of 24 inches.	Hübsch, pretty, handsome, fair.
Bekannt' machen, to publish.	England, *n.* England, Britain.	Juni, *m.* June.
Beschütz'er, *m.* patron.	Entdeck'er, *m.* discoverer.	Liebhaber, *m.* lover, friend.
Buch (Papier), *n.* quire.	Geburts'tag, *m.* birthday.	Loth, *n.* half an ounce.
Capital', *n.* capital.	Genue'ser, *m.* Genoese.	Ludwig, *m.* Lewis.
Dreifach, threefold, *or* triple. (§ 47.)	Gründen, to found.	Luther, Luther.
Drei'jährig, triennial, three years old.		Mal, *n.* time. (§ 50.)
Dutzend *n.* dozen.		Minu'te, *f.* minute.
		Oel, *n.* oil.

Pfund, *n.* pound.	Ungefähr', about, near.	Viertel, *n.* quarter.
Procent', per cent.	Verhei'rathen, to marry	Worun'ter, under which, among which.
Sech'ziger, *m.* one sixty years of age.	Verzin'sen, to pay interest.	

RÉSUMÉ OF EXAMPLES.

Der Elephant' wird (Sect. XXXIV. 1) ungefähr hundert Jahre alt.	The elephant lives (becomes) about a hundred years.
Dieser Brunnen ist zwanzig Fuß tief.	This well is twenty feet deep.
Dieser Matro'se hat drei Paar Stiefel und ein Paar Schuhe gekauft'.	This sailor has bought three pair of boots and one pair of shoes.
Er war vor'gestern zum ersten Male im Thea'ter.	He was for the first time, the day before yesterday, in the theatre.
Die Frau kaufte vier Ellen Kattun'.	The woman bought four ells of calico.
Dies ist jäh'riges Fohlen fünf.	This colt is a yearling.
Um ein Viertel auf acht früh'stücken wir.	At a quarter past seven we breakfast.
Um halb Zehn brach in der Vorstadt Feuer aus.	At half-past nine a fire broke out in the suburbs.
Zehn Minuten nach zehn hörte ich Kano'nenschüsse.	Ten minutes past ten I heard the report of cannons.
Er ist ein Acht'ziger.	He is an octogenarian.

EXERCISE 116.

1. Ich bin neunzehn Jahre alt, und in meinem drei und zwanzigsten Jahre gehe ich mit meinem Vater nach England. 2. Mein ältester Bruder hatte fünf und zwanzig Personen eingeladen, worunter ungefähr die Hälfte verheirathete Leute waren. 3. Um drei Viertel (Sect. XXIV. 9) auf zwölf hat uns die Gesellschaft verlassen. 4. Columbus entdeckte im Jahre (1492) vierzehn hundert zwei und neunzig Amerika. 5. Ein Dutzend hat zwölf Stück, und ein Pfund hat dreißig Loth. 6. Wir kauften drei Faß Oel, zwei Paar Schuhe und sieben Ellen Tuch. 7. Tausende von Deutschen wandern nach Amerika aus. 8. Ich habe hundert Federn für einen halben Thaler verkauft. 9. Der drei und zwanzigste April ist Shakspeare's Geburtstag. 10. Ludwig der Vierzehnte war ein Liebhaber von Künsten und Wissenschaften. 11. Zwanzig Minuten nach eilf Uhr starb der Kaiser. 12. Ich war erst zwei Mal in Amerika, aber das vierte Mal in England. 13. Die Deutschen hatten zu verschiedenen Malen Krieg mit den Franzosen. 14. Die Vier und Neun haben dreifach gewonnen. 15. Den achtzehnten Juni 1815 war die Schlacht bei Waterloo. 16. Wissen Sie, wie alt jener Mann ist? 17. Er ist ein Sechziger. 18. Dieses hübsche Pferd ist dreijährig, und jenes größere ist sechsjährig. 19. Was ist dies für Wein? 20. Es ist Vierunddreißiger (1834). 21. Ich verzinse dieses Capital zu fünf Procent. 22. Giebt es Hirsche in diesem Walde? 23. Ja, der Jäger hat vorgestern einen Sechszehner geschossen.

EXERCISE 117.

1. My brother has a hundred books, and my uncle, the professor, has more than a thousand. 2. He rose generally at half-past five in the morning, and worked till a quarter to eleven o'clock. 3. I have spent seven months with him. 4. I have sold two dozen of pens and seven quires of paper. 5. The half of a hare did he eat at his breakfast. 6. This beautiful horse is five years old. 7. The third part of this money belongs to me. 8. I forgave you once. 9. You did it twice. 10. This piece contains about twenty-two ells. 11. My sister died in the sixteenth year of her age. 12. Thousands died of the cholera in Poland in the year 1852. 13. The wine of the vintage of 1832 is sold at one thaler a bottle. 14. My sister bought three ells of ribbon. 15. Rome was founded by Romulus seven hundred and fifty-two years before the birth of our Saviour.

KEY TO EXERCISES IN LESSONS IN GERMAN.

EXERCISE 34 (Vol. I., page 197).

1. Ist Ihre Schwester, welche mir diese Blumen gab, zu Hause? 2. Nein, sie ist auf das Land gegangen. 3. Es ist Jemand in dem Garten gewesen. 4. Wohnen Sie in Berlin? 5. Nein, ich wohne in Dresden. 6. Die Königin ist von Belgien zurück gekommen. 7. Kennen Sie den Kaufmann, welcher von Wien kam? 8. Ja, ich kenne ihn. 9. Sie haben wenig Vergnügen auf Ihrer Reise gehabt; Sie sind nicht weit gewesen. 10. Sie hatten mehr Vergnügen, als wir hatten, aber wir sind ebenso vergnügt gewesen als Sie.

EXERCISE 35 (Vol. I., page 197).

1. Where is the lead that you have bought? 2. It is still in the shop where I bought it. 3. Have you the same pen which I have had? 4. To whom will you send this gold watch? 5. I shall send it to the same man who sent it to me. 6. How much money does this old soldier require? 7. He requires much, because he is always ill. 8. Is he the person who was here yesterday? 9. No, that one is very lame to-day. 10. To whom do you send the beautiful ring? 11. I send it to the man whom you have praised so much. 12. Have you praised my brother's friends? 13. Yes, I have praised them. 14. Have you not loved them? 15. I have a little sister whom I love; do you love her? 16. The uncle loves his nephew, but he is unthankful. 17. The father loves his little son because he is good. 18. Why are so many troops in the town? 19. Because they have come from the war. 20. Why do our parents love us? 21. Because we are their children. 22. To whom are you going? 23. I am going to my nephew. 24. With whom are you going? 25. I go with my brother.

EXERCISE 36 (Vol. I., page 198).

1. Ist Ihr Bruder zu Hause? 2. Ja, aber er ist krank. 3. Wie haben Sie diese Uhr gekauft? 4. Ich habe sie bei dem Uhrmacher gekauft. 5. Diese Ringe sind schön, wollen Sie mir einen derselben geben? 6. Die Truppen, welche nach Leipzig gingen, kehrten gestern zurück. 7. Der Lehrer liebt den Knaben, weil derselbe schön schreibt. 8. Gehen Sie zu Ihren Eltern? 9. Ich gehe mit meinem Bruder. 10. Diese Kinder lieben ihren Lehrer, weil derselbe gut zu ihnen. 11. Gebrauchen Sie meine Bücher noch länger? 12. Ich werde Ihnen dieselben morgen zurückgeben.

EXERCISE 37 (Vol. I., page 211).

1. Will you go with me to Mannheim? 2. I cannot (i.e., I am not able), I have no time. 3. When can you go? 4. I shall go (the) next week, if you can wait so long. 5. Will your teacher go with you to the field, or to the town? 6. He will not go to the field, and cannot go to the town. 7. What do these children want? 8. They want some apples and cherries; but they can buy none, for they have no money. 9. What do you wish, sir? miss? madam? 10. Will you have the kindness to give me a glass of water? 11. Can you tell me what o'clock it is? 12. I cannot tell you, I have no watch with me. 13. What was the merchant going to sell you? 14. I could find nothing at his shop that I wished to buy. 15. We shall have bad weather to-morrow. 16. It may be, that it will still rain to-day. 17. Can you read the German handwriting? 18. No, I have enough to do with the print. 19. The envious man will not praise his friend. 20. A learned woman is not always a good housewife. 21. Patience is a difficult attainment; many can teach it, but not learn it. 22. A good teacher must have patience. 23. Every good scholar will be attentive.

LESSONS IN BOTANY.—XXI.

SECTION XXXIX.—COMPOSITÆ, OR COMPOSITE-FLOWERED PLANTS (*continued*).

PASSING on now to the radiate sub-tribe of the natural order *Compositæ*, let us first direct our attention to the common but modest daisy (*Bellis perennis*), which spreads on the verdure its yellow disc surrounded with white rays tipped with pink, springing up at the earliest dawn of spring, and gladdening our sight until the winter blasts return. The pretty daisy (Fig. 176) is associated with our earliest recollections of fields and flowers; it has inspired the pastoral bards of many lands, and formed the subject of many beautiful verses. Every one knows how ornamental are daisies to the green turf of meadows; but only the intelligent farmer knows how dear is the price paid for the ornament. The daisy, unostentatious as it is above ground, encroaches sadly, with its leaves and spreading roots, on the grass tribe, which is the special object of culture; hence the grazier should extirpate our little daisy friends by all means in his power; to him they are rather foes than friends. The chrysanthemums are all beautiful species, many of which are cultivated in England. The Indian chrysanthemum (*Chrysanthemum Indicum*), as it is called, is a native of China, where it is a great favourite. It flowers very late in the year, thus furnishing us with a floral Christmas ornament. Its compound flowers grow to the size of three or four inches in diameter.

The asters are sturdy perennials, which, by their large and highly-tinted compound flowers, contribute much to the embellishment of a flower-garden. Most of the exotic asters have been introduced from America; nevertheless, that of greatest beauty, the China aster (*Callistephus Sinensis*), originally came from China. The extensive genus, *Gnaphalium*, which is divided into many secondary genera, comprehends many ornamental plants, known under the general designation of *Everlastings*. The greater number of these species is indigenous to Africa and America. But of all the radiate sub-genera of *Compositæ* esteemed for the beauty of their flowers, the most popular, the most cherished, the most beautiful, is the dahlia, with the

number gives a compound quantity, and that a compound quantity divided by a compound quantity of the same kind gives an abstract number as a quotient.

Obs.—The last remark is the same thing as saying that the *ratio* (Art. 1, Lesson XXI., Vol. I., page 342) of two concrete quantities of the same kind must be an abstract number. It is of the nature of *how many times*.

Furthermore, notice that if two concrete numbers are to be compared—that is, if one is to be divided by the other—they must be of the *same kind*. The ratio of one sum of money to another sum can be found, or that of one weight to another weight; but money cannot be compared with weight or with length. To talk, for instance, of the ratio of 25 shillings to 13 lbs. would simply be an absurdity.

12. EXAMPLE.—Divide £87 10s. 7½d. by 47.

Beginning with the pounds, we find that £87 divided by 47 gives £1, with a remainder £40. Reducing these £40 to shillings, and adding in the 10 shillings of the dividend, we get 810 shillings, which, divided by 47, gives 17 shillings, with a remainder 11s. Reducing these 11 shillings to pence, and adding in the 7 pence of the dividend, we get 139 pence, which, divided by 47, gives 2 pence and a remainder 45 pence. Reducing the 45 pence to farthings, and adding in the 2 farthings of the dividend, we get 182 farthings, which, divided by 47, gives 3 farthings, and a remainder 41, which, divided by 47, gives a fraction $\frac{41}{47}$ of a farthing. The answer, therefore, in £1 17s. 2d. $3\frac{41}{47}$f.

The operation may be thus arranged:

```
47) £87 10 7½ (£1
    47
    ---
    40
    20
    ---
47) 800 + 10 = 810s. (17s.
                47
                ---
                330
                329
                ---
                 11
                 12
                ---
47) 132 + 7 = 139d. (2d.
                94
                ---
                 45
                  4
                ---
47) 180 + 2 = 182f. (3f.
                141
                ---
                 41 Remainder.
```

Answer £1 17s. 2d. $3\frac{41}{47}$f.

13. The principle upon the truth of which this process depends is the same as that mentioned in Art. 3, Lesson V. (Vol. I., page 69), namely, that when a quantity is to be divided, if we separate it into a number of parts, and divide each part individually, the sum of all the quotients so obtained will be the required quotient.

Here notice that we have, in reality, divided £87 10s. 7½d. into the following parts:

£47 + 799s. + 94d. + 182 farthings;

Or, £47 + (47 × 17s.) + (47 × 2d.) + (47 × $3\frac{41}{47}$ farthings).

The quotients of each of these separate sums, divided by 47, are respectively

£1, 17s., 2d., and $3\frac{41}{47}$ farthings.

Hence the required quotient is

£1 17s. 2d. $3\frac{41}{47}$f.

14. From the above remarks we see the truth of the following

Rule for Compound Division when the Divisor is an Abstract Number.

Beginning with the highest denomination, divide each separately and in succession. When there is a remainder, reduce it to the next lower denomination, adding the number of that denomination contained in the dividend, and divide the sum as before. Proceed in this manner through all the denominations.

Obs.—It is sometimes convenient, when the divisor is a composite number, to separate it into factors, and divide successively by them, instead of dividing at once by the whole divisor. For instance, if it be required to divide 75 cwt. 2 qrs. 8 lbs. by 35, which = 7 × 5, we can perform the operation thus:—

```
                cwt.  qrs.  lbs.
7 )             75    2     8
-------------------------------
5 )             10    3     5 4/7
-------------------------------
                2     0     17 5/7 + 1/35.
```

Notice that the $\frac{1}{35}$ arises from the division of the $\frac{1}{7}$ by 5. Adding $\frac{4}{5}$ and $\frac{1}{35}$, we get $\frac{29}{35}$; so that the required answer would be written—

cwt.	qrs.	lbs.
2	0	$17\frac{29}{35}$

And, if necessary, the $\frac{29}{35}$ of a pound could be further reduced to ounces, etc.

15. When it is required to divide one compound quantity by another of the same kind, we must reduce each to the *same* denomination, and then divide as in ordinary simple division; for, clearly, the number of times which one compound quantity contains another does not depend upon the particular denomination or denominations in which they happen to be expressed.

Supposing one man to have 5 sovereigns in his pocket, and another 1 sovereign, the former would still have 5 times as much as the latter, if they had respectively 100 and 20 shillings instead of the sovereigns.

16. EXAMPLE.—Divide £35 17s. 6d. by £2 11s. 3d.

£35 17s. 6d. = 8610 pence.
£2 11s. 3d. = 615 pence.

```
615 ) 8610 ( 14
      615
      ---
     2460
     2460
     ----
```

Hence 14 is the answer.

We shall, however, return to this part of the subject when we treat of fractions in connection with compound quantities.

EXERCISE 46.—EXAMPLES IN COMPOUND DIVISION.

Divide

1. £87 10s. 7½d. by 18, 27, and 39.
2. £33 by 96.
3. 312 lbs. 9 oz. 18 dwts. by 7, 43, 84, and 160.
4. 410 lbs. 4 oz. 5 dwts. 6 grs. by 8, 25, 39, 73, and 210.
5. 786 bshs. 18 qts. by 17, 19, 21, 25, 48, and 97.
6. 216 yds. 3 qrs. by 20.
7. 500 yds. 3 qrs. 2 nls. by 54, 63, and 108.
8. 365 days 10 h. 40 min. by 15 and 48.
9. 111 yrs. 20 d. 13 h. 25 min. 10 sec. by 11, 19, 83, and 100.
10. 45° 17′ 10″ by 25, 35, and 45.
11. How much a day is £200 a year?

How many times is

12. 6s. 3½d. contained in £5?
13. £29 7s. 6d. contained in £523 15s. 3½d.?
14. 2 qrs. 13 lbs. 5 oz. contained in 4 tons 3 cwt. 2 qrs. 6 lbs.?

Divide

15. 195 m. 7 fur. 30 ft. by 7 ft. 6 in.
16. 531 m. 2 fur. 10 p. by 17 m. 5 fur. 27 p.
17. 950 days 1 h. 11 min. 6 sec. by 4 days 8 h. 6 min. 54 sec.

*** *The Key to Exercises 44, 45 (Vol. II., page 78), will be found at the end of Lesson XXVIII.*

LESSONS IN GEOGRAPHY.—XVII.

THE GREAT CIRCLES OF THE EARTH—THE MERIDIAN—THE EQUATOR.

ON the globe of the earth, or *terrestrial globe*, as it is called, the *first* great circle of importance is the *meridian*: this is a great circle which passes through the two poles, P P (Fig. 6), of the axis of the earth, and through any point, as M, on the earth's surface. It is called *meridian*, because when the sun in our climate shines on a gnomon or style (the pin of a sun-dial), and casts its shadow in the direction of this line on the surface of the earth, it is then (*meridies*) *mid-day* or *noon*; and whenever any heavenly body appears in the plane of this circle, as determined by the position of the style and its shadow at noon, it is said to be *on the meridian*.

The meridian of the point M in Fig. 6 is, according to this definition, the circle P M T P N S. But as every spot on the surface of the globe has *its own meridian*, if we wish to have a proper notion of the distance of the meridian of any place from that of the place where we dwell, we must fix upon the meridian of *some one place* as *a standard* to which we shall refer the distance of every other meridian. Accordingly, the *meridian of Greenwich* has been fixed upon by common consent in this country as the *standard* or FIRST MERIDIAN, to which we are to refer all others in point of distance.

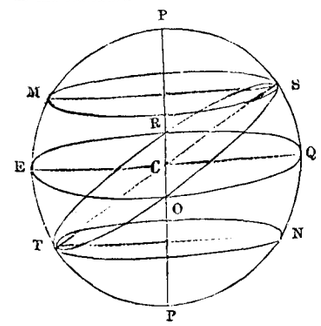


Fig. 6.

The *second* great circle of importance on the terrestrial globe is the *equator*. This is a great circle which passes through all the points on the earth's surface situated at an equal distance from the two poles, P P, of the earth's axis; it is called the *equator*, because when the sun's rays are vertical to this line there is no shadow to the gnomon or style at noon, and there is an *equalisation* of light all over the globe (on the days when this takes place), this position of the sun being the *equaliser* (equator). The equator is also made the starting place for the measurement of the distances of places on the surface of the earth as to their position in the northern or southern hemisphere; for the equator divides the globe into two equal parts, called the northern and southern *hemispheres* or *half-globes*: that hemisphere in which we live is called the *northern* hemisphere, because our Saxon ancestors called the point opposite to the sun at noon the *north*; and that hemisphere in which the point opposite to the sun in the contrary direction is seen, is called the *southern* hemisphere, because they called the point where the sun is seen at noon the *south*.

The *distance* of any place on the earth's surface in the northern or southern hemisphere from the equator is usually measured in degrees of the quadrant of the meridian of that place. Thus, the meridian of the place or point M on the surface of the globe (Fig. 6) being the circle P M P S; the distance of M from the equator, E Q, is measured by the number of degrees of the quadrant, E P, contained in the arc E M, the extent of opening of the angle E C M. Now the quadrant E P is divided into 90° from E to P, that is, from the equator to the north pole at P, and the degrees are reckoned from E, which is marked 0° (*no degrees*), to P, which is marked 90° (*ninety degrees*). Hence, if M be any point on the earth's surface to which the rays of the sun are vertical on the 21st of June—as shown in the diagram of the seasons (Fig. 4, page 80) at R at mid-summer—then the distance of the point M from the equator is 23° 28′ N.: that is, 23 degrees 28 minutes *north*. The reason for this is plain; for, if from the right angle or 90° formed between the plane of the earth's orbit and the perpendicular to that plane (see Fig. 4, page 80), and also from the right angle or 90° formed between the plane of the earth's equator and the perpendicular to that plane in the axis of the earth, we take away the common angle N O R, the inclination of the earth's axis to the plane of the earth's orbit, which is 66° 32′, we shall have 23° 28′ in either case; and this is the distance between the polar circle and the pole, or the inclination of the plane of the earth's equator to the plane of the earth's orbit, and consequently the distance M E (Fig. 6). The distance of any point on the earth's surface, measured in degrees, from the equator is called its *latitude* (from the Latin latitudo, *breadth*), because the extreme distance of the earth from north to south was by early geographers reckoned less than its extreme distance from east to west; the term *longitude* (from the Latin longitudo, *length*) being applied to distances reckoned east or west from the first meridian. The *latitude* of the point M on the earth's surface is thus reckoned 23° 28′ N. In like manner the *latitude* of the point T on the earth's surface, or any point to which the rays of the sun are vertical on the 21st of December, is reckoned 23° 28′ S.; that is, 23 degrees 28 minutes *south*.

The two circles of the greatest importance in Geography and Navigation are the *meridian* and the *equator*. We proceed now to show their use.

To do this clearly let us suppose that a golden treasure was hid in a field, and that two of its boundaries consisted of *one fence* lying north and south, or such that at noon its shadow coincided with itself—that is, lay in the same direction; and *another fence* lying east and west, or such that it intersected or crossed the former fence at right angles, as in Fig. 7. In this figure, the straight line A Y represents the *north* and *south* fence, and the straight line A X the *east* and *west* fence; that is, if you go from A to Y you go *north*, and if you go from Y to A you go *south*; but if you go from A to X you go *east*, and if you go from X to A you go *west*. The directions of the fences being thus understood, suppose that you were told the exact distance of the place where the golden treasure lay from the fence A X, say 20 yards; this would not be enough to enable you to find it, because there are ever so many points in the field, all at 20 yards distance from the fence A X. Now suppose you were also told the exact distance of the place where the golden treasure lay from the fence A Y, say 25 yards; this alone would not be enough to enable you to find it, because there are ever so many points in the field, all at 25 yards distance from the fence A Y. Among these latter points, however, there can be only one which is at the exact distance of 20 yards from the fence A X; so that if you were told both distances at once, you could evidently, by some means or other, determine the place where the golden treasure lay hid. It is necessary, therefore, and sufficient, to inform you of the exact distances of the place in the field from both fences, in order to enable you to find it.

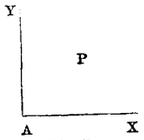


Fig. 7.

With the information now supposed to be given, the next question is, how should you proceed to determine the exact place of the golden treasure. A little reflection would suggest the following method. In Fig. 8, measure off from the point A, along the fence A X, the given distance of 25 yards, at which the place is said to be situated from the fence A Y; let this distance be A M. Then, from the point M, draw a straight line, M P, parallel to the fence A Y; or, which is easier in this case, draw M P a perpendicular to the fence A X from the point M; for M P and A Y being both at right angles to A X, are parallel to each other. Lastly, measure off from the point M, along the straight line M P, the given distance of 20 yards, at which the place is said to be situated from the fence A X; and the point P will be the place in the field where the golden treasure is to be found.

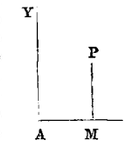


Fig. 8.

That this mode of determining the place of the golden treasure is correct may be proved thus: in Fig. 9 let P be the place in question; from P draw P N perpendicular to A Y, and P M perpendicular to A X; then, according to the data (*things given*), P M is a distance of 20 yards, and P N is a distance of 25 yards. But by the nature of the construction, the figure A M P N is a rectangular (*right-angled*) parallelogram, and its opposite sides are therefore equal; whence A M is equal to N P, and A N equal to M P. It follows, therefore, that the point P is found by the method shown in the preceding paragraph. In mathematical language, the distances P N and P M of the point P from the fences A Y and A X, are called the *rectangular co-ordinates* of that point; but the distances A M and M P, which are equal to the former, are more usually denominated the rectangular co-ordinates of the P; and by these co-ordinates we can always determine the position of any point, when their exact lengths are given. The straight lines A X and A Y, from which the given distances are measured, are called *rectangular axes*, and the point A, where these axes intersect each other, is called the *origin* of the rectangular axes. With the origin and the direction of the rectangular axes (in our figures, the fences at right angles), and the lengths of the rectangular co-ordinates (*all given*), in reference to any point on a given surface, we can always find the true position or place of that point when required.

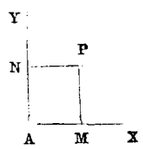


Fig. 9.

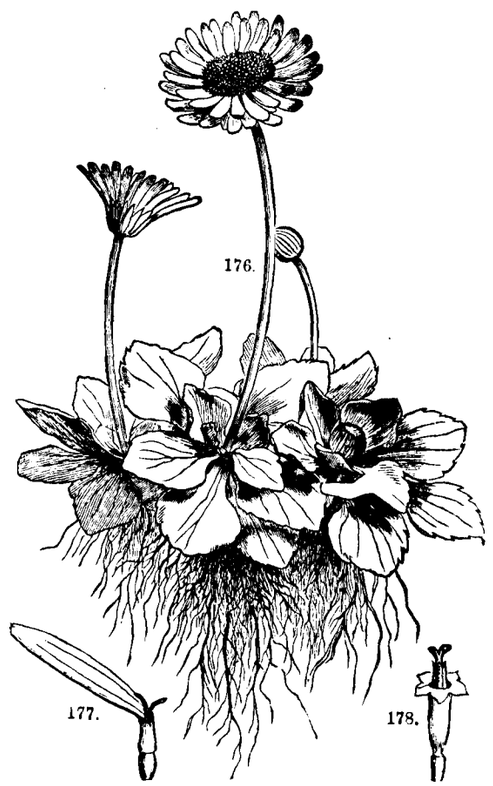
description of which we shall terminate this notice of the family *Compositæ*.

The genus dahlia is characterised by having an involucrum of which the exterior bracts, about five in number, are reflexed, and the internal ones, from twelve to twenty in number, arranged in double series, are membranous at their summit, thick and fleshy at their base. The achænia, or fruit, are surmounted by two short points. The stem is herbaceous; leaves opposite and pinnatifid. The species most cultivated in our gardens, which it embellishes during the autumn, is the *Dahlia coccinea*, or ordinary scarlet dahlia. It is a native of Mexico, whence it was transported to Spain about 1790, and a specimen was sent from Madrid to France in the year 1802. At first the French gardeners cultivated it as a greenhouse plant, but they soon discovered the dahlia to be capable of flourishing in the open air. From this time the plant was rapidly disseminated, and many varieties began to appear. The flowers of the primitive species were all simple, the disc yellow, the rays arranged in two series, dark scarlet and velvety in appearance. In 1810 varieties sprang up, having lilac, rose-coloured, and saffron-yellow rays. In 1818 double-flowered varieties were obtained, possessing cornet-shaped tubular florets, constituting an imbricated rose. Since then so many varieties have sprung up, that their mere enumeration would be impossible.

SECTION XL.—VALERIANACEÆ, OR VALERIAN WORTS.

Characteristics: Calyx adherent to the ovary; corolla monopetalous, epigynous; stamens ordinarily less numerous than the lobes of the corolla, and adherent to its tube. Ovary three-celled, two of which cells are barren, the third containing one seed; ovule pendant; seed dicotyledonous; radicle superior.

The *Valerianaceæ*, which derive their name from the valerian, one of the principal genera, are either herbs, with slender roots, or perennials, having an almost woody rhizome, generally containing odorous matter. The radical leaves are tuft-like, petiolate, simple, opposed, and without stipules.



176. THE FLOWERS, LEAVES, AND ROOT OF THE DAISY. 177. PISTILLIFEROUS RAY FLORET OF THE DAISY. 178. PERFECT DISC FLORET OF THE DAISY.

The flowers of most of the *Valerianaceæ* contain both pistils and stamens, though certain members are monœcious, others dicœcious. Usually the inflorescence is a cyme, sometimes a corymb. The tube of the calyx is attached to the ovary; the limb of the calyx divided into three or four parts. The corolla, inserted into the margin of a disc crowning the ovary, is tubular, and shaped like a funnel. Its tube is often spurred at the base, its limb generally divided into five lobes, and sometimes irregular. The stamens inserted upon the tube of the corolla alternate with the divisions of the latter. Their number is rarely five, more frequently four, the fifth being suppressed; sometimes three, by the suppression of the lateral stamens. Lastly, in certain cases only a single stamen becomes developed. The anthers are bent inward; the ovary inferior, composed of three carpels, forming three cells, two of which are empty, the third alone fertile. The ovule is reflexed, and hangs from the cell; the style is simple filiform, terminated by two or three stigmas, which are sometimes coherent into one. The fruit is dry, indehiscent, ordinarily unilocular by disappearance of the barren cells; never containing more than one seed: embryo straight; cotyledons oblong, exceeding in length the radicle. The *Valerianaceæ* are, for the most part, inhabitants of the ancient continent, being chiefly found in Central Europe, and the Mediterranean region, and the Asiatic district of the Taurus and Caucasus, from which a few species have wandered to Nepaul, and Siberia, and Japan. In the tropics they are unknown, except in certain mountainous regions. In Chili and Magellan several species are not unfrequent; but North America only possesses one.

The *Valerianaceæ* are a natural order concerning the medicinal qualities of which all persons are agreed. The active principles are a volatile oil, and an acid termed the valerianic acid, which chemists now make artificially. The perennials are more efficacious than the annuals, probably because in the latter the active principles have not had sufficient time to develop themselves. The smell of the valerian is very peculiar; some people think it agreeable; a far greater number, however, are of a contrary opinion. Amongst cats there is no such difference of sentiment. These animals are very partial to the odour of the valerian, and eagerly scratch up such plants of it as they meet with in their rural explorations. Valerian is now employed by physicians in the cure of spasms; formerly its employment was directed to the cure of the far graver disease, epilepsy. Report states that a Neapolitan noble, who lived in the sixteenth century, being a great sufferer from epileptic attacks, and deriving no advantage from physicians, set about learning botany, in order that he might discover the medicinal properties of vegetables, and thus become his own doctor. Notwithstanding the common proverb, that the man who is his own doctor has a fool for his patient, the Neapolitan did not study botany in vain. After trying a host of plants, he at length alighted on valerian, and cured himself of epilepsy. Without intending any disparagement to the skill and perseverance of this resolute gentleman, it may be permitted to hazard a doubt whether the disease which afflicted him was really epilepsy.

Let us now proceed to an enumeration of the principal *Valerianaceæ*, commencing with the *Valeriana officinalis*, which is the species most commonly employed. This plant is generally distributed throughout Europe, where it frequently grows in humid meadows, rarely in dry and sandy places; its stem is furrowed, its leaves pinnate and covered with down. The *Valeriana Phu* is a German species, cultivated in our gardens, the radical leaves of which are simple and lanceolate, the flowers white. *Valeriana Sichensis* is a North American species, and valued beyond every other by the Russians. The ancients vaunted the medicinal qualities of the Celtic and Indian nard. The former (*Valeriana Celtica*) grows on the mountain summits of Styria and Carinthia; the latter is a native of the Alps. Both are still the objects of a very considerable commerce, large quantities being sent every year to Turkey and Egypt from Trieste, whence they find their way to the interior of Africa and India.

The Indian nard, or *spikenard* of the ancients, was in great favour; not that it was exactly a medicine, but it was thought to secure the affections of any lady or gentleman towards one

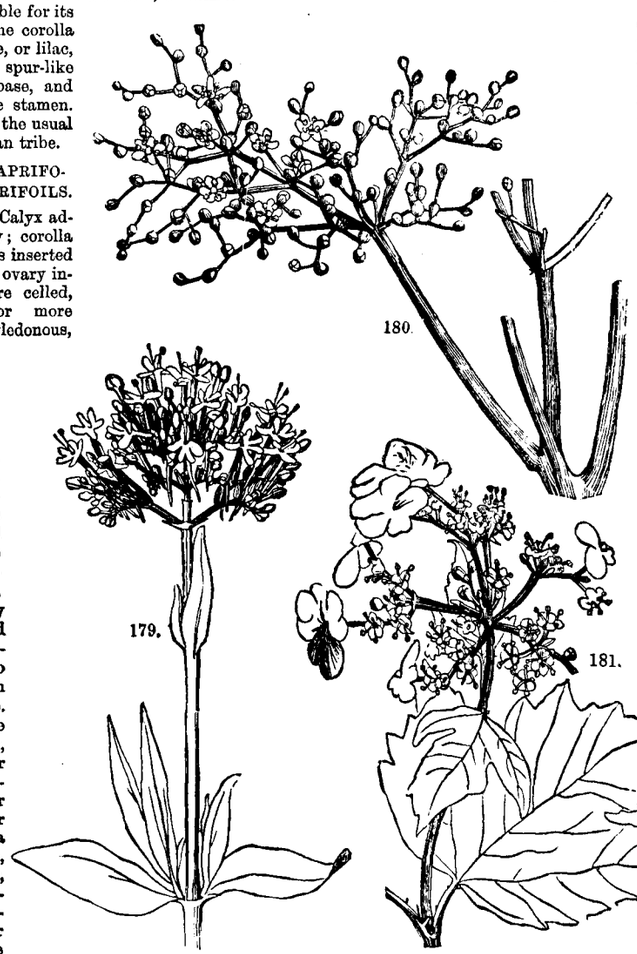
of the opposite sex giving it. The plant to which the ancient term refers is supposed by botanists to be the *Nardostachys Jatamansi*, which is in high repute among the natives of India as a perfume and a remedy for epilepsy. However well attested by ancient testimony the efficacy of spikenard may be, still, in our times, it may be doubted whether the mineral kingdom be not more potent than the vegetable in securing the affections of young ladies.

The chief ornamental plant furnished to our gardens by this natural order is the *Centranthus ruber*, or crimson centranthus (Fig. 179), remarkable for its floral panicles. The corolla is purple, red, white, or lilac, furnished with a spur-like projection at its base, and only containing one stamen. Its root possesses the usual odour of the valerian tribe.

SECTION XLI.—CAPRIFOLIACEÆ, OR CAPRIFOILS.

Characteristics: Calyx adherent to the ovary; corolla epigynous; stamens inserted upon the corolla; ovary inferior, two or more celled, containing one or more seeds; seed dicotyledonous, albuminous; leaves without stipules.

The *Caprifoliaceæ* are generally trees or shrubs, some of them climbers. The leaves are opposite; stipules absent, or represented by hairs or glands situated at the base of the petioles. The flowers are complete, regular, or slightly irregular, disposed in a head or terminal corymb springing from an axillary peduncle. The limb, or free part of the calyx, is five cleft, or dentated. The corolla is tubular or infundibuliform or rotate, having a five-partite limb, ordinarily regular, imbricated in æstivation. The stamens are in number equal to that of the divisions of the corolla, with which they are alternate; or one less. A very familiar example of a member of this natural family is the common elder (Fig. 180).



179. THE CRIMSON CENTRANTHUS (CENTRANTHUS RUBER). 180. THE ELDER (SAMBUCUS NIGRA). 181. THE GUELDER ROSE (VIBURNUM OPULUS).

The natural order of *Caprifoliaceæ* is usually sub-divided by botanical writers into two tribes, *Lonicereæ* and *Sambuceæ*.

The *Caprifoliaceæ* chiefly belong to temperate or cool regions of the northern hemisphere. They are more abundant in Central Asia, in the north of India, and in America, than in Europe. Certain species pass beyond the limits which seem to be imposed by nature to the family, and penetrate into tropical climes; but not being able to support the full rigour of a tropical sun, they take refuge on mountain elevations. A small number of the Elder genus, that truly cosmopolitan one, are met with in Chili and in Australia.

The *Lonicereæ*, or honeysuckle tribe, composed of beautiful and delicately-scented plants, are general favourites as ornamental members of the vegetable world. Nor is ornament their only quality; many of them have another claim to our regard as medicinal agents. The berries of the common honeysuckle are eminently purgative, although but rarely employed in medical practice. The symphorine (*Symphoricarpus parviflora*), a small North American species, bearing small flowers and bright-red berries, which, appearing towards the end of summer, form such an agreeable ornament in our gardens, is also useful as a medicine. Its root is astringent, and is employed by the people of North America as a febrifuge. The *Linnæa borealis* is an herbaceous evergreen plant, very prevalent in the forests of Sweden, the native country of Linnæus, for which reason the plant was dedicated to him. Like the common honeysuckle, it is a creeper, but its inflorescence is different, each peduncle terminating with two campanulate or bell-shaped flowers, rose-coloured within, white externally. This plant, also, is employed by the Swedes as a medicine.

In addition to the *Lonicereæ* already mentioned there are many beautiful species cultivated in our gardens. Among the honeysuckles we have the evergreen honeysuckle (*Caprifolium sempervirens*), a native of North America, the stem of which is climbing, the leaves yellow or white below, the flowers bright-red externally, beautiful, but inodorous. Then we have the honeysuckle of Japan (*Lonicera Japonica*), a climbing species, termed in its native country gold and silver tree, because its flowers are first white, then yellow. Finally, we have the Tartarian honeysuckle (*Lonicera Tartarica*), which is not a climbing plant. It has leaves of a bluish-green; flowers rose-coloured externally, white internally; and ruddy fruits. Passing on to the consideration of the elder tribe, the common elder tree (*Sambucus nigra*) first comes under our notice. It is quite a cosmopolite, known almost everywhere, and consecrated by ancient traditions. Every part of this tree diffuses, when bruised, a disagreeable odour, and a bitter acrid juice exudes. Its berries are familiar in England as the basis of elder wine. In many parts of Germany they are boiled, and in that state eaten as a favourite article of food. The guelder rose (*Viburnum Opulus*), an illustration of which is given in Fig. 181, partakes to some extent the properties of the common elder. The *Viburnum Lantana*, or "wayfaring tree," possesses berries and leaves which are slightly astringent, but the external bark is so acrid that in some countries it is employed as a blister.

LESSONS IN DRAWING.—XVII.

TREATMENT OF TREES AND FOLIAGE (*concluded*).

BEFORE concluding our observations upon trees and foregrounds, we will offer a few additional remarks upon that which we have so often maintained to be of the utmost importance, and which our pupils will by this time begin to realise. It is because, in this particular instance of trees, there is some difference of treatment in making the outline, to that required by a solid object, the form of which is unmistakable, that we think it unnecessary to offer any excuse for this repetition. The power of *drawing* is the rock upon which the whole superstructure of art is based; in other words, it is practically the foundation of all that afterwards commands admiration or praise. To whatever point of excellence we may hereafter attain, we shall invariably look back with satisfaction upon the exertions we have used, and the time we have devoted to ensure our success in making a really learned and carefully-constructed outline; it must be the *one only* starting-point of all who are ambitious to excel, though the subjects they may eventually choose will vary according to their individual tastes, wishes, and circumstances.

In the case of foliage it is necessary to explain what we mean by *outline*, and how it is to be treated when subject to the various changes caused by sun and shade under which the tree is found. Let us suppose ourselves to be standing opposite a tree on a dull, cloudy day. The force of light and depth of shadow will each be less than if the sun were shining upon it, and the half-tints will be more apparent and varied. All round the tree against the grey sky behind there will be the same distinctive and uniform character throughout; but let the sun break out, and then observe what a remarkable change takes place. The general or larger masses of light and shade will be more decided, the neutralising tones among the half-tints will in a great measure have disappeared; the shadow side of the tree will be distinctly made out against the sky, whilst the details in light will be less definite than they were before the sun shone, owing to the radiation of light from the leaves; the half-tints and small shadows in the light will have less strength than they had before—they will be of a warmer tone, and partake of the light and colour around them; the corresponding half-tints on the shadowed side will follow the same course on the same principle—that is, become more general and less distinct in form. We therefore advise the pupil, when "massing in the foliage" of a tree in sunshine, to use his pencil less vigorously on the lights, and not to be betrayed into leaf-drawing and making dark heavy lines. The kind of tree he may be drawing will suggest its own *mode of treatment of the form*, as we have already remarked; but now it is the *strength* and *quantity* of the work we more especially allude to. If the same tree were drawn on a dull heavy day, there might be much more *leaf character* introduced both in the lights and in the shades. There is a very common and well-known custom when in difficulties as to the true extent of light and shade; when the pupil is in doubt as to where the light ends and shade begins, let him *half close his eyes* when looking at the object; the minor tones, or those which seem to belong to neither light nor shade, will apparently disappear, and the true extent and force of both extremes become distinct, and so far evident as to enable him to determine their shape and character.

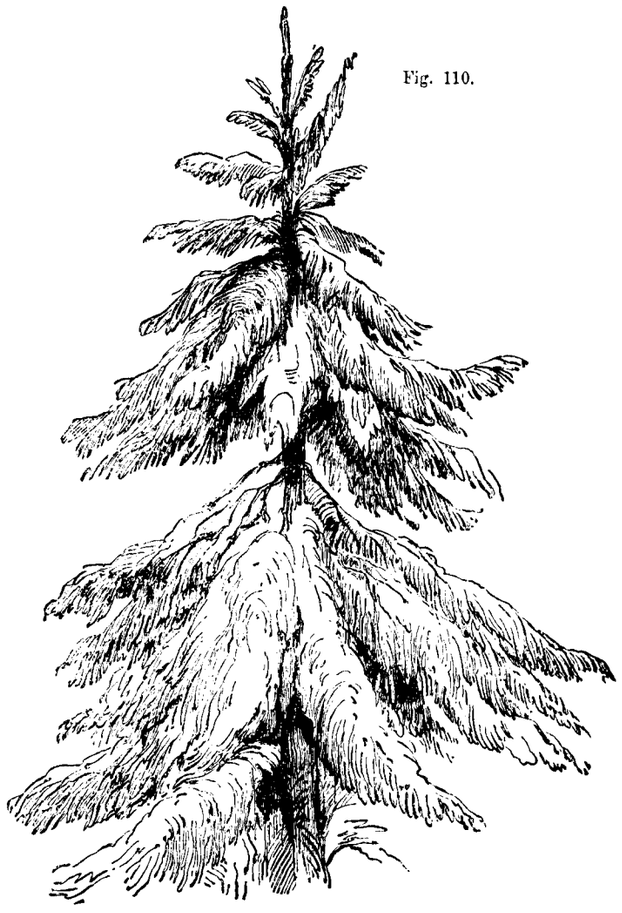


Fig. 110.

Fig. 110 is the general character of a fir-tree, in which we have endeavoured to show how the foregoing instructions are to be observed. Fig. 109 in the last lesson will also illustrate our meaning. Now the pupil must clearly understand that whilst we advocate a breadth of treatment on the whole, characteristic details must not be omitted; these details may be expressed in such a way (without descending to littleness of manner) as not to destroy that breadth, and yet be sufficiently carried out to enable us to say whether the tree be an oak, a poplar, a fir, or one of any other description.

We will now introduce a few practical hints respecting some of the uses to which the knowledge of drawing trees, shrubs, or wild plants may be applied, especially by designers of patterns and ornament. Our country lanes and hedgerows afford abundance of material to supply us with an endless variety of form and culture especially applicable for the decoration of our walls, and for the enrichment of articles of ornament and use. The Corinthian capital is said to have had its origin from the circumstance of a tile having been placed on the top of a basket around which grew the leaves of the acanthus plant. This, whether true or not, is highly suggestive, and tells us there are beautiful combinations to be found in nature, which the designer would do well to cultivate. To point out a few of them will be sufficient to direct the way in which the lover of nature and art may select examples for himself without fearing to exhaust the supply. The most graceful of all the wild plants are those which cling to others for support. Who has not noticed the wild convolvulus with its elegant elongated leaves, and its simple symmetrical flowers twined about the stem of a brier or hazel? The hop plant, also, the black bryony, and others may be named whose spiral twistings round stems of various kinds produce natural combinations which no mind could suggest, or power of invention could supply. The leaves alone are models for imitation. The ancient Greeks saw this, and proved it by their frequent appli-

cation of the vine-leaf, the oak, and the ivy. In fact, as Mr. Redgrave has said, "He that would be a great designer must be in the hedgerows and fields at all times, sketching with patient diligence the form and curvatures of leaves, fruits, and flowers, their groupings and foreshortenings; studying them as a whole, and in their minutest details, together with their growth and structure. Not to repeat as a mere imitator, but to display them as ornament; to dispose them geometrically, to arrange them to suit the various fabrics or manufactures for which they may be called on to design, and to give them life and words, as it were, by using them as emblems of some living thought or poetical allusion."

It is the *application* of the graceful forms of the vegetable kingdom that constitutes the most important part of the study of the designer and decorator: the power of drawing, important as it is, is only the means; the *adaptation* is the end sought for. Here it is, we can say with truth, that it requires the mind of an artist to accomplish it, to be imbued with an originality of thought, that can make the simplest object do duty for worthy purposes. It very frequently occurs, in art universally, that by contrast or application we discover excellences not before observed: respecting the use of this idea, how many times, may we ask, have we trod on the decaying leaf in our pathway, without having had the attention in the least directed to it as capable of suggesting either an original form or a fresh arrangement of colour? However insignificant and valueless an object the fallen leaf may seem to be, it is capable of teaching us a lesson of great practical utility. It has been supposed by some that the shape of the vase owes its origin to a leaf; it may be so or not, but it is sufficient for us to know its capability of suggesting it, and it leads us to where the designer may apply if any new form is required. Such resources, when regulated by a disciplined and scientific taste, must produce something as beautiful as it is original. In search for hints for decorative purposes it is not absolutely necessary to confine our choice to the floral varieties of a conservatory or greenhouse, however valuable they may be for the purpose; the green lanes and hedgerows can boast of gems of form amongst nettles and wild flowers, from which articles of ornament and utility may borrow their simple elegance either to decorate a palace or perform some humble service in a cottager's dwelling. Nature everywhere offers hints that are useful as well as beautiful, and the designer need never sigh for a model. As an illustration of the way in which plants may be adapted to ornament and design, we have introduced one for a candlestick in Fig. 111, the socket of which is a lily; the extinguisher inserted in the side is a dead blossom of the same plant, emblematic of its use.

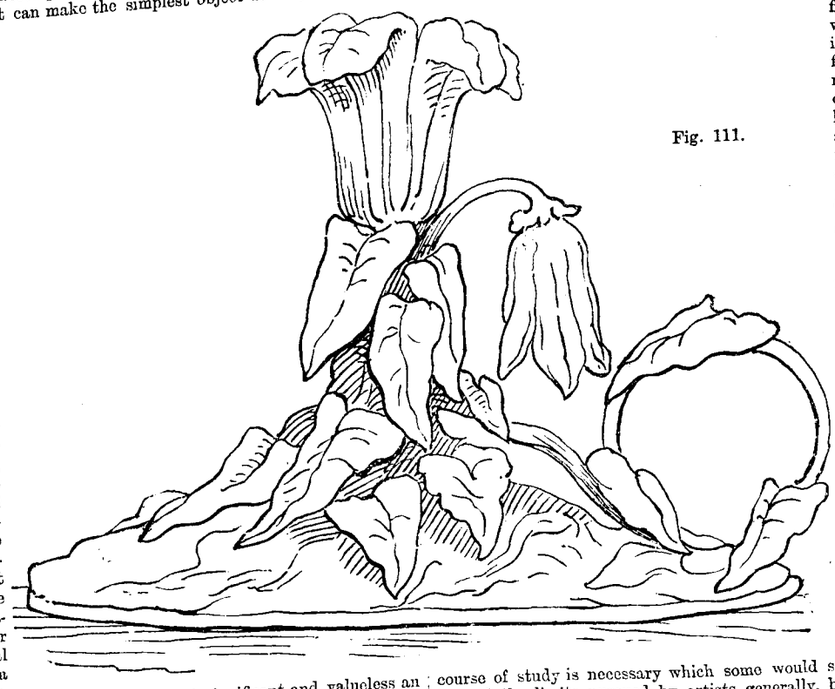


Fig. 111.

We now take up another portion of our subject relating to landscape—the principles of the reflection of objects in water, as by reflection only can water be represented.

It has been frequently said that a landscape is incomplete without water; it is certainly an element which contributes much additional beauty and effect to any scene, be it ever so simple; yet we cannot go so far as to say that it must necessarily be introduced in all cases. Independently of itself, there are associations connected with water that cannot be passed over without notice, and which bear an important part in the whole composition whenever it forms a portion of the picture, such as shipping, barges, boats, fishermen, and picturesque bridges. Why is it that, in our choice of a walk, we generally prefer a stroll near some stream? We attribute it to the variety of scenery afforded by the winding river, and the numberless points of interest that catch the eye as we ramble along its banks. The life and motion connected with water have no limit; and besides, we cannot forget, when it is clear and calm, its capability of reflecting every object near it in full perfection, and increasing our admiration by the fidelity with which it reverses form, and reflects colour, light and shade, thus making a double picture. There are several phenomena resulting from the appearances of reflections upon the surface of water which undoubtedly require more attention than is generally devoted to such subjects by many who aim at representing them. A course of study is necessary which some would suppose to be beyond the limits pursued by artists generally, but which we contend is indispensable; for every one who undertakes or hopes to paint Nature as she is, must go deeply into her mysteries, and endeavour as far as possible to understand them, and not abide by a mere superficial following of outward appearances. Why is it that the sculptor and the historical painter seek the advantages to be gained in the dissecting-room? Because they feel that a knowledge of anatomy is of the utmost importance to them when engaged upon the human form. Similarly the landscape painter wisely looks about for aid when difficulties arise, which have their remedy often beyond the limits of his own legitimate art; and he will meet with an abundant source of difficulty with regard to reflections. There are incidents so puzzling connected with these, that unless he possesses a little geometrical knowledge, he cannot avoid falling into endless mistakes. We must again have recourse to geometrical perspective, which will not only assist us in our explanations, but will set at rest many doubts which might arise in the minds of our pupils with regard to *facts* that seem to be *impossibilities*, unless we employed this conclusive help in rendering them intelligible. Sir Joshua Reynolds said, "The rules of art are not fetters to genius; they are fetters only to men of no genius."

READING AND ELOCUTION.—XXI.

EXERCISES ON EXPRESSIVE TONE (*continued*).

THE following piece affords scope for "force" of utterance. In the second, third, and fourth stanzas, it rises to what is distinguished, in elocution, by the designation of "impassioned force"—the fullest *vehemence* of voice, bordering on the *shout*, and sometimes passing into it. This style is found chiefly in lyric poetry; but it is sometimes exemplified in the vehement energy of prose, on exciting occasions.

V.—THE AMERICAN EAGLE.

[II] Bird of the heavens! whose matchless eye
Alone can front the blaze of day,
And, wandering through the radiant sky,
Ne'er from the sunlight turns away;
Whose ample wing was made to rise
Majestic o'er the loftiest peak,
On whose chill tops the winter skies,
Around thy nest, in tempests, speak,—
What ranger of the winds can dare,
Proud mountain king! with thee compare;
Or lift his gaudier plumes on high
Before thy native majesty,
When thou hast ta'en thy seat alone,
Upon thy cloud-encircled throne?

[O] Bird of the cliffs! thy noble form
Might well be thought almost divine;
Born for the thunder and the storm,
The mountain and the rock are thine;
And there, where never foot has been,
Thy eyrie is sublimely hung,
Where low'ring skies their wrath begin,
And loudest lullabies are sung
By the fierce spirit of the blast,
When, his snow mantle o'er him cast,
He sweeps across the mountain top,
[II] With a dark fury naught can stop,
And wings his wild unearthly way
Far through the clouded realms of day.

Bird of the sun! to thee—to thee
The earliest tints of dawn are known,
And 'tis thy proud delight to see
[II] The monarch mount his gorgeous throne
Throwing the crimson drapery by
That half impedes his glorious way;
And mounting up the radiant sky,
E'en what he is,—the king of day!
Before the regent of the skies
Men shrink, and veil their dazzled eyes;
But thou, in regal majesty,
Hast kingly rank as well as he;
And with a steady, dauntless gaze
Thou meet'st the splendour of his blaze.

Bird of Columbia! well art thou
An emblem of our native land;
[O] With unblenched front and noble brow,
Among the nations doomed to stand;
Proud, like her mighty mountain woods;
Like her own rivers, wandering free;
[II] And sending forth from hills and floods,
[I] The joyous shout of liberty!
Like thee, majestic bird! like thee,
She stands in unbought majesty,
With spreading wing, untired and strong,
That dares a soaring far and long,
That mounts aloft, nor looks below,
[II] And will not quail though tempests blow.

[I] The admiration of the earth,
In grand simplicity she stands;
Like thee, the storms beheld her birth,
And she was nursed by rugged hands:
[I] But, past the fierce and furious war,
Her rising fame new glory brings,
For kings and nobles come from far
To seek the shelter of her wings.
[I] And like thee, rider of the cloud,
She mounts the heavens, serene and proud,
Great in a pure and noble fame,
Great in a spotless champion's name,
And destined in her day to be
Mighty as Rome—more nobly free.

[I] My native land! my native land!
To her my thoughts will fondly turn;
For her the warmest hopes expand,
For her the heart with fears will yearn.
Oh! may she keep her eye, like thee,
Proud eagle of the rocky wild,
Fixed on the sun of liberty,
By rank, by faction unbeguiled;
Remembering still the rugged road
Our venerable fathers trod,
When they through toil and danger pressed,
To gain their glorious bequest,
And from each lip the caution fell
To those who follow'd, "Guard it well."—*Thomson.*

LESSONS IN LATIN.—XXI.

THE LATIN VERB: ITS SEVERAL TERMINATIONS.

THE student is already familiar with case-endings and the way in which they modify the signification of nouns. He must now pass on to consider certain endings in the verbs which in a similar manner affect their import. Referring him back to what has already been said respecting the verb, we here take up the subject, and ask his attention to voice-endings, person-endings, tense-endings, and mood-endings.

As preliminary to the whole, we must recall to mind what has been said respecting the stem of words. Having reviewed in his thoughts what has gone before, the reader will find our present statements easy. The endings, then, to which we have just adverted, are added to the stem of the verb, and being so added, vary the meaning. The stem of a verb is that part to which these endings are added. If the endings have been already made, they must be removed. When you have gone through these instructions, you will know what they are. Take lego, *I read*, as an instance. You are already aware that the *o* at the end is the sign of the first person singular, indicative mood, present tense, active voice. Cut off that *o*, and you have *leg*; *leg* is the stem. Now in English, if we want to make *I read* passive, we insert another word, and say I *am* read. Instead of inserting another word, the Romans added an *r* to the active form, making the verb stand thus, lego*r*, *I am read*. Hence *r*, you see, is here the sign of the passive. In verbs, *r* at or near the end is generally the sign of the passive voice; thus in legar, *I may be read*; and legerer, *I might be read*, the *r* is the sign of the passive; for the corresponding active forms are legam, *I may read*; legerem, *I might read*. The voice-endings vary with the persons; thus, as the active endings are *o*, *is*, *it*, so the passive endings are *or*, *ĕris*, *ĭtur*. Thus voice-endings and person-endings combine, as you see, in this example of

THE VOICE-ENDINGS AND PERSON-ENDINGS OF THE PRESENT TENSE, INDICATIVE MOOD.

Active.	Lego,	legis,	legit;	legimus,	legitis,	legunt.
Passive.	Legor,	legĕris,	legitur;	legimur,	legimini,	leguntur.

To the voice-endings and person-endings must be added the tense-endings. In English we form the past tense, for instance, of the verb *I love*, by adding to *love* the consonant *d*, *I loved*. Something like this takes place in Latin. Thus, as amo is *I love*, ama*bam* is *I loved*; the *bam* performing in Latin the part which the *d* performs in English. This *bam*, in the active voice, is made passive by being changed into *bar*, *r* taking the place of *m*. Putting these three endings together, we have an example of

VOICE-ENDINGS, PERSON-ENDINGS, AND TENSE-ENDINGS OF THE IMPERFECT INDICATIVE.

Active. Lege*bam*, lege*bas*, lege*bat*; lege*bamus*, lege*batis*, lege*bant*.
Passive. Lege*bar*, lege*baris*, lege*batur*; lege*bamur*, lege*bamini*, lege*bantur*.

Another variation is introduced by the mood-endings. The examples given are in the indicative mood. We subjoin an instance of the change in the endings, by which the subjunctive mood is indicated. In the subjunctive mood *rem* is added to the stem, instead of *bam*; thus—

VOICE-ENDINGS, PERSON-ENDINGS, TENSE-ENDINGS, MOOD-ENDINGS OF THE SUBJUNCTIVE MOOD, IMPERFECT TENSE.

Active. Legerem, legeres, legeret; legeremus, legeretis, legerent.
Passive. Legerer, legereris, legeretur; legeremur, legeremini, legerentur.

The endings will be more clearly seen, if they stand by themselves, as in the following example:—

VOICE-ENDINGS, PERSON-ENDINGS, TENSE-ENDINGS, MOOD-ENDINGS, ACTIVE AND PASSIVE.

	SINGULAR NUMBER.					
	Act. 1 *Per.*	*Pass.* 1 *Per.*	*Act.* 2 *Per.*	*Pass.* 2 *Per.*	*Act.* 3 *Per.*	*Pass.* 3 *Per.*
Present Indicative.	-o	-or	-is	-ĕris	-it	-itur.
Present Subjunctive.	-am	-ar	-as	-aris	-at	-atur.
Imperfect Indicative.	-bam	-bar	-bas	-baris	-bat	-batur.
Imperfect Subjunctive.	-rem	-rer	-res	-reris	-ret	-retur.

Some tenses in the passive voice are formed as in English, by the addition not of an ending, but of another word. Thus, as we say, *I have been loved*, so the Latins say, amatus sum. Amatus sum is a form made up of parts of two separate words; namely, amatus, the passive participle of amo; and sum, the indicative mood, present tense, first person singular of the verb *to be*. This is, in effect, to declare that the Romans cannot be said to have a perfect tense of the passive voice. The idea which that tense conveys they express by combining parts of the verb sum with the passive participle. In this way, however, the perfect passive has peculiarities of its own. We subjoin an example of

ENDINGS OF THE PERFECT TENSE INDICATIVE, ACTIVE AND PASSIVE.

Active. Legi, legisti, legit; legimus, legistis, legērunt, or legēre.
Passive. Lectus *sum*, lectus *es*, lectus *est*; lecti *sumus*, lecti *estis*, lecti *sunt*.

Where observe that, instead of *bam*, *bas*, *bat*, etc., of the imperfect, you have *i*, *isti*, *it*, etc. Observe, also, that in the passive parts of the verb, sum, etc., denote the persons; the participle lectus undergoes, however, one change in the plural—lectus becomes lecti. Now, if you wanted to put the passive form just given into the subjunctive mood, you have only to substitute the subjunctive *sim*, *sis*, *sit*, etc., for the indicative *sum*, *es*, *est*, etc. Other forms of sum may stand in combination with the past participle, as, lectus *eram*, *I had been read*; lectus *essem*, *I might have been read*; lectus *ero*, *I shall have been read*. Also the endings of the perfect indicative active change to suit corresponding changes in the meaning; they become, in the singular, *erim*, *eris*, *erit*, and in the plural, *erimus*, *eritis*, *erint*, in the perfect tense *subjunctive* mood; and in the pluperfect tense *subjunctive*, they pass into *essem*, *esses*, *esset*, *essemus*, *essetis*, *essent*.

There is yet another source of variation in these endings. That source is in the conjugations. There are, you know, four conjugations, or general models for the formation of verbs. All verbs which follow these models are called regular. Such as deviate from these models are called irregular. Confining ourselves, at present, to the regular verbs, we find the endings of the present tense indicative mood active and passive voices vary, as already (Vol. I., pp. 38 and 70) shown. In the next lesson we shall give a general view of the tense and person-endings of the four regular conjugations of the active and passive voices. In order to get the full forms, you must prefix for the first conjugation *am* or *ama*; *doc*, or *doce*, for the second; *leg* for the third; and *aud* for the fourth. *Am* is the stem to be prefixed in the present tense; *ama*, in the imperfect and future, and *amav* in the perfect; as appears in this view of the

STEMS OF THE CHIEF PARTS OF THE FOUR CONJUGATIONS.

Conj.	*Present.*	*Imp. and Fut.*	*Infinitive.*	*Perfect.*	*Supine.*
1.	am (a)-	ama-	ama-	amav-	amat-
2.	doce-	doce-	doce-	docu-	doct-
3.	leg-	lege-	lege-	leg (i)-	lect-
4.	aud (i)-	audie-	audi-	audiv-	audit-

These chief parts are commonly exhibited thus:—

Conj.	*Present.*	*Infinitive.*	*Perfect.*	*Supine.*
1.	Amo	amare	amavi	amatum.
2.	Doceo	docere	docui	doctum.
3.	Lego	legere	legi	lectum.
4.	Audio	audire	audivi	auditum.

Now, by comparing these tables together, you may learn that *o* is the sign of the present tense; *re*, of the infinitive mood; *i*, of the perfect tense; and *um*, of the supine. In other words, by adding *o* to *am*, you form the present tense indicative mood first person singular; by adding *bam* to *ama*, you form the corresponding imperfect tense; by adding *i* to *amav*, you obtain the perfect tense; by adding *re* to *ama*, you get the infinitive mood; and finally, by adding *tum* to *ama*, you make the supine; thus:—

Am-*o* } amo, ama-*bam* } amabam, amav-*i* } amavi, ama-*re* } amare, ama-*tum* } amatum.

You thus see that there is a present stem, an imperfect stem, a perfect stem, an infinitive stem, and a supine stem. Of these, the imperfect and the infinitive are nearly the same. Properly speaking, the present stem in *amo* is the same as the imperfect and the infinitive, for the second *a* is a part of the root. Hence *amo* is a contraction of *ama-o*.

KEY TO EXERCISES IN LESSONS IN LATIN.—XX.

(Vol. II., p. 210.)

EXERCISE 73.—LATIN-ENGLISH.

1. God is present in all places. 2. Arms are of little avail abroad, unless there is deliberation at home. 3. Those are despised, who benefit neither themselves nor another. 4. As the laws preside over the magistrates, so the magistrates (preside over) the people. 5. Reason and speech unite men to one another, and in nothing are we further from the nature of wild beasts. 6. I am joyful; thou art sad. 7. If you are contented with your lot, you are happy. 8. While we were in school, our sisters were in the garden. 9. When Charles was at our house yesterday, I was abroad. 10. As long as you and your brother were at our house, you were joyful, but your brother was sad. 11. As long as you were absent, I was sad. 12. Why were you not in school yesterday? 13. Because I was abroad with my father. 14. How long have you and your father been absent from home? 15. We have been absent six months. 16. Why were not our soldiers present at the fight? 17. Because they were too far away. 18. Where had you been yesterday, when I was at your house?

EXERCISE 74.—ENGLISH-LATIN.

1. Ego prosum tibi. 2. Tu prodes mihi. 3. Pueri matribus non prosunt. 4. Cur puellæ patribus non prosunt? 5. Quum tu aberas, ego eram tristis. 6. Quamdiu pater tuus abfuit? 7. Carolus pugnæ interfuit. 8. Erasne heri domi nostræ? 9. Ero hodie tuæ domi. 10. Nisi domi es beatus, non es lætus foris.

EXERCISE 75.—LATIN-ENGLISH.

1. So long as you are (shall be) happy, you will have many friends. 2. The fight was most frightful, because the soldiers of each army were very brave. 3. We had been in the city before the beginning of the war. 4. There were many great and illustrious orators in the age of Demosthenes, and had been before, nor did they fail afterwards. 5. This thing was not useful to us, but injured (us). 6. If any one is (shall be) endued with virtue, he will always be happy. 7. So long as I am (shall be) contented with my lot, I shall be happy. 8. The action will not be right, unless the will has (shall have) been right. 9. If we have (shall have) been good, the praise of men will not fail. 10. Scholars, be attentive. 11. Let men be mindful of death. 12. Be ye contented with your lot. 13. O my son, be always mindful of the precepts of virtue! 14. The prudent man not only takes care of the present, but also in mind seeks again the past, and foresees the future from the past. 15. Good men endeavour to be useful to the good.

EXERCISE 76.—ENGLISH-LATIN.

1. Milites nostri in pugnâ fortissimi fuerunt. 2. Cur milites nostri fuerunt in pugnâ fortiores quam vestri. 3. Quamdiu felix eris, non deerunt amici. 4. Miseris amici desunt. 5. Ante belli initium in urbe fueram. 6. Fortes fortibus semper proderunt. 7. Inimici mihi obsunt. 8. Si eritis virtutis compotes, felices eritis. 9. Quamdiu sorte meâ contentus ero, felix ero. 10. Discipuli, in scholâ attenti este! 11. Illi student esse fortissimi. 12. Mi fili, fortis esto. 13. Prudentes futura ex præteritis provident.

EXERCISE 77.—LATIN-ENGLISH.

1. I am not ignorant of what your disposition is toward us. 2. I know what your feeling has always been toward us. 3. I am not ignorant of what your disposition both was before, and now is, toward us. 4. I was not ignorant of what your feeling was toward us. 5. I know how uncertain are the minds of men. 6. Think how short is life! 7. Of what kind the mind is, the mind itself knows not. 8. Think how much good examples are useful to us. 9. I am uncertain where my brother is now. 10. I am uncertain where my friend both has been and now is. 11. I am uncertain where you were yesterday. 12. Tell us (narrate) where you were yesterday.

EXERCISE 78.—ENGLISH-LATIN.

1. Narra mihi ubi sis. 2. Narra mihi ubi tui pater et mater sint. 3. Nescio ubi soror mea sit. 4. Scisne quantum boni pueri suis parentibus prosint? 5. Scio ubi filius sit. 6. Mi fili, ubi es? 7. Sciebam ubi filius esset. 8. Incertus sum ubi hostes sint. 9. Estne dux nescius ubi exercitus sit? 10. Scio quâ mente tu in regem sis.

LESSONS IN GEOMETRY.—XXI.

CONIC SECTIONS—THE ELLIPSE.

THE three curves respectively known as the ellipse, the parabola, and the hyperbola, are called conic sections, because they may be displayed by cutting a cone in different directions. Before, however, we explain the directions in which the cone must be cut

LESSONS IN FRENCH.—XXX.

SECTION LXIV.—USE OF THE VERB *FAIRE* (*continued*).

EXERCISE 123.

Aise, *glad.*
Aliment, m. *food.*
Crédit, m. *credit.*
Demand-er, 1. *to ask.*
Dorm-ir, 2. ir. *to sleep.*
Etude, f. *study.*
Faire l'aumône, *to give alms.*
Laiss-er, 1. *to leave, let.*
Mendiant, m. *beggar.*
Négociant, m. *merchant.*
Quart, m. *quarter.*
Rarement, *seldom.*
Réuss-ir, 2. *to succeed.*
Riz, m. *rice.*
Se fâch-er, 1. ref. *to become angry.*

1. Seriez-vous bien aise de faire connaissance avec ce monsieur? 2. J'en serais bien aise. 3. Ce cheval fait-il une lieue en un quart d'heure? 4. Il a fait ce matin une lieue en douze minutes. 5. Leur avez-vous fait des questions? 6. Je leur en ai fait.* 7. Quelles questions leur avez-vous faites? 8. Je leur ai demandé s'ils avaient fait des emplettes. 9. Vos élèves font-ils des progrès dans leurs études? 10. Ils n'en font pas beaucoup, ils viennent rarement à l'école. 11. Si vous étiez chez vous, feriez-vous semblant de dormir? 12. Je ne ferais certainement pas semblant de dormir. 13. Pourquoi ne faites-vous pas entrer ce mendiant? 14. Ma mère vient de lui faire l'aumône. 15. Le négociant fait-il usage de son crédit? 16. Il en fait usage. 17. De quels aliments ce malade fait-il usage? 18. Il fait usage de riz et de bouillon. 19. Faites-vous votre possible pour réussir? 20. Je fais tout mon possible. 21. Avez-vous fait entrer ces enfants, ou les avez-vous fait sortir? 22. Je les ai laissés où ils étaient. 23. Vous avons-nous fait attendre? 24. Vous nous avez fait attendre plusieurs heures. 25. Si vous faisiez attendre ces dames, elles se fâcheraient.

EXERCISE 124.

1. Does that child pretend to read? 2. He pretends to read. 3. Does not that gentleman pretend to sleep? 4. He does not pretend to sleep, he sleeps really (*réellement*). 5. Will you take a walk this morning? 6. I would do so with pleasure, if I had time. 7. Have you become acquainted with the physician? 8. I have not yet become acquainted with him. 9. How many questions have you asked (*à*) the child? 10. I asked him many questions. 11. Have you asked him if he had studied his lesson? 12. I did not ask him. 13. Will not that little girl do her best to learn her lesson? 14. She will do her best to learn it. 15. Of what food do you make use when you are ill? 16. We make use of bread and rice. 17. Have you forgotten to bid farewell to your mother? 18. I had not forgotten it; I intended to go to her house this afternoon. 19. With whom have you become acquainted? 20. With the bookseller? 21. Do you not keep those ladies waiting? 22. I do not keep them waiting, they are not ready (*prêtes*). 23. Do I keep you waiting? 24. You do not keep me waiting. 25. Have you left your children in your room? 26. I have not done so (*le*). 27. Have you sent them out? 28. I have not sent them out, I have let them remain where they were. 29. Have you made purchases this morning? 30. I have made none, I have no money. 31. Has the servant made a fire in my room? 32. He has made one. 33. Will you do your best to come to-morrow? 34. I will do my best to come early. 35. We travelled yesterday forty leagues in sixteen hours.

SECTION LXV.

1. **Faire** is also used in the sense of *playing the part of*, or *pretending to be*:—

Il fait le grand seigneur.	*He plays the great lord.*

2. **Faire** also means *to matter, to concern, to help*:—

Cela ne fait rien.	*That is no matter.*
Cela ne vous fait rien.	*That is nothing to you, does not concern you.*
Qu'est-ce que cela nous fait?	*What is that to us?*
Je ne puis qu'y faire.	*I cannot help it.*

3. **Se faire mal** conjugated reflectively, means *to hurt one's self*. **Se faire** is used reflectively in the sense of the English verbs, *to become, to turn*. It is also used with the signification of the words *cause, have, get*, &c. **Se faire**, as all reflective verbs, takes **être** as its auxiliary [§ 45, Sect. 47]:—

Je me suis fait médecin.	*I have become a physician.*
Je me suis fait faire une paire de bottes.	*I have had a pair of boots made for me.*
Je me suis fait raser.	*I have had my beard shaved.*
Nous nous sommes fait couper les cheveux.	*We have had our hair cut.*
Je me suis fait mal au doigt.	*I have hurt my finger.*

4. Besides the instances mentioned [Sect. 33, R. 5], **faire** is used impersonally in many idiomatic expressions:—

Il fait jour; il fait nuit.	*It is daylight; it is night.*
Il fait de la boue; il fait de la poussière.	*It is muddy; it is dusty.*
Il fait clair de lune; il fait obscur.	*It is moonlight; it is dark.*
Il fait bon ici; il fait chaud ici.	*It is comfortable here; it is dear here.*

MISCELLANEOUS EXAMPLES.

Ce jeune homme fait le savant.	*That young man plays the learned man.*
Cela ne me fait rien.	*That is nothing to me.*
Que pouvons-nous y faire?	*What can we do to it?*
Mon frère s'est fait orfèvre.	*My brother has turned goldsmith.*
Pourquoi vous faites-vous raser?	*Why do you get shaved?*
Je me ferai couper les cheveux.	*I will have my hair cut.*
Je me suis fait bâtir une maison.	*I have had a house built for me.*
Nous nous sommes fait mal à la tête.	*We have hurt our heads.*
Il commence à se faire tard.	*It is beginning to grow late.*
Fait-il cher vivre à Paris?	*Is it dear living in Paris?*
Il fait beaucoup de boue.	*It is very muddy.*

EXERCISE 125.

Absolument, *absolutely.*
Artisan, m. *mechanic.*
Bijoutier, m. *jeweller.*
Bon marché, *cheap.*
Chagriné, e, *vexed.*
Denrées, f. p. *provisions.*
Étudiant, m. *student.*
Fou, folle, *fool, simpleton.*
Impertinent, e, *impertinent.*
Ouvrier, m. *workman.*
Peintre, m. *painter.*
Personne, m. *nobody.*
Tanneur, m. *tanner.*
Vigneron, m. *dresser.*
Vitrier, m. *glazier.*

1. Pourquoi cet ouvrier fait-il le malade? 2. Il fait le malade parce qu'il n'a pas envie de travailler. 3. Cet étudiant ne fait-il pas le savant? 4. Il ne fait pas le savant, il fait le fou. 5. Sied-il à ce jeune homme de faire le maître ici? 6. Il ne sied à personne de faire l'impertinent. 7. Cela fait-il quelque chose? [R. 2.] 8. Cela ne fait absolument rien. 9. Cela peut-il faire quelque chose à ces vignerons? 10. Cela ne leur fait rien du tout. 11. N'êtes-vous pas bien chagrinés de cela? 12. Nous en sommes bien fâchés, mais nous ne pouvons qu'y faire. 13. Votre associé ne s'est-il pas fait bijoutier? s'est-il pas fait vitrier? 16. Il s'est fait tanneur, et son frère s'est fait soldat. 17. La modiste ne s'est-elle pas fait couper les cheveux? 18. Elle se les est fait couper. 19. Ne vous levez-vous pas aussitôt qu'il fait jour? 20. Oui, Monsieur, je me lève de très bonne heure. 21. Ne fait-il pas clair de lune? 22. Il fait très clair, mais il ne fait pas clair de lune. 23. Fait-il bon vivre en Amérique? 24. Il fait très bon vivre en Amérique, les denrées y sont à bon marché.

EXERCISE 126.

1. Does not that gentleman play the learned man? 2. He plays the lord and fool at the same time (*à la fois*). 3. Does not that boy pretend to be ill? 4. He pretends to be ill, he does not wish to study his lessons. 5. When you have no wish to work, do you pretend to be ill? 6. I never pretend to be ill. 7. Is it muddy to-day? 8. It is not muddy, it is dusty. 9. Will it be moonlight this evening? 10. It will not be moonlight, it will be very dark. 11. Is it comfortable here? 12. It is very comfortable. 13. Is it too warm or too cold? 14. It is neither too warm nor too cold here? 15. Will you have your hair cut? 16. I had my hair cut yesterday morning. 17. Will you not go home, it is beginning to grow late? 18. Is it not very dark out? (*dehors.*) 19. It is not dark, it is moonlight. 20. Has not the glazier turned goldsmith? 21. He has not turned goldsmith, he has turned soldier. 22. Does that concern your brother? 23. That does not concern him, I cannot help it. 26. Why do you get shaved? 27. Because I cannot shave myself. 28. Have you not hurt those children? 29. I have not hurt them. 30. Have you hurt your arm? 31. No, Sir, but I have hurt my head. 32. Has not your sister hurt her hand? 33. She has hurt her hand, and my mother has hurt her elbow. 34. Have you not hurt your head? 35. I have not hurt my head, but I have hurt my hand.

* See Sect. 42, II, and § 125 (7).

SECTION LXVI.

1. **Avoir mal** means *to have a pain* or *ache, a sore.* When used in relation to one of the limbs, it means generally, *to have a sore, a bruise, a cut*, &c. The name of the part of the body is preceded by the preposition **à** and the article [*See* Sect. 63, R. 5, § 77 (9)]:—

N'avez-vous pas mal au doigt?	*Have you not a sore finger?*
Je n'ai pas mal à la tête.	*My head does not ache.*

2. **Avoir une douleur,** or **des douleurs,** corresponds to the English *to have a pain* or *pains*:—

J'ai une douleur au bras.	*I have a pain in my arm.*

3. The construction mentioned in Rule 1 is used after **avoir,** taken in the sense of **tenir,** *to hold*, and after **avoir froid** and **avoir chaud** [Sect. 63, R. 5]:—

Vous avez les armes à la main.	*You have your arms in your hands.*
J'ai chaud aux mains et aux pieds.	*My hands and feet are warm.*

4. The article **le,** &c., is used before words indicating moral and physical properties, in cases where the English use *a* or *an*, or omit the article. When, however, an adjective precedes the noun, **un, une,** or **de, des,** are used:—

Cette dame a l'esprit juste.	*That lady has a correct mind.*
Votre sœur a les yeux noirs.	*Your sister has black eyes.*

5. A noun expressing a moral or physical property, which, in the individual is single, is not put in the plural in French, even when referring to a number of individuals:—

Ces dames ont l'esprit juste.	*Those ladies have correct minds.*
Ces garçons se sont fait mal à la tête.	*Those boys have hurt their heads.*

MISCELLANEOUS EXAMPLES.

N'avez-vous pas mal au pied?	*Have you not a sore foot?*
Cette demoiselle a mal à la tête.	*That young lady has the headache.*
N'avez-vous pas mal aux dents?	*Do not your teeth ache?*
Mon frère a mal aux dents.	*My brother has the toothache.*
Mon cousin a mal au côté.	*My cousin has a pain in his side.*
Il a des douleurs de poitrine.	*He has pains in his chest.*
Qu'avez-vous à la main?	*What have you in your hand?* / *What is the matter with your hand?*
Je n'ai rien à la main.	*I have nothing in my hand.* / *Nothing is the matter with my hand.*
J'ai chaud aux mains et froid aux pieds.	*My hands are warm and my feet cold.*
Vos sœurs ont le goût délicat.	*Your sisters have a delicate taste.*
Ces messieurs ont le nez aquilin.	*Those gentlemen have Roman noses.*

EXERCISE 127.

Bleu, e, *blue.*
Bouche, f. *mouth.*
Dent, f. *tooth.*
Doigt, m. *finger.*
Gorge, f. *throat.*
Mal de gorge, m. *sore throat.*
Mal d'oreille, m. *earache.*
Mémoire, f. *memory.*
Nièce, f. *niece.*
Noir, e, *black.*
Pied, m. *foot.*
Presque, *almost.*
Teint, m. *complexion.*
Visage, m. *face.*
Yeux, *from* œil, *eyes.*

1. Ce jeune homme a-t-il mal à la gorge? 2. Oui, Monsieur, il y a deux jours qu'il a mal à la gorge. 3. Avez-vous souvent mal à la tête? 4. J'ai mal à la tête presque tous les jours. 5. N'avez-vous pas mal au bras? 6. J'ai mal au bras et à la main. 7. Votre sœur a-t-elle mal à l'oreille? 8. Oui, Madame, elle a mal à l'oreille et mal aux dents. 9. N'avez-vous pas froid à la tête? 10. Non, Monsieur, mais j'ai froid aux doigts. 11. N'avez-vous pas froid au visage? 12. Non, Monsieur, je n'y ai pas froid. 13. Ce monsieur a-t-il le nez aquilin? 14. Il a le nez aquilin et la bouche grande. 15. Cette demoiselle a-t-elle de belles dents? 16. Elle a de belles dents et de beaux yeux. 17. Ce petit garçon a-t-il les pieds petits? 18. Il a les pieds petits et les mains grandes. 19. Votre nièce n'a-t-elle pas les yeux bleus? 20. Non, Monsieur, elle a les yeux noirs. 21. Vos écoliers se sont-ils fait mal au visage? 22. Ils se sont fait mal à la poitrine. 23. Vos filles ont-elles une bonne mémoire? 24. Elles ont la mémoire excellente. 25. Ces Italiennes n'ont pas le teint frais.

EXERCISE 128.

1. What is the matter with your hand? 2. I have had a sore hand these ten days. 3. Has your brother sore fingers? 4. He has sore fingers and a sore hand. 5. What has your brother in his hand? 6. He has a pen in his hand. 7. Has your little boy a sore throat? 8. He has a sore throat. 9. Has not your eldest sister the toothache? 10. She has not the toothache, but she has a sore finger. 11. Why does not the soldier walk? 12. He cannot walk, he has a sore foot. 13. Have you not sore feet? 14. My feet are not sore. 15. If your finger were sore would you write? 16. If I had sore fingers I should not write. 17. If your brother had the headache, would he study his lesson? 18. He could not study his lesson if he had the headache. 19. Has not that gentleman pains in his chest? 20. He has pains in his chest and in his side. 21. Has your little girl black eyes or blue eyes? 22. She has black eyes and a fresh complexion. 23. Has not your daughter the toothache? 24. She has the toothache and the ear-ache. 25. Are not your hands and feet cold? 26. My hands are cold, but my feet are warm. 27. Have not those ladies aquiline noses? 28. They have aquiline noses and a fair complexion (*le teint beau*). 29. Has your sister large hands? 30. No, Sir, my sister has small hands. 31. Have not those little girls hurt their heads? 32. They have not hurt their heads, they have hurt their faces. 33. That little boy has black hair (*cheveux*).

SECTION LXVII.

1. **Avoir beau—Vous avez beau,** corresponds in signification to the English expression, *it is in vain for you to, you may do, say, &c., what you like.* It must be followed by the infinitive:—

Vous avez beau dire, il ne viendra pas.	*It is in vain for you to speak, you may say what you like, he will not come.*

2. **Épouser, marier,** *to marry*, have, in French, a different meaning. **Marier,** conjugated actively, can only have as its nominative the person performing the ceremony, or giving one or both of the parties in marriage; **épouser** takes, as its nominative, the contracting parties only, and must always be followed by a direct object. **Se marier,** *to get married*, and **marier,** conjugated passively, take the same nominative as **épouser**:—

M. L. a marié sa fille avec M. G.	*Mr. L. has married his daughter to Mr. G.*
M. G. a épousé la fille de M. L.	*Mr. G. has married Mr. L.'s daughter.*
M. G. et Mlle. L. sont mariés.	*Mr. G. and Miss L. are married.*
Mon frère va se marier.	*My brother is going to be married.*

3. **Un de mes amis** is equivalent to the English, *a friend of mine*:—

Votre ami a épousé une de mes amies.	*Your friend has married a friend of mine.*

MISCELLANEOUS EXAMPLES.

Ils ont beau dire et beau faire, ils ne l'empêcheront pas de se marier.	*Whatever they may say or do, they will not prevent his marrying.*
Vous avez beau lui faire des remontrances.	*It is in vain for you to remonstrate with him.*
L'évêque de B. a marié ma sœur.	*The Bishop of B. has married my sister.*
Le capitaine G. a épousé ma cousine.	*Captain G. has married my cousin.*
Quand il se mariera, il nous invitera à la noce.	*When he marries, he will invite us to the wedding.*
Votre cousine est mariée avec mon cousin.	*Your lady cousin is married to my cousin.*
Votre cousine a épousé un de mes cousins.	*Your lady cousin has married a cousin of mine.*
Le colonel a épousé une de mes sœurs.	*The colonel has married a sister of mine.*

EXERCISE 129.

Aîné, e, *elder, eldest.*
Archevêque, m. *archbishop.*
Cadet, te, *younger.*
Demoiselle, f. *young lady.*
Dev-oir, 3. ir. *to owe, to be about.*
Époux, pl. *couple; man and wife.*
Évêque, m. *bishop.*
Infanterie, f. *infantry.*
Parent, e, *relation.*
Princesse, f. *princess.*
Prochain, e, *next.*
Régiment, m. *regiment.*
Sav-oir, 3. ir. *to know.*
Vieillard, *old man.*

to display these curves, the reader must endeavour to understand what a cone is, mathematically speaking. The word *cone* is derived from the Greek *κωνος* (ko'-nos), or the Latin conus, terms applied by the Greeks and Romans respectively to objects rising to a point, and by the ancient mathematicians to a solid figure having a circular base and pointed apex, and so formed that straight lines drawn from any points in the circumference of the base to the apex, lie wholly in the superficies or surface of the solid. The ordinary cone, which is usually called a right cone, is formed by the revolution of a right-angled triangle round its altitude. Thus, in Fig. 82, if the right-angled triangle A B C, having the altitude A B, the base B C, and the hypothenuse A C, were caused to revolve around its altitude A B in a direction from left to right, the triangle would occupy the positions A B D, A B E, A B F, A B G, A B H, successively, in its revolution round A B, and when it had returned to its original position the movement of the hypothenuse would have described a figure which is called a cone. The base of this figure is a circle, C D E F G H, described virtually from the point B as centre, with a radius B C. The path traced by every point in the hypothenuse, as the triangle revolves around its altitude, is a circle; as, for example, the circle K L M N, traced by the revolution of the point K in the hypothenuse round A B. As any figure which can be formed by cutting a cone in any particular direction is a conic section, it is obvious that the circle is also a conic section, as well as the ellipse, parabola, and hyperbola; and in a cone circles of any size, varying from nothing at the apex of the cone, to the extent of the circle forming the base, may be obtained by cutting the cone at successive points in the altitude from top to bottom, or from the point A to the point B in Fig. 82, in an horizontal direction at right angles to the altitude. Any section, therefore, of a cone made by cutting the cone transversely in a direction perpendicular to the altitude is a circle.

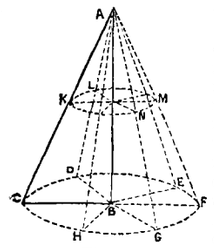


Fig. 82.

In Fig. 83 let A be the apex, and B C D E the circular base of a right cone, the axis or altitude of the cone being the straight line, A F, drawn from the apex, A, to F, the centre of the circular base. It has been already shown that if the cone be cut transversely, in a plane at right angles to its axis or altitude, the section will be a circle. Now, instead of cutting the axis at right angles, let the plane of section be inclined to the axis, or a plane passing through the axis, as the plane A B D, at an angle that is not a right angle, as the plane of section G H K L is inclined to the plane of section A B D, at an angle, A M G, which is less than a right angle. The plane of section, G H K L, is called an ellipse. The line K G is called the major axis, or greater axis of the ellipse. Next, suppose the straight line G K to be produced both ways to an indefinite length, and to turn on M as on a pivot, moving in the plane shown by the triangle A C E, until it assumed the position N O. On examination of the figure it will be found that N O is parallel to A C, a line drawn from apex to base on the side of the cone. If, then, a plane be drawn passing through the points N and O, and the points H L, as well as the plane of section N H P Q L, this plane of section will be parallel to the side of the cone, as well as its axis N O. The plane of section N H P Q L is called a parabola. If, however, the plane of section be parallel to a plane passing through the axis of the cone, as the plane R S T, it is called an hyperbola.

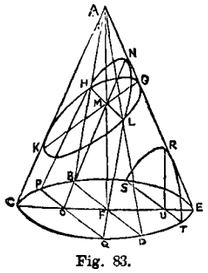


Fig. 83.

To recapitulate what has been said of the various curves produced by cutting the cone in different directions—

1. If the cone be cut by a plane parallel to the base, or at right angles to the axis or altitude of the cone, the plane of section is a circle.

2. If the cone be cut by a plane making any angle other than a right angle with the axis of the cone, the plane of section is an ellipse.

3. If the cone be cut by a plane parallel to the side of the cone, the plane of section is a parabola.

4. If the cone be cut by a plane parallel to the axis of the cone, or parallel to any plane passing through its axis, the plane of section is an hyperbola. Indeed, any plane of section which makes with the base of the cone an angle greater than the inclination of the side of the cone to the base, is an hyperbola.

PROBLEM LVIII.—*To trace the curve of an ellipse by mechanical contrivances.*

To students of practical geometry who are seeking a knowledge of the subject that will aid them in their daily avocations, it will be far more acceptable to have a brief statement of the practical means adopted for tracing the conic sections than it will to have an exposition of the properties of these curves, which belongs to the higher branches of mathematics. Failing a pair of compasses, every artisan knows that a circle may be readily traced by tying one end of a piece of string round a pencil, and fastening the other end to a board, or anything on which the circle is to be traced, by a nail. A similar plan may be adopted for tracing an ellipse, which may be briefly described as follows:—

Take a piece of thread and two small fine pins, if you are going to draw a small ellipse on paper, or a piece of twine and two nails, if you wish to trace a larger ellipse on a piece of board. Draw a straight line, X Y, of indefinite length, and in it take any two points, A and B. Having tied two knots in the thread or twine, distant from each other a little more than the length of the line A B, thrust a pin through each, and fasten the pins through the paper at the points A and B. Then, stretching the thread as tightly as you can on the point of a lead pencil, and keeping it at its utmost tension during the operation, you trace the half of the ellipse—namely, the curve C E D—with the pencil point. After this, pulling the thread across X Y, between the pins at A and B, the thread is again tightened, and the ellipse is completed by tracing the lower half of the ellipse, the curve C F D, with the pencil point as before. The points A and B, in which the pins have been inserted, are called the *foci* of the ellipse. The straight line, C D, passing through the points A and B, is called the *axis major*, or *transverse diameter* of the ellipse. The point G, in which C D is bisected, is called the *centre* of the ellipse, while the straight line E F, drawn through the centre G, at right angles to C D, is called the *axis minor*, or *conjugate diameter* of the ellipse. As the length of the thread does not vary during the process of tracing the curve, it must follow that the sums of the distances of any points in the circumference of the ellipse from the foci are equal to one another. Thus, in Fig. 84, the sum of A H + H B is equal to the sum of A K + K B, and the sum of B F + F A. The straight line C D, the axis major of the ellipse, is also equal to A H + H B, A K + K B, or A F + F B; so to describe an ellipse having a major axis of a certain length, all that is necessary to be done is to make the distance between the knots in the thread equal to the given length of the axis major. It must be remembered that the nearer the foci A and B are to the extremities C and D of the axis major, the narrower the ellipse will become in its minor axis, or the distance from E to F; but, on the contrary, the nearer the foci approach to G, the centre of the ellipse and point of bisection of the axis major, the wider the ellipse will become in its minor axis, approximating more and more closely to the form of a circle, until it becomes a circle, if the foci approach so closely that they coincide with each other and the centre of the ellipse, G. If the foci be removed so far apart that they coincide with C, D, the extremities of the axis major, the ellipse assumes the form of a straight line. The straight line and circle are therefore the extremes between which the forms of the ellipse vary, the minor axis being longer or shorter (the length of the axis major remaining the same in all cases) according as the foci are more remote from or nearer to each other.

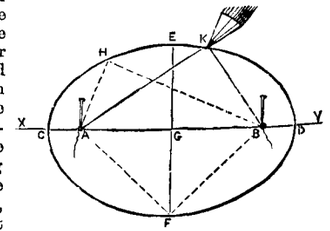


Fig. 84.

In Fig. 85 another contrivance is represented, which affords a useful means for drawing an ellipse by mechanical aid. A B and C D are two flat pieces of wood or metal fastened together in the centre so as to form a flat cross, having its four arms of equal length. Along the central line of each transverse piece a deep broad groove is cut in such a manner that anything drawn down the groove C E may pass freely at the centre, E, into either of the other grooves in the remaining arms of the cross. In these grooves travel two pins, attached by clamping screws to the beam F G, which is also fitted with a socket at one end, in which a pencil may be placed. The method of describing the ellipse with this kind of elliptic compasses, which is called a trammel, is as follows:—The beam, F G, is placed on the top of the cross-piece, C D, having the pencil point at M, the pin K at E, the centre of the ellipse required to be described, and the pin H at D. As the beam, F G, is turned slowly to the right, the pencil point traces out the curve from M to N, while the pin that was at D travels up the groove D E towards E, and the pin K travels along the groove E B towards B. On the completion of the curve M N, the beam F G is lying on the surface of the cross-piece A B, and in the same direction with it, the pin H having travelled from D to E, while the pin K has travelled from E to B. The process is then repeated in tracing out the next quarter of the ellipse from N to O, the pin at H moving from E towards C, while the pin at K returns from B to E. The pins continue to travel in this manner up and down the grooves, from the centre to either end, and from either end to the centre, until the whole of the curve M N O P is traced out by the movement of the pencil point at L, from M to N, from N to O, from O to P, and from P to M.

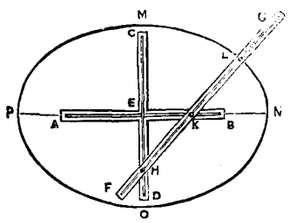


Fig. 85.

PROBLEM LIX.—*To describe an ellipse of which the axis major and axis minor are given.*

In Fig. 86 let X represent the axis major, and Y the axis minor of the required ellipse. Draw two straight lines, A B, C D, of indefinite length, at right angles to one another, and intersecting each other in the point E. From the point E, set off E F, E G, along E C, E D, each equal to half of X; and along E A, E B, set off E H, E K, each equal to half of Y. From the point H or K as a centre, with a radius equal to E F or E G, describe arcs cutting F G in L and M. The points L and M are the foci of the ellipse required, and the curve F H G K can then be traced by the aid of a pencil and piece of thread, as shown above.

If, however, it be necessary to determine points through which the curve may be traced by hand, draw straight lines through the points F, G, H, K, parallel to H K and F G, so as to form the parallelogram N Q P O. Then to trace the part H F K of the curve of the ellipse, divide the straight line E F into as many equal parts as possible in the points *a*, *b*, *c*, *d*, *e*, etc., and divide the straight line F N into the same number of equal parts in the points *f*, *g*, *h*, *i*, *k*, etc., and the straight line F O also into the same number of equal parts in the points *l*, *m*, *n*, *o*, *p*, etc. Then from the point H draw straight lines passing through the points *a*, *b*, *c*, *d*, *e*, in E F, and through *f*, *g*, *h*, *i*, *k*, in N F; and from the point K draw straight lines also passing through the points *a*, *b*, *c*, *d*, *e*, in E F, and through *l*, *m*, *n*, *o*, *p*, in F O. The points of intersection, 1, 2, etc., of the lines drawn from H through *f*, and from K through *a*, from H through *g*, and from K through *b*, and so on, are points in the curve, and the curve may be traced by hand by drawing a curved line carefully through these points of intersection. The other half may then be completed in a similar manner.

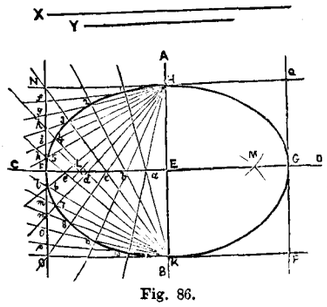


Fig. 86.

HISTORIC SKETCHES.—XXI.

CHARLES EDWARD STUART AND THE REBELLION OF 1745.—II.

As soon as the Pretender discovered himself to the people of Moidart, where he landed, they declared themselves willing to join him; and in a few days came Macdonald of Kinloch-Moidart, Macdonald of Glengary, Cameron of Lochiel, Stuart of Appin, and the Frasers, with some 2,000 men. The royal standard was now reared, and Prince Charles found himself so strong that about the middle of August he appeared in force near Fort William, and two companies of royal troops, who were sent against him, were cut to pieces or taken prisoners. On the 4th of September possession was taken of Perth, and on the 5th the Pretender was publicly proclaimed there. The titular Duke of Perth, the Marquis of Tullibardine, Lord George Murray, and several other noblemen joined him; and in spite of the preparations which were being made by Sir John Cope, King George's commander-in-chief in the north, the prince's army moved towards the Forth. Glasgow was summoned, but returned no answer; so the army marched to Edinburgh and occupied it, the garrison retiring to the castle. At Edinburgh the prince resolved to wait till he was joined by certain influential men, who had sent to him promising assistance.

Sir John Cope, who had made strenuous exertions to muster a force capable of crushing the insurgents, now pushed forward with infantry, cavalry, and artillery, and on the 20th of September (Edinburgh having surrendered on the 16th) his vanguard reached Preston Pans, in the immediate neighbourhood of Edinburgh. About three a.m. the next morning the Highlanders attacked the English troops, and some of the English dragoons having shamefully ridden away, the infantry were unsupported, a panic ensued, many of the English were killed or taken prisoners, and a complete victory was won for the Pretender.

A vain attempt was made to reduce Edinburgh Castle, which resolutely held out for King George; and then, about the end of October, the prince removed his quarters to Dalkeith, where he was joined by Gordon of Glenbucket, Lord Pitsligo, and the Earl of Kilmarnock, and whither also were brought the supplies of warlike stores, money, and accoutrements which had been sent to him from France.

King George was abroad when the Pretender landed, most of his troops were in Flanders, and there were not more than 6,000 regular troops in England to oppose the rebels. The king came over forthwith, troops were detached from the army in Flanders, the militia were called out, associations of volunteers were formed, and by the beginning of November there were 14,000 men in arms in the north of England, besides a considerable body of loyal Scots to the north of Fort William. Marshal Wade was given the command in chief, and was taking steps to secure the English towns of importance, when he was apprised of the Pretender's march southwards.

Charles Edward had been assured that the English country gentlemen only waited his coming to rise against the government, and that if he marched at once into England he would swell his ranks to such a size that no force the government could bring would be able to withstand him. The orders were therefore given for the Highlanders to march south, and southwards they went, about 7,000 strong, and crossed the Tweed on the 6th of November. Wade was concentrating his troops in and about Newcastle, by which town he expected the rebels would pass, when he heard that Carlisle had surrendered, city and citadel, on the 15th of November. On the 20th the rebels marched to Penrith, thence to Kendal, and arrived at Lancaster on the 24th. On the 27th they reached Preston, and on the 28th an advanced party entered Manchester. The inhabitants of the chief towns were compelled to aid the Pretender both by money and goods; but few people joined the army, and none of the English gentry. On the 1st of December the Pretender entered Macclesfield, and on the 4th Derby, which was the most southern point to which he penetrated. Divisions sprang up among the rebel chiefs, some voting for a march direct to London, which, judging after the event, seems the wisest thing they could have done; others voting, in view of the large army which the Duke of Cumberland had formed in Staffordshire, and of the strong force which Marshal Wade had in the north-eastern counties, for an immediate retreat into Scotland. The Pretender yielded to the voice of the majority, and on the 6th of December gave orders for the retreat.

1. Votre nièce ne va-t-elle pas se marier? 2. Elle se mariera l'année prochaine. 3. Qui épousera-t-elle? 4. Elle épousera le fils aîné du général M. 5. Savez-vous qui a marié ces deux époux? 6. L'archevêque de Paris les a mariés. 7. N'a-t-il pas aussi marié Mlle. L.? 8. Il l'a mariée avec M. G. 9. Qui madame votre fille a-t-elle épousé? 10. Elle a épousé M. L., capitaine au 25ème régiment d'infanterie. 11. Ce vieillard n'a-t-il pas tort de se marier? 12. Il n'a pas tort de se marier, mais il a tort d'épouser cette demoiselle. 13. Quand ces princesses vont-elles se marier? 14. Elles se marieront le mois prochain. 15. Qui les mariera? 16. L'évêque d'Arras les mariera. 17. Qui doivent elles épouser? 18. L'aînée doit épouser M. W., et la cadette M. G. 19. Le capitaine G. n'a-t-il pas épousé une de vos parentes? 20. Oui, Monsieur, il a épousé une de mes cousines. 21. Qui est cette demoiselle? 22. C'est une de mes sœurs. 23. N'avez-vous pas un de mes livres? 24. J'ai un de vos livres et une de vos plumes. 25. Je viens de parler à une de vos sœurs.

Exercise 130.

1. Is your brother going to marry Miss L.? 2. Yes, Sir, it is in vain for us to speak to him, he will marry her. 3. Will not your father marry your sister to Mr. G.? 4. No, Sir, he will marry her to Mr. L. 5. Is Captain H. married? 6. No, Sir, he is not yet married, but he will be married next year. 7. Whom does he intend to marry? 8. He intends to marry a cousin of mine, who is at my brother's. 9. Who will marry them? 10. My eldest brother intends to marry them. 11. Is your youngest sister married? 12. No, Sir, she is not married. 13. Is she going to be married? 14. She will marry when she is [Sect. 61, 5] old enough (*assez âgée*). 15. Whom did Colonel J. marry? 16. He married a sister of mine. 17. How long have they been married [Sect. 57, 2]? 18. They have been married two years. 19. Is not that young lady wrong to get married? 20. She is wrong to marry; she is too young. 21. Who married General S. and Miss N.? 22. The Bishop of Arras married them. 23. Did not the Archbishop of York marry that couple? 24. The Archbishop of Paris married them. 25. Will not your aunt marry? 26. She will not marry. 27. Is not your sister at home? 28. No, Sir, she is with (*chez*) an aunt of mine. 29. Is your brother at your house? 30. No, Sir, he is with one of my relations. 31. Is he married? 32. He is not married. 33. Is Captain H. married? 34. He was married last week. 35. He married Miss H.

KEY TO EXERCISES IN LESSONS IN FRENCH.

Exercise 16 (Vol. I., page 60).

1. Avez-vous les chevaux de mon frère? 2. Je n'ai pas les chevaux de votre frère, j'ai les chapeaux de votre cousin. 3. Les maréchaux ont-ils de bon fer? 4. Le maréchal a deux morceaux de fer. 5. Avez-vous deux paires de bas? 6. J'ai une paire de bas, et deux paires de gants. 7. Votre sœur a-t-elle les bijoux d'or? 8. Ma sœur a les bijoux d'or et les joujoux de papier. 9. Avez-vous les choux dans votre jardin? 10. Nous avons deux choux dans notre jardin. 11. Avez-vous les chapeaux de soie? 12. Les généraux ont les chapeaux de soie. 13. Avez-vous du café ou du sucre? 14. Nous n'avons ni café ni sucre. 15. Vos frères ont-ils honte? 16. Mes frères n'ont ni honte ni peur. 17. Qui a deux barils de farine? 18. Le meunier a deux barils de farine.

Exercise 17 (Vol. I., page 78).

1. Have you the blacksmiths' hammers? 2. Yes, Sir, I have them. 3. Have you them not? 4. No, Sir, we have them not. 5. The workman has them. 6. Has the innkeeper your horses? 7. The innkeeper has neither my horses nor yours, he has his. 8. Has the physician books? 9. Yes, Sir, he has good books. 10. Have you not my best pens? 11. Yes, Sir, I have your best pens, mine, and those of your cousin. 12. Has the traveller good guns? 13. He has no good guns, he has iron guns. 14. Has not the sailor my horse-hair mattresses? 15. He has them not. 16. What has he? 17. He has the cabinet-maker's woollen mattresses. 18. Has the cabinet-maker mahogany tables? 19. Yes, Madam, he has mahogany tables and white marble tables. 20. Have you my chairs or yours? 21. I have neither yours nor mine, I have the cabinet-maker's. 22. Are you not sleepy? 23. No, Sir, I am neither sleepy nor hungry. 24. Has the tinman your iron candlesticks? 25. No, Sir, he has the blacksmith's.

Exercise 18 (Vol. I., page 78).

1. Avez-vous mes tables ou les vôtres? 2. Je n'ai ni les vôtres ni les miennes, j'ai celles de l'aubergiste. 3. Les avez-vous? 4. Non, Monsieur, je ne les ai pas. 5. Votre sœur a-t-elle mes chevaux? 6. Oui, Monsieur, elle a vos deux chevaux et ceux de votre frère. 7. Avez-vous raison ou tort? 8. J'ai raison, je n'ai pas tort. 9. Le ferblantier a-t-il mes chandeliers d'argent ou les vôtres? 10. Il n'a ni vos chandeliers d'argent ni les miens. 11. Qu'a-t-il? 12. Il a les tables de bois de l'ébéniste. 13. A-t-il vos chaises d'acajou? 14. Non, Monsieur, il a mes tables de marbre blanc. 15. Avez-vous ces tables-ci ou celles-là? 16. Je n'ai ni celles-ci ni celles-là, j'ai celles de l'ébéniste. 17. Avez-vous de bons porte-crayons? 18. Non, Monsieur, mais j'ai de bons crayons. 19. Le voyageur a-t-il des fusils de fer? 20. Oui, Monsieur, il a les miens, les vôtres et les siens. 21. N'a-t-il pas ceux de votre frère? 22. Il n'a pas ceux de mon frère. 23. L'ouvrier a-t-il mes marteaux de fer? 24. Oui, Monsieur, il les a. 25. Mon frère a-t-il vos plumes ou celles de mon cousin? 26. Il a les miennes et les vôtres. 27. Avez-vous les habits des enfants? 28. Oui, Madame, je les ai. 29. Avez-vous le chapeau de votre sœur? 30. J'ai celui de ma cousine. 31. Votre frère a-t-il quelque chose? 32. Il a froid et faim. 33. Avez-vous des chevaux? 34. Oui, Monsieur, j'ai deux chevaux. 35. J'ai deux matelas de crin et un matelas de laine.

Exercise 19 (Vol. I., page 79).

1. Is that lady pleased? 2. No, Sir, that lady is not pleased. 3. Is your daughter quick? 4. My son is very quick, and my daughter is idle. 5. Is she not wrong? 6. She is not right. 7. Is your cousin happy? 8. Yes, Madam, she is good, beautiful, and happy. 9. Has she friends? 10. Yes, Sir, she has relations and friends. 11. Has she a new dress and old shoes? 12. She has old shoes and an old dress. 13. Has not your brother a handsome coat? 14. He has a handsome coat and a good cravat. 15. Have you good meat, Sir? 16. I have excellent meat. 17. Is this meat better than that? 18. This is better than that. 19. Has your friend the beautiful china inkstand? 20. His inkstand is beautiful, but it is not china. 21. Is any one hungry? 22. No one is hungry. 23. Are the generals here? 24. The generals and the blacksmiths are here. 25. I have your parasols and your umbrellas, and your children's.

Exercise 20 (Vol. I., page 79).

1. Votre petite sœur est-elle contente? 2. Oui, Madame, elle est contente. 3. Cette petite fille est-elle belle? 4. Cette petite fille n'est pas belle, mais elle est bonne. 5. Avez-vous de bon drap et de bonne soie? 6. Mon drap et ma soie sont ici. 7. Votre sœur est-elle heureuse? 8. Ma sœur est bonne et heureuse. 9. La sœur de ce médecin a-t-elle des amis? 10. Non, Madame, elle n'a pas d'amis. 11. Votre viande est-elle bonne? 12. Ma viande est bonne, mais mon fromage est meilleur. 13. Le libraire a-t-il un bel encrier de porcelaine? 14. Il a un bel encrier d'argent et une paire de souliers de cuir. 15. Avez-vous mes parasols de soie? 16. J'ai vos parapluies de coton. 17. L'habit de votre frère est-il beau? 18. Mon frère a un bel habit et une vieille cravate de soie. 19. Avez-vous des parents et des amis? 20. Je n'ai pas de parents, mais j'ai des amis. 21. Cette belle dame a-t-elle tort? 22. Cette belle dame n'a pas tort. 23. Avez-vous de belle porcelaine? 24. Notre porcelaine est belle et bonne. 25. Elle est meilleure que la vôtre. 26. Cette petite fille n'a-t-elle pas faim? 27. Cette belle petite fille n'a ni faim ni soif. 28. Qu'a-t-elle? 29. Elle n'a ni parents ni amis. 30. Cette montre d'or est-elle bonne? 31. Celle-ci est bonne, mais celle-là est meilleure.

LESSONS IN SHORTHAND.—XIII.

CONCLUSION.

201. Having at length conducted the student through a complete course of Phonography, under the personal guidance of the founder of the system, we propose to close our Lessons with a brief sketch of phonographic literature, from the pen of one who, as being wholly unconnected with Mr. Pitman, can speak freely, and, as being a professional shorthand writer of many years' standing, can also speak with authority. Our object in giving this sketch is twofold. In the first place, we desire to point out to the learner the abundant means he has at hand of pursuing, with the least possible expenditure of time and labour, the study of the art in which he should now be well grounded. In the second place, we desire to give some indication of the widely extended uses to which Phonography may be put as a medium for the intercommunication of thought, and of the signal triumphs it has already won for itself in that direction.

202. At the outset it is worthy of observation that Phonography is the only system of shorthand which has ever yet achieved a literature. Every other system begins and ends with the one lesson book which explains it to the world. It is true that the Bible was printed in Rich's system, from engraved plates, in 1689, and an abridged Prayer Book was lithographed by Lewis, the stenographer; but these two books, though the very best, do not make a library. The reason that no other system than Phonography has given to the world a shorthand literature, is that in no other system of shorthand is there the same definiteness and simplicity of principle, the same

certainty as to the meaning of the written character, the same general legibility utterly independent of the context. The Bible in Phonography is, to the practised student, as easy to read as the Bible in ordinary type. Nay more, so certain is the system in its results that the most intricate, the most technical, the most delicate correspondence may be carried on between two phonographers with all the clearness of the most legible longhand. Time makes no difference to its readableness: that which was written ten years ago is as easy to decipher as that which was written to-day. Nor is the memory called in to assist the eye in this matter. The writer once, when taking down a speech by one of our leading orators, fell into a profound reverie on a matter of deep personal interest, and awoke to consciousness to find as he supposed, that he had missed full ten minutes of an address which it was his duty to write out then and there for to-morrow morning's daily paper. Turning to his note-book in a kind of despair, his delight scarcely knew bounds when he found that the practised hand had registered every sound as it fell on the equally practised ear, and that every word that had been uttered was as legible to him as if it had been printed in bold Roman letters. It is probable that no other system of shorthand would this have been possible, because in no other system is the character so certain, the context so entirely a matter of indifference. And it is in virtue of this clearness, this certainty, this never-failing legibility, that Phonography has been able to make to itself a literature. One phonographer can read another phonographer's writing, provided such writing be not slovenly and imperfect, as easily as he can read his own, and he can read lithographed Phonography as easily as he can read print.

203. We now proceed to our sketch. Phonographic literature may be conveniently divided into four branches: 1. Educational, 2. Periodical, 3. Bibliothecal, 4. Recommendatory and Eulogistic.

204. In the Educational division we have first of all three works which lead the student up to the point at which we leave him—the "Phonographic Teacher," the "Phonographic Reader," and the "Manual of Phonography." These three books contain all that is necessary to induct the learner into a knowledge of the art as it is used in correspondence and business, and for making notes and memoranda. For the actual work of professional reporting, where greater speed and consequently greater brevity are requisite, there is, as will be seen directly, another set of books which, while utilising all that has gone before, develop the system almost indefinitely, rendering it possible to follow with ease the most rapid speaker. While grounding the student in Phonography proper, however, as distinct from the Reporting branch of the art, the three works we have mentioned are not the only ones belonging to this period of study. There is an invaluable little volume, upon which immense labour must have been expended, entitled "A Phonetic Shorthand and Pronouncing Dictionary of the English Language." It holds to Phonography the same relation which a dictionary holds to a language. In it are to be found the easiest and most legible methods of writing the longest and most awkward words. None but those who in the earlier stages of their learning have availed themselves of this useful little volume, know the difficulties it smooths over, or the ease and clearness it imparts to their writing. At this period, too, certain of the shorthand magazines give useful help to the student, but of these we shall speak presently.

205. We now come on to the Educational literature of the "Reporting Style"—that is, the style which is indispensable to the intending reporter. First of all there is the "Phonographic Reporter, or Reporter's Companion," which is to reporters' Phonography what the "Manual" is to ordinary Phonography. It lays down principles for shortening the system, gives additional grammalogues, leads the learner further into the labour-saving paths of phraseography, and closes with a number of admirably arranged exercises. As with the "Manual" so with the "Reporter's Companion:" it contains all that the student absolutely requires to know. But in the same manner as the "Dictionary" supplements the "Manual," so are there other works which supplement the "Reporter," and lighten the labour of practice. One of these is the "Phonographic Phrase Book," which contains, together with a preliminary essay on the principles of phraseography, somewhere between three and four thousand useful phrases, written in such a way as to combine the maximum of ease with the maximum of clearness. Two other works—the "Reporter's Reading Book" and the "Reporter's Guide"—complete with a few minor exceptions, the Educational literature of the "Reporting Style" of Phonography. The first contains elaborate reading lessons in shorthand, with a longhand key, enabling the student to practise from dictation and compare his work with a recognised standard of good Phonography afterwards. The second is filled with every sort of technical information concerning the preparation of copy for the press and the correction of proofs. Both are of very considerable value to the intending reporter, and may be consulted by all shorthand students with great advantage.

206. Turning to the Periodical literature of Phonography, we find that the system boasts a number of magazines, some of which appear weekly and some monthly. The majority of them are replete with articles which combine instruction with entertainment. Some of them contain papers which solve the student's difficulties, others give him valuable information upon points likely to be of special value to him in his profession. Others again travel out of the technical into the general, and win his suffrages by their literary merit alone. The uses of these magazines are simply incalculable. If we were to single out one of them, for the purpose of recommending it to the student, it would be the *Phonetic Journal*, published weekly, 1d. In addition to a large amount of literary matter, printed partly in the common spelling and partly in phonetic spelling, each number contains several pages of lithographed shorthand. Nothing is of more importance to the shorthand writer than that he should be able to read with ease what he has written; nor is there any point of practice more frequently neglected. It is too often forgotten that in learning a language the first thing we do is to read it fluently. It is too often thought sufficient to write swiftly and "let the reading come." No error is more fatal to accurate or swift transcription. And it is therefore that these phonographic magazines are so helpful to the student. They accustom him to read. They do more: they accustom his eye to correct spelling and correct form—both matters of prime necessity in all shorthand work. The reader of Dickens cannot forget how poor David Copperfield, after travelling a weary way through some antique system of stenography, until he was able to follow with difficulty Tom Traddles' impassioned declamation, suddenly found out that he had to retrace the whole journey, because he could not decipher a phrase of what he had written. So will it be with the student of Phonography unless he accustom his eye to read that which his hand may so readily be taught to trace; and in this view of the case we are by no means sure that we ought not to have included the phonographic magazines among the strictly educational literature of the system.

207. In the Bibliothecal division we have a proof at once of the capabilities of Phonography and the universality of its use among those who write shorthand. Nothing but a very large constituency of phonographers could repay the enterprise which has brought into existence so many handsome library volumes, all beautifully lithographed in shorthand—some in plain Phonography, and some in Reporting. First, we have a magnificent edition of the Holy Bible, to be had either in roan gilt or morocco gilt, in size an octavo, and, though written in ordinary Phonography, not thicker than a printed reference Bible such as one carries to his place of worship in his pocket. Then we have, similarly bound and got up, a Church Service and a book of Common Prayer, the former in Reporting, the latter in Phonography. The Bible complete is in Phonography, but parts of it, as for instance the New Testament, and some other portions, are published separately in handsome bindings in an easy Reporting Style. A list of all the published books it is, of course, impossible to give, but a catalogue may be obtained on application at the Phonetic Depôt, 20, Paternoster Row, London.

208. The fourth department of phonographic literature must be dismissed in a sentence or two. It consists mainly of tracts and pamphlets illustrative of the advantages of Phonography—wisely urging the young man setting out in life to master it, and pointing out the thousand and one ways in which it may be made subservient to the daily necessities even of those who can conceive of no present use for it. Some of these tracts are reprints of publications or speeches from America and the colonies; others have their origin nearer home. Others, again, are the production of the fertile brain and facile pen of the venerable inventor of Phonography, Mr. Isaac Pitman, who

The march back to the north was swift though orderly, and as soon as ever it was known that the retreat had begun, the Duke of Cumberland and Marshal Wade moved northward in pursuit. On the 18th of December the duke's advance came up with the rear-guard of the Highlanders near Lowther Hall, and gained a slight advantage over it, the main body of the rebels crossing the Esk on the 20th and 21st, after leaving the Manchester regiment in garrison at Carlisle. By the 23rd they reached Glasgow, and thence moved to join the army under Lord John Drummond, Lord Lewis Gordon, and the Master of Lovat, in order to make a combined attack on Stirling. General Hawley, who commanded the English troops in Scotland, attempted to release Stirling of the quasi siege which the Pretender laid to it, and suffered a discreditable defeat in his attempt. Fresh efforts were made in England to crush the insurrection, and the Duke of Cumberland was sent down to Scotland to take the chief command. After a short stay in Edinburgh, he relieved Stirling, on the 2nd of February, 1746, and strained every nerve to overtake the enemy, who had once more set off in their retreat northwards, and towards the end of the month made themselves masters of Inverness and of Fort George which protected it. An ineffectual siege was laid to Fort William, after which the Pretender had enough to do to collect his men to oppose the royal troops, who were gradually converging upon him at Inverness.

On the 16th of April, the Duke of Cumberland having come up with the rebels' main army at Culloden, gave orders for an immediate attack, which was made with infantry, cavalry, and artillery, upon the ill-conditioned force of the enemy. With singular valour the Highlanders fought against great odds, and for a while contested the fortune of the day; but after an obstinate battle, in which very many of their men perished, they were utterly routed. The Pretender fled for his life, and many of his followers fell into the hands of their enemies.

How the Duke of Cumberland behaved after the battle, how he won the surname of "the Butcher," and how, after Culloden, the Stuart cause was lost for ever, we have not space to show. It is certain that the Stuart cause was now irretrievably lost. Prisoners were taken in batches, those who were not summarily dealt with by martial law being handed over for trial to special commissions of gaol delivery, by whom great numbers were sentenced to death, while many more were transported for life. The Earl of Kilmarnock, Lord Balmerino, and Lord Lovat suffered on Tower Hill, after trial and condemnation by the House of Lords; many officers and gentlemen of less degree were hanged, drawn, and quartered, and their limbs were exposed in various cities of the kingdom. Prince Charles Edward, after undergoing great hardship and privation, living in incessant fear of being discovered, and roaming about from place to place in order to escape pursuit, was rescued from his forlorn situation on the 18th of September by two French men-of-war. On the 29th he landed in France, and subsisted during the rest of his life on the French king's bounty.

He was the last of his race who ventured to dispute the right of the British nation to dispose of the crown, and when he died, in 1788, without issue, there was no one left, except his brother, Henry Benedict, the Cardinal York, to perpetuate his claims. Since the battle of Culloden the House of Hanover has reigned in peace at home, by the grace of God and the will of the people.

LESSONS IN BOOKKEEPING.—XII.

SUBSIDIARY BOOKS—THE DAY BOOK.

In the following Day-Book, the entries of the Purchases and Sales of Cotton, detailed in the *Memoranda of Transactions*, are entered in the proper *Dr.* and *Cr.* form, and in business they would constitute the *original record* of these transactions. The *original documents* relating to these transactions would, of course, be found in the Invoice Book; those relating to Purchases, in the *Invoice Book inward*; and those relating to Sales, in the *Invoice Book outward*—the former consisting of the *actual invoices* sent in with the goods, which are usually pasted in a Blue Paper Book, or folded, endorsed, and put away in bundles; the latter consisting of *exact copies* of the actual invoices sent out with goods, generally taken in a copying-press.

(1) DAY BOOK. (1)

1881, January 7th.	Dr. £	s.	d.	Cr. £	s.	d.
Cotton Account Dr. to Osmond and Co.						
Bought 22 bags of Berbice Cotton, Net 7280 lbs., at 9½ per lb.	288	3	4	288	3	4
12th.						
Cotton Account Dr. to Andrews and Co.						
Bought 30 bags of Grenada Cotton, Net 9240 lbs., at 8½d. per lb.	327	5	0	327	5	0
26th.						
Cotton Account Dr. to Andrews and Co.						
Bought 14 bags of Maranham Cotton, Net 4350 lbs., at 7½d. per lb.	135	18	9	135	18	9
£	751	7	1	751	7	1
February 1st.						
Brown and Smith Dr. to Cotton Account	313	14	5	318	10	0
Sold 22 bags of Berbice Cotton, Net 7280 lbs., at 10½ per lb.						
Discount at 1¼ per cent.	4	15	7			
10th.						
Cotton Account, Dr. to White and Co.	199	0	3	202	0	10
Bought 24 bags of West India Cotton, Net 7460 lbs., at 6½d. per lb.						
Discount at 1½ per cent.	3	0	7			
Carried forward £	520	10	10	520	10	10

(2) DAY BOOK. (2)

February 14th.	Dr. £	s.	d.	Cr. £	s.	d.
Brought forward	520	10	10	520	10	10
Williams and Co., Dr. to Cotton Account	168	2	6	170	13	8
Sold 14 bags of Grenada Cotton, Net 4312 lbs., at 9½d. per lb.						
Discount at 1½ per cent.	2	11	2			
17th.						
Cotton Account Dr. to White and Co.	226	2	4	229	11	2
Bought 24 bags of West India Cotton, Net 8476 lbs., at 6½d. per lb.						
Discount at 1½ per cent.	3	8	10			
21st.						
Williams and Co. Dr. to Cotton Account	192	2	10	195	1	4
Sold 16 bags of Grenada Cotton, Net. 4928 lbs., at 9½d. per lb.						
Discount 1½ per cent.	2	18	6			
25th.						
Charges Account Dr. to James Manning	3	12	2	3	12	2
For his Brokerage on £721 12s. 0d. at ½ per cent.						
Carried forward £	1119	9	2	1119	9	2

(3) DAY BOOK. (3)

February 25th.	Dr. £	s.	d.	Cr. £	s.	d.
Brought forward	1119	9	2	1119	9	2
Cotton Account Dr. to East India Company	721	12	0			
Bought 10 Lots of Madras Cotton (prompt, April 25th), viz.,						
Lot No. 1, containing 12 bales, Net 4320 lbs., at 4d. per lb.				72	0	0
„ 2 „ 12 „ 4260 „ „ „				71	0	0
„ 3 „ 12 „ 4132 „ „ „				68	17	4
„ 4 „ 12 „ 4084 „ „ „				68	1	4
„ 5 „ 12 „ 3976 „ „ „				66	5	4
„ 6 „ 12 „ 4092 „ „ „				68	4	0
„ 7 „ 12 „ 4300 „ 4½d. „				80	12	6
„ 8 „ 12 „ 4184 „ „ „				78	9	0
„ 9 „ 12 „ 3896 „ „ „				73	1	0
„ 10 „ 12 „ 4004 „ „ „				75	1	6
£	1841	1	2	1841	1	2
March 13th.						
Spencer and Co. Dr. to Cotton Account	160	13	7	163	2	6
Sold 14 bags of Maranham Cotton, Net 4350 lbs., at 9d. per lb.						
Discount 1½ per cent.	2	8	11			
16th.						
Thompson and Co. Dr. to Cotton Account	257	12	1	264	4	2
Sold 24 bags of West India Cotton, Net 7460 lbs., at 8½d. per lb.						
Discount 2½ per cent.	6	12	1			
22nd.						
Althorpe and Co. Dr. to Cotton Account	141	6	8	141	6	8
Sold 12 bags of West India Cotton, Net 4240 lbs., at 8d. per lb.						
24th.						
Cotton Account Dr. to Baring, Smith, and Co.	288	1	3	288	1	3
Bought 30 bags of Demerara Cotton, Net 9218 lbs., at 7½d. per lb.						
£	856	14	7	856	14	7

descends into the vale of years, not only accompanied by the gratitude of thousands whose labours he has lightened, but cheered by the consciousness that he has benefited millions who, as they read their morning paper, little dream that they are indebted to a still living benefactor for the accuracy, the speed, and to some extent the cheapness with which they are furnished with the report of last night's debate or public meeting. When we mention that all the educational works we have enumerated (except the "Reporter's Guide" and the "Reporter's Reading Book"), and by far the larger number of those which we have classed under the other three heads of division, have been produced under Mr. Pitman's own superintendence, and the lithography executed by his own hand, we shall have thrown an additional light upon the Herculean task which has been undertaken and accomplished by him, under whose guidance our shorthand students have been piloted so pleasantly through the preliminary difficulties of an invaluable art. To add that full particulars concerning all the works to which we have referred in this brief and necessarily inadequate notice, may be obtained by application to Mr. Isaac Pitman, Phonetic Institute, Bath, or of his brother and London publisher, Mr. Fred. Pitman, 20, Paternoster Row, is to close our task, and with it our "Lessons in Shorthand."

LESSONS IN ENGLISH.—XVII.

SUFFIXES (*continued*).

LANGUAGE has many a tale to tell respecting national character and manners. The fact that the English names of animals, when alive, are of Saxon origin—for example, *bull, sheep, calf*—and that the English names of animals, when dead, are of French origin—as *beef, mutton, veal*—in showing that at one period of our history the Saxon population fed the animals, and those who spoke the French language ate them, shows also that the former were in hard servitude to the latter; in other words, that our Saxon ancestors were serfs, and that the Norman-French were masters on this soil of England.

Such a relation was not likely to be durable. A proof of the assertion is found in the words etiquette and coquette, to which reference was made in the last lesson (page 71). Etiquette and coquette are both of French origin. Essentially French are the things the words stand for. Among the French those things had their birth, and on the soil of France they flourished. Hence you learn that lightness, weakness, and vanity are essential features in the character of Frenchmen. Superficial, if pleasing, a true type of the French character may outshine, or for a moment overcome, an Englishman, but he is utterly unable to hold our countryman in permanent subjection.

Equally illustrative of national character is the fact that Pantaloon and Punch come to us from Italy. Pantaloon is from the Italian Pantalone, which when written in full is Piantaleone, a word signifying *lion-planter*. Pianteleone was a surname or name of honour, given in the Middle Ages to a very powerful Venetian, who planted the banner bearing the winged lion of St. Mark, the symbol of the Venetian Republic, on many islands of the Mediterranean. His renown caused Piantaleone to be brought on the stage. Hence Pantaloon, the lion-hearted, who originally bore a nearer resemblance to his prototype than is found in the impudence and hardihood of the modern degenerated specimen. And hence the peculiar dress of Pantaloon (also trousers called *pantaloons*), which, making due abatement for exaggerations, was the attire of distinguished Italians in former days.

Our Punch owes his birth and his name to Italy. Punch is derived from the Italian Pulcinello; and Pulcinella seems to be made up of Puccio d' Aniello; that is, Puccio, an ill made, witty clown of the town Aniello, who gained a livelihood by his antics in the market-places and public highways. The character being transferred to the stage, Punch came to be the recognised symbol of fun and frolic.

Ion, from the Latin termination *io*; as actio, *action*; quæstio, *question*; motio, *motion*; visio, *vision*. Nouns in *ion*, like nouns in *ing*, may be called verbal, seeing they are derived immediately from verbs; as actio, from the Latin verb ago (participle passive actus), *I do*; motio, from the Latin verb moveo (participle passive motus), *I move*, etc. Nouns in *ion*, again, resemble nouns in *ing*, in having (for the most part) an active signification; but the ending *ion* differs from the termination *ing*, inasmuch as the former can be affixed only to nouns of Latin parentage: thus, we say the communi*cation*, or the communicat*ing*; but WE CANNOT SAY the *runion (running)*, nor the ris*ion* (*rising*). Nouns in *ion* are not so purely active as are nouns ending in *ing*. For instance, communi*cation* may signify either the act of communicat*ing*, or the thing communicated, the *result* of the act of communicat*ing*. So devot*ion* may denote the act of devot*ing*, or the object devot*ed*.

Ique, from the Latin *iquus*, another form of *icus*; as in antiquus, *antique*. *Antiquus* means *ancient*; but *antique* does not mean ancient merely or generally, so much as ancient in relation to the immediate past, the age of the Reformation, the Middle Ages. Not seldom has antique the subordinate notion of *curious, singular*, or *odd* connected with it; probably because *antiques* are rare.

> "Name not these living death-heads unto me,
> For these not ancient but *antique* be."—*Donne.*
>
> "And sooner may a gulling weather-spy,
> By drawing forth heaven's scheme, tell certainly
> What fashion'd hats or ruffs, or suits next year,
> Our giddy-headed *antique* South will wear."—*Donne.*

The word *antic*, from *antique* (formerly spelt *antick*), takes its force from this associated notion of singularity.

> "We cannot feast your eyes with masks and revels,
> Or courtly *antics*."
> *Shakespeare.*
>
> "Within the hollow crown
> That rounds the mortal temples of a king
> Keeps Death his court; and there the *antick* sits
> Scoffing his state."
> *Shakespeare.*
>
> "A work of rich entail and curious mold,
> Woven with *anticks* and wild imagery."—*Spenser.*

Ise, formerly *ize*, of Greek origin, introduced through the New Testament; as in the word bap*tise*, from the Greek *βαπτίζω*, pronounced bap-ti'-zo, *I dip frequently*. From the same Greek ending we have dogmat*ise*, methodi*se*, criti*cise*. This termination gives rise to others; as from baptizo come bapt*ist*, bapt*ism*, bapt*istry*, bapt*ismal*.

"He (the pope) solicited the favour of England by sending Henry a sacred rose, perfumed with musk, and anointed with *chrism*."—*Hume.*

—anointed; that is, with a consecrated unguent or *holy oil*.

The suffix *ise* or *ize*, added to nouns, gives them the force of verbs, thus: to christian*ise*, is to make Christian; to evangel*ise*, is to bring men to the evangel, that is, the Gospel. In the use of this termination authority must be followed.

The termination *ism* is employed to describe religious or social diversities; it is found in Atheism, Deism, Swedenborgian*ism*, Calvin*ism*, Arminian*ism*, Owen*ism*, etc.

While *ism* denotes the sect, *ist* denotes the sectary; as, Atheist, Deist, Methodist, etc.

The adherents to particular modes of faith are also designated by *arian*; as, Trinitar*ian*, Unitar*ian*; or *ian*, as Episcopal*ian*. Sometimes the word *man* holds a similar post, as in Church*man*, used in contrast with Dissenter. *Ist*, too, performs the same office; as in Nonconformist. Another form is found in *ite*; as Irving*ite*, Mormon*ite*, etc. Analogy is a dangerous guide in English, for, while we say Irving*ite*, we DO NOT say Southcot*ite*, but Southcot*ian*—probably for the sake of euphony. This *ite* comes, we are disposed to think, not from the rare Latin ending *itus* (as auri*tus*, *with pricked-up ears*), but the scriptural *ite*; as in Jebus*ite*.

Ish, probably from the Saxon *ic* and the German *isch* (as in mürr*isch*, peev*ish*), denotes, as in peev*ish*, quality, and so forms adjectives. *Ish* has sometimes a diminutive force; as thinn*ish*, thick*ish*. When forming part of verbs, as in punish, puib*ish*, *ish* has a different origin, and may be a softened form of the Greek termination *ise* or *ize*.

Ite, a patronymic, or father-name—the name that is expressive of a race, like the Greek *ides*—is very common in the Old Testament, from the language of which it may have come into the English; thus, Israel*ite* is *a descendant of Israel*; so we have Hitt*ites*, Hiv*ites*, etc.

Ive, of Latin origin, from *ivus*, as seen in capt*ivus*, *a captive*; also in fugit*ive* (Latin, fugio, *I flee*); nat*ivus* (Latin, natus, *born*), *a native*; vot*ivus* (Latin, votum, *a vow*), *votive*. This *ivus* in French becomes *if*, whence we have plaint*iff* (French, plaindre, *to complain*), the *complainant* in a suit in opposition to the defendant. Plaint*iff* and plaint*ive* are the same words differently employed.

"We were here entertained with an echo repeating a whole verse in a softer and more *plaintive* tone, indeed, but with surprising precision and distinctness."—*Eustace, "Italy."*

Ix. For remarks on this suffix and its meaning, see *Or*.

RECREATIVE NATURAL HISTORY.

THE FROG.

"WHAT are the frogs about this morning, mother?" said a keen little country boy to a stout dame, who was carrying on her head a basket of live poultry to the neighbouring market town. "Oh, bless'ee, child," replied the matter-of-fact woman, "how should I know what the frogs be a-doing? Thee'd better be a-larning yer Catechism for schoolmaster, than go a woolgathering about them frogs." The boy felt he should get no help from "mother," though he "did mightily wish to know" what made the frogs croak so much in the early twilight of that spring morning.

Now, reader, can *you* tell why the frogs were thus croaking from every shallow pool and moat? Draw near to the places whence the sounds proceed. What multitudes of frogs are just showing their heads above the water; how earnestly they give out that croak, croak, croak; and their bright eyes show a singular excitement for such cold creatures! See what a gluey-like substance, speckled with numerous black spots, floats on the water. Ah! that explains the agitation in the frog kingdom this morning. The race of these creatures is not to perish, like the dodo or the old English rat; provision is now being made for the next generation of these unlovely but interesting reptiles. The black specks in that jelly-looking substance are the eggs, which have just been deposited, and the parents are singing a merry ditty on the happy occasion. By each one of those female frogs above 1,200 eggs will be placed in the water, where the sun will gradually develop the hidden life in each dark speck.

Has the reader ever traced the growth of a frog from the egg? The process is worthy of observation. Let us collect some of that substance in which the eggs are embedded, and place it in a vessel, with some of the water and weeds from the pool. We may now be able to watch all the changes. What is the first transformation? The eggs become marked with little burrows, some vital power being clearly at work within. Next we see, in place of the egg, a tiny lump of jelly-like life, which clings to one of the water weeds. How does it hold on? By a small sucker, which it clearly knows how to use. Is this, then, the first form of the frog baby? The reader may call it so, if he please, but it is not a frog at all yet. Mark the third change; our bit of jelly has acquired gills and a tail, and see how swiftly it moves in the water. It is now really a *fish*, though called a tadpole. But what is going to happen? The animal is changing again; a pair of hind legs are forming. This is the fourth state. What next? A pair of front limbs are developed, and it is now evident that the creature does not mean to remain a fish; it has reached the fifth transformation. But what has become of the long tail? Has a part dropped off? Certainly not; it has been *absorbed* into the animal's system, and will soon entirely disappear. We have here reached the sixth stage in a frog's life. The month now gradually widens, assuming the form which belongs to the fully-developed reptile. Are the transformations complete now? No; the most remarkable change is the last. Hitherto the creature has breathed by gills—a beautiful living machine for obtaining oxygen from water; but now a means must be provided for breathing air. Lungs, therefore, are gradually formed, and the whole series of wonderful transmutations is complete. Thus our frog has passed through eight changes, each bringing him one step nearer to the final shape and condition. All these mysterious processes can be noted by many readers for themselves, and some will, doubtless, take opportunities for tracing the frog from its cradle to "full age." In warm and moist weather the newly-perfected frogs appear in such multitudes that the lanes swarm with the little creatures, and it is difficult to walk without stepping on them. Indeed the rustics of some districts believe in "frog showers," thus accounting for the sudden and numerous swarms of hopping reptiles.

Catch a full-grown frog, place him under a glass vessel into which air can freely enter, and watch him. How he puffs! What causes that gasping, gulping motion in his throat? He is swallowing air, and *forcing* it into the lungs. The task is evidently a laborious one; see how tightly he shuts the mouth at intervals, lest the air should escape. Why must the creature use such violent efforts to keep its lungs inflated, when we breathe almost unconsciously? Our ribs keep the chest expanded without exertion; but the frog has *no ribs*, and a succession of "gulps" is necessary to draw sufficient air into the lungs. No doubt the absence of ribs is good for the frog, but the work of filling "the chest" is much harder in consequence. When a man is engaged in strong exercise, and requires an increased supply of air, the mouth is opened to allow of more free breathing; but if we keep the frog's mouth open for a short time, the animal dies from suffocation. The frog can, however, absorb air through his skin, having in this respect some advantage over us. Indeed, the covering membrane of this animal may be called an absorbing machine, as by it the reptile can imbibe, in a short time, water equal in weight to that of the whole body. Suppose a man weighing one hundred pounds were capable of absorbing through his skin, in one hour and a half, a hundred-weight of water, this would only be on a par with the imbibing power of the frog. Thus it happens that the animal has generally a supply of water at command, and when suddenly startled from a soft resting-place, indignantly ejects a quantity of pure water at the intruder. At one time this emitted fluid was supposed to be poisonous; but if any reader is enthusiastic enough to *taste* the liquid, he will ascertain its nature. There will not be much to boast of in this feat, the experiment having been often made.

The skin of the frog is, in places, so transparent, that the blood may be seen circulating in the vessels beneath, by the aid of a powerful microscope. The foot shows this beautiful process in the most impressive degree.

Can a frog bite? The reader can put his finger for a short time into the reptile's mouth, and thus get a reply for himself. We say for a short time, presuming that the experimenter does not wish to suffocate his frog, which would be the result of long keeping its mouth from closing. Well, our naturalist has made the trial, and finds that nothing like a bite can be given. There are, indeed, about eighty teeth in the mouth, but they are all in an undeveloped state. The frog can "bolt," but not masticate its food, and why teeth are given at all is a mystery.

The use to which a frog or toad can put its tongue is best seen when the creature is at dinner, feasting on insects and ants. The tongue then acts as a javelin, a trap, and a hand. How still the reptile stands, as he feeds; how rapidly that wonderfully elastic tongue darts out upon the unsuspecting ants; how sure is the aim; how firmly the prey is held by the trap-like point: and how instantaneously the living food is hurried to the captor's mouth! When the meal is over the tongue is doubled up, the tip being then at the back of the mouth. The frog may well dispense with teeth, having such a compensating apparatus.

The *heart* of a frog has some resemblance to that of a fish, having, strictly speaking, but two divisions instead of the four found in the hearts of the larger animals. This reptile is rather a phlegmatic little fellow, the circulation of the blood being very slow, though quick enough for all his wants.

We have referred to the absence of ribs in the frog, but the creature has a well-set, though short spine, and its muscular strength is enormous. Measure the length of a frog's leap, when the jump is done in good style. It will often be found that this dull-looking creature is able to leap about fifty times its length at one bound. If a man had muscular power equal to that of a frog he could clear 300 feet at a jump, and would be able to leap over a wall 100 feet high. What lover of gymnastics will not henceforth look upon a frog with deep respect!

These reptiles and their cousins, the toads, can endure surprisingly long fasts, for months sometimes, especially if allowed the privilege of living in a damp place. They also reach a comfortable old age, living to about fifty years, when permitted to pass life in a quiet and do-nothing style. But some readers may here remind us that frogs and toads have been said to live for hundreds of years, in the hearts of trees or rocks, without food or air. If this were so, we should say these were very lucky frogs indeed, and we should like to possess one of the breed. We might, indeed, offer a silver medal to any

LESSONS IN PENMANSHIP.—XXXII.

LEGAL HANDWRITING.—II.

AS a useful supplement to our last lesson in Penmanship, in which we gave the student an example of engrossing-hand, with a few brief hints on the method of holding the pen, and the general principles on which the letters were formed, we now give him a complete set of the capitals and small letters used in German text-hand. These alphabets will prove useful to the young law-writer, or any one who is endeavouring to acquire a style of handwriting suitable for a law stationer's office, since, from these letters as copies, it is possible to write in the proper manner any word occurring in any deed or legal document in German text-hand, such as the word "Whereas," at the commencement of the first line of the piece of writing given as a specimen of engrossing-hand in our last lesson. (See page 208.)

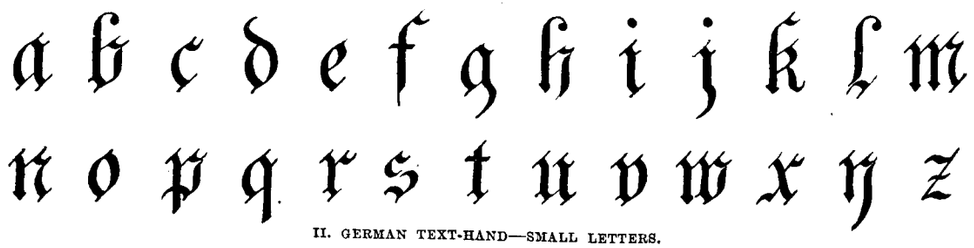


I. GERMAN TEXT-HAND—CAPITAL LETTERS.

Let us look first through the capital letters, and note the strokes that occur most frequently in their composition. In our ordinary writing alphabet of capital letters, almost every letter is formed by a succession of strokes that run into one another, up-stroke into down-stroke, and down-stroke into up-stroke, without a break. In the capitals in German text-hand, on the contrary, each letter is formed of three or more strokes, which are connected, it is true, but which are formed separately as a succession of independent strokes, some of which are brought into contact in some letters, while in others there is no connecting link whatever between the component parts.

The letter **A** is formed of six separate strokes, omitting to count as a stroke the fine diagonal line at the bottom of the large curved stroke to the right of the letter, since it may be added without lifting the pen from the paper. The first stroke is a curve almost circular in form, drawn from left to right, commencing with a hair-stroke, widening in the middle into a broad stroke, made by exerting a gradual pressure on the pen, narrowing once again into a hair-stroke, and terminating in a full point. This stroke, with slight modifications, enters into the composition of **A**, **B**, **H**, **M**, **N**, **P**, **R**, **S**, **U**, **V**, **W**, and **Y**, nearly half the letters of the alphabet. The second stroke, which comes immediately under the first stroke in **A**, crossing it a little to the right of the full point, is a curved stroke drawn down with a slight inclination from left to right. It is found larger or smaller, according to circumstances, in **A**, **B**, **C**, **E**, **F**, **G**, **H**, **I**, **K**, **L**, **M**, **N**, **O**, **P**, **S**, **T**, **U**, **V**, **W**, and **Y**, or all the letters of the alphabet except five, the same form of letter serving for **I** and **J**. The third and fourth strokes—namely, the thin perpendicular stroke, and the thicker horizontal stroke in the centre of the letter—are of little importance. The fifth stroke, at the top of the letter to the right, is merely a repetition of the second stroke on a smaller scale, while the sixth is a modification of the second, entering in this modified form into the composition of the letters **A**, **M**, **N**, and **U**.

The left-hand portion of the letter **B** is somewhat similar to the left-hand half of **A**, except that the first stroke terminates to the right of the second, instead of passing under it to the left and finishing in a full point. The brace to the right of the letter **B** occurs again, with a little difference in the termination at the bottom, in the letters **K** and **R**, and even in **Q**. The upper part of the brace in each letter is a modification of the second stroke in **A**, and the lower part in **K** and **R** is also a modification of the same stroke. The lower part of the brace in **B** is found in the first stroke in **A**. In **C** we find that the left-hand part of the letter is a stroke like a crescent, which occupies the same position, with very nearly the same form, in the letters **G**, **O**, **Q**, and **T**. The long thick stroke that forms the top and front of the letter **D** may be also traced in **O**, **Q**, and **X**. The horizontal curved stroke, commencing with a hair-stroke, and terminating abruptly in a broad-stroke, which forms the bottom of the letter **D**, is found again in the letters **F**, **H**, **I**, **K**, **R**, **S**, **V**, and **X**. The long serpentine stroke which forms the bottom of the letter **E** is also used for the bottom of the letter **L**. A modification of it is found in the stroke that forms the top of the letter **T**, and in the top and bottom of the letter **Z**, which resembles the form ordinarily used in writing to represent this letter.



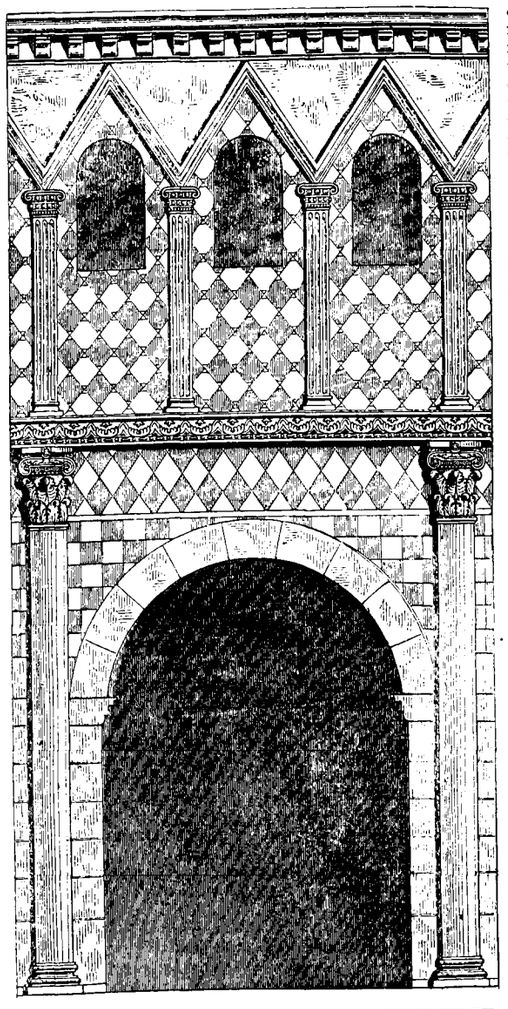
II. GERMAN TEXT-HAND—SMALL LETTERS.

By paying attention to this analysis of the strokes used in the formation of the capital letters of German text-hand, the student will soon get into the habit of shaping his letters regularly, and with that degree of uniformity that is so necessary if the writer wishes to make a good display in this kind of writing. He may make for himself, if he will, an analysis of the small letters, noting first of all that the strokes in the small letters commence and terminate, for the most part, in square blunt ends, bending right or left from the perpendicular down-stroke that enters so largely into their composition, and that these square ends are mostly finished with a fine diagonal line trending upwards from left to right.

LESSONS IN ARCHITECTURE.—VII.

ROMAN ORDERS OF ARCHITECTURE—TUSCAN ORDER—COMPOSITE ORDER.

THE origin of the Tuscan order of architecture is involved in obscurity. During the era of the kings of Rome, it appears that this order was followed in the buildings of the Romans; but it originally belonged to the people of Etruria or Tuscany, and in that country remains of this order are found which can be traced to a very remote antiquity. The characteristic qualities of the Tuscan style were solidity and grandeur, features in which it resembled the ancient Egyptian architecture, with less gigantic but more graceful forms. To whom the Etrurians were indebted for their style of architecture cannot now be determined, or whether it originated entirely with themselves. Some, indeed, say that they brought it from the East; but we cannot agree with those who would deprive it of all originality, and assert that it was only the ancient Doric stripped of its finest features. The early Romans, who used this style, did not invent it; for they were mere warriors and not artists. They adopted from time to time the arts of the nations which they conquered. Hence, first came the Tuscan style, and then the Grecian orders, to be adopted by the Romans. The Temple of Jupiter Capitolinus—begun by Tarquinius Priscus, and finished by Tarquinius Superbus—said to have been built by workmen from Etruria, and the tomb of Porsenna, king of that people, were splendid early specimens of this order; but no remains of them are to be found. The column of Trajan, built about a century after the Christian era, and which remains to this day, is considered to be a remarkable specimen of the Tuscan column.



PORCH OF THE ABBEY OF LORSCH, OR LAURISHEIM.

After the introduction of the Grecian orders of architecture into their edifices, the Romans chiefly employed Greek artists, and made no alteration in the form of these orders, except sometimes blending them together in the same building. In general, they employed the Corinthian order, as the most elegant; and a modification of this order is attributed to them, as the only attempt which they made at originality in architecture. But some are inclined to believe that even this invention was due to some Greek architect. This new order was called the Composite, because it was, in fact, a compound order, made by the union of the Corinthian and the Ionian orders. The power, the wealth, and the vanity of the Romans led them to increase the number, the magnitude, and the decorations of their edifices to a degree far beyond those of Greece. In the theatre of Marcellus, and in the Coliseum, the Doric and the Ionic styles were both introduced; but the Corinthian style, with its rich ornaments, was most adapted to the tastes of the masters of the world; and as if not left by the inventors in a shape sufficiently expressive of splendour and magnificence, they loaded every member of it with ornaments unknown to the Greeks. In the Composite, sometimes called the Roman order, there was especially a profusion of ornament: and there was scarcely a moulding which was not loaded with decorations. When the particular members could receive no more ornaments, they had recourse to varying the outlines of their edifices (particularly their temples) into every shape that could be produced by the union of circular and triangular figures. Specimens of the Roman style of architecture are to be seen in the arch of Titus and the baths of Diocletian; and two magnificent capitals are to be seen in the baptistery of Constantine, which belonged to some elder edifice whose history is now unknown. A representation of the Tuscan and Composite orders will be given in the next lesson.

In the decline of the Roman empire, Constantine the Great transferred the capital from Rome to Byzantium, as Constantinople was then called, and attempted to make the latter city rival the former in monumental grandeur by erecting immense public edifices. Here, however, as in Italy, art and science took a retrograde course, and the elegant orders invented by the Greeks rapidly lost their original purity and simplicity. A new style was then grafted on Roman art; the capitals lost their graceful outlines, and assumed cubical forms; the columns were shortened, and the entablature no longer possessed its regular proportions. This style of architecture was called the Byzantine; its ornamentation was no more that of Rome. It again approached the older Greek style, but shorn of the grandeur and magnificence of the whole, and of the exquisite beauty of its details. The Byzantine style lasted during the period of the Eastern empire, and to this day it is employed by the Greeks in their buildings. From the combined influences of that empire, and the memorials which Rome still preserved, in the first ages of the Christian era, of the finest periods of her architecture, a variety of styles arose, of which the oldest was called the Latin style, because it was adopted by the whole of the Latin Church. Numerous examples of this style are to be found in Italy, and some in France; such as the churches of St. Laurence (without the walls) and St. Agnes, at Rome; the ancient baptistery of St. John, at Poitiers, etc. This style, in which may be found all the divisions of an order, was preserved entire until the age of Charlemagne, of which the cathedral of Aix-la-Chapelle, and the porch of the monastery of Lorsch, or Laurisheim, a town of Germany in the grand duchy of Hesse-Darmstadt, are striking proofs. After the reign of this emperor, new innovations and a retrograde movement in the forms of the orders of architecture led to the Romanesque style, in which all regular proportion was completely abandoned, while in most of the applications of this style the entablature was altogether omitted. From the Romanesque to the pointed

one producing a frog which has lived even ten years without food or air, without fear of being out of pocket by the proposal.

Many of our readers are aware of the experiments made to test such reports, but to others they may be unknown, and we will therefore describe them, as we hope that they will not be repeated. Toads were selected for the experiments, but the results would, doubtless, be true for frogs. A French naturalist shut up three toads in close boxes for eighteen months; at the end of the time one was dead, and the remaining two in a dying state. Dr. Macartney buried a toad in a vessel, covered with a slate only, a foot deep in the ground. At the end of a fortnight the creature seemed "all right," and as plump as before. He then enclosed the same toad in an air-tight vessel, and buried it; in a week the animal was dead, and even much decayed. But the most decisive experiment was carried out by Dr. Buckland. He placed twelve toads separately, in twelve holes cut in blocks of soft limestone, and also a like number of toads in twelve blocks of hard, flinty sandstone. Each of the twenty-four cells was covered with a plate of glass, over which a slate was placed, and each cover firmly cemented to its own stone. The imprisoned toads, thus secured, were buried three feet deep on the 26th of November, 1825. At the same time four toads were deposited in holes cut in the heart of an apple-tree, the opening being securely plugged up. Four others were also placed in a plaster of Paris bowl, and completely covered with a luting. The thirty-two reptiles were examined on the 10th of December, 1826. Mark the result. On that day every toad in the hard stones, all in the tree, two in the plaster of Paris, and all the small ones in the soft limestone, were dead. The remaining two in the plaster were dying; but several in the pervious stones were in tolerable health, and of these two were actually fatter than when placed in the holes. It is thought that some water had filtered through the more porous stone, and insects had certainly penetrated into one cell. The surviving toads were placed in their respective holes for another year, and at the end of that period *all* were dead. Thus, not one toad out of thirty-two could live even for two years, when deprived of air and food. Yet there are thousands of people who still firmly believe that toads and frogs can exist for ages without nourishment in the heart of a rock. No doubt these reptiles are often found strangely enclosed in hollows of trees and stones; but if their hiding-places were closely examined, it would often be found that some small opening existed, through which an egg might have been carried by water. The animal, when hatched in its hidden rock-pool would be unable to escape, and an aperture, however minute, would admit drops of water and even small insects, on which a frog might live very comfortably for many years.



THE FROG.

We need not inform the reader that one species of frog is eaten in many countries, and is said to be as delicious as a crab. It is called the *edible* frog, and is not only sold largely in the markets on the Continent, but is known in England also, being found in the fenny parts of Cambridgeshire, where its peculiar croak has gained for it the poetic or ironical name of the "Cambridgeshire Nightingale."

Has the frog ever been employed as a *doctor?* To this strange question we must answer, Yes. In Lincolnshire and the surrounding counties it was, and perhaps still is, the custom to use this reptile in curing a baby's sore mouth, called in those parts the *frog*. The ignorant mother actually thrust the living animal into the child's mouth, holding the struggling frog by its hind legs. We hardly know whether to pity the baby or the reptile most. In some parts of Great Britain women believe that stomach affections, and even consumption, may be cured by swallowing a frog alive! To judge by one case, the revolting remedy was at least harmless; one of these frog swallowers, a Mrs. Mary Inglis, being alive in 1857, aged eighty years. Some Wiltshire farmers have a notion that live frogs are an excellent medicine for the "cud" disease in the cow, and administer the dose without the slightest regard to the frog's feelings or the cow's tastes.

Among the various species of frogs that exist, the tree-frog is one of the most peculiar. It is found in Europe as well as different parts of America and Asia. Speaking of the tree-frog, Sir Emerson Tennent says: "In the shrubberies around my house at Colombo (Ceylon), these graceful little frogs were to be found in great numbers. They possess in a high degree the power of changing their colour, and one which had seated himself on the gilt pillar of a dinner lamp, was scarcely to be distinguished from the ormolu to which it clung. They are enabled to ascend glass by means of the suckers at the extremity of their toes."

Literature has not scorned to notice the frog. One of the ancient Greek poets has represented this sedate reptile as a warrior of mettle, in the comic poem, "The Battle of the Frogs and the Mice." The reader who wishes to see how the two singular armies behaved will, of course, study the poem for himself. The great comic poet of ancient Athens, Aristophanes, named one of his dramas "The Frogs," and all who wish to hear how poetically these creatures can chant, and what a first-rate chorus they make, will find their curiosity gratified in that play. The ballad-makers of Queen Elizabeth's time must have seen something humorous in this animal, as they have celebrated his courtship in the once-popular song—

"The frog would a-wooing ride,
With his buckler by his side."

The reader will not fail to observe the high respect paid to the creature in these verses; he is provided with a horse and a shield, being, in fact, treated as of knightly rank. The modern version of the old ballad is, we regret, less dignified, though more domestic—

"Froggie would a-wooing go,
Whether his mother would let him or no."

The heralds, too, have complimented the frog by having sometimes placed his figure as a symbol on knightly tombs. It is supposed by some that three frogs constitute the proper national armorial bearings of France, instead of the three fleur-de-lys. That this is not at all improbable, any one may see, who will take the trouble to compare an heraldic fleur-de-lys with the outline of a frog laid on its back and having its legs extended.

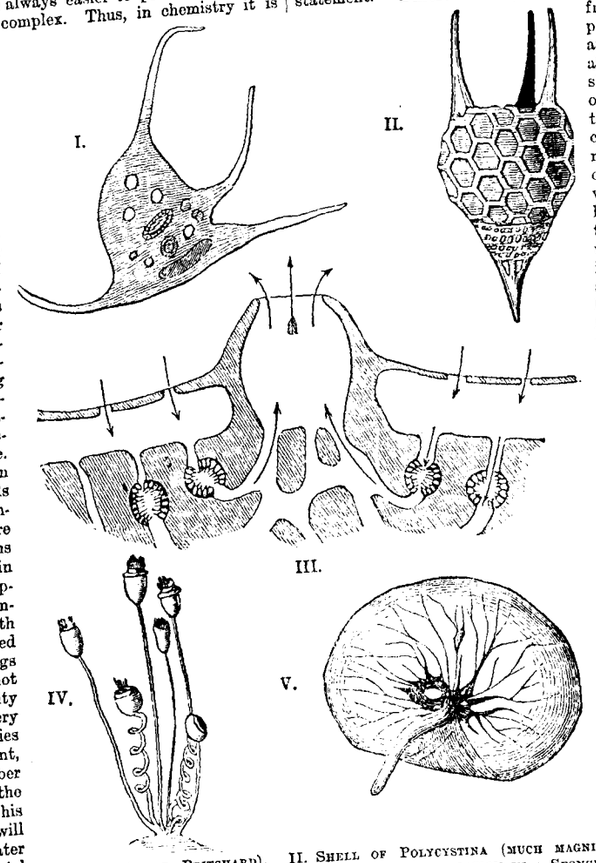
We must not entirely pass over the connection of the frog with *science*. Galvanic electricity is now a mighty agent, stooping to cure "the rheumatics," or whispering a telegram from India. What can that have to do with a frog? Many readers will surely remember how galvanism was discovered by the convulsive movements of a skinned frog, which Madame Galvani had prepared for her learned husband's dinner. The reptile, having been placed near an electrified substance, displayed that strange muscular excitement which induced Dr. Galvani to investigate the matter. The inquiry ended, as we know, in the great discovery which bears his name.

Thus, our frog has the fivefold honour of being harmless in habits, interesting for its transformations, useful as food, associated with literature, and connected with science.

COMPARATIVE ANATOMY.—III.

SUB-DIVISIONS OF THE ANIMAL KINGDOM—TABLE OF SUB-DIVISIONS OR CLASSES—PROTOZOA.

THE main divisions into which the animal kingdom is divided were given in the last lesson. We have now to sub-divide these branches into classes, a class being the next lower denomination in our arrangement. The order in which we now enumerate the classes will be an ascending one. We shall proceed from the lowest animals to the highest. This order is evidently the more scientific, because, other things being omitted from the consideration, it is always easier to proceed from the more simple to the more complex. Thus, in chemistry it is usual first to treat of the elements, or the most simple forms of inert matter, and then to proceed to compounds, made by the unions of these elements. By this method of procedure it is true that we deprive the student of anatomy, who has just commenced the study, of a valuable aid. In studying the higher animals, a knowledge of his own body, however superficial, the consciousness of what he feels, however faulty the inductions therefrom, and the constant presence of a similar living subject on whom to experiment, all furnish illustrations to the tyro of structure in relation to life. When, however, we begin by a description of animals so far removed from himself as the Protozoa, there is nothing which he learns about them which fits in with his previous conceptions. The animals themselves can inspire him with little interest as compared with those higher beings with whom we have not only an essential community of structure, but whose very instincts and sympathies we share. The student, however, should remember that his conceptions of the phenomena of life, and his interest in animals, will dawn upon him with greater clearness and a more genial warmth, as he proceeds and arrives at the study of the higher forms, by having first mastered the successive steps by which the great problem of life has been worked out. One question must be answered before we can proceed along the road which we have decided to be the best and safest. When may an animal be said to be higher or lower than another in the scale of the animal creation? The self-complacent assumption that man is the highest animal, and that an animal is higher or lower in proportion as he is more or less like to him, will serve us but little; because, as we have seen, animals cannot be ranged in a single series, and there is no link of connection between some of the branches we have given and that to which we belong. One principle alone should guide us in our arrangement, and that is illustrated by the following axiom:—An animal may be said to be higher than another if its structure is more complex. If an animal performs many or all of the functions of life by or through one structure, it is low in the scale; but if certain parts are separated and assigned to the performance of definite vital acts, which acts are therefore done more efficiently, then the animal occupies a higher station. Just as political economists will tell us that nations are more or less civilised in proportion as the principle of the sub-division of labour is followed out in their communities, so the comparative anatomist will esteem that animal the highest whose body is made up of the greatest number of *different* organs. This idea has given origin to a technical term, which, though barbarous English, is useful for conciseness. When the reader meets with the expression that an animal manifests greater *differentiation of parts* than another, he will henceforth know not only what is meant, but also the bearings of the statement. Differentiation, however, must be distinguished from *multiplication* of parts. The possession by an animal of many organs all alike in function and structure, is a sign rather of a low than of a high station. A worm's body is composed of very many rings, while the bee has only thirteen at most; but, with the exception of the head and tail segment of the worm, they are all alike, while every ring of the bee is dissimilar. This latter animal, therefore, is much higher, because it manifests a greater differentiation of organs.



I. AMŒBA (AFTER PRITCHARD). II. SHELL OF POLYCYSTINA (MUCH MAGNIFIED). III. SECTIONAL DIAGRAM SHOWING THE CIRCULATION IN A SPONGE (AFTER HUXLEY). IV. GROUP OF VORTICELLÆ (MAGNIFIED). V. NOCTILUCA MILIARIS (MUCH MAGNIFIED).

The tendency of an animal to produce a repetition of the same structure, whether the structures so formed be set forth in a radical manner or in a longitudinal series, is called a "*vegetative repetition of parts.*"

The most prominent feature in the vegetable forms which clothe the landscape, and which therefore give to us our ideas of vegetable life, is their unlimited growth, resulting in the almost infinite production of like parts. The forest tree has ten thousand leaves, all built upon a framework of netted veins of the same pattern. When the chestnut puts forth its "milky cones," it does so in rich profusion, and each of these bears many flowers, all alike. Thus, the phrase *vegetative repetition* is derived from the most prominent feature presented to and impressed upon the mind as associated with vegetable life. Combining this idea of vegetable growth with the knowledge that the vegetable kingdom has never developed any organic form at all comparable for the exhibition of the higher functions of life to those which we find in the animal kingdom, we assume that this vegetative repetition of parts is a sign of a low grade of structure: so doubtless it is, but it is not a sign of *the lowest* grade. In tracing upward the different forms assumed by living animals, the idea strikes the mind that Nature's first effort was to form a simple individual like a cell. The next step seems to be an indefinite multiplication of similar cellform bodies in such connection with one another as to form an aggregate individual, and then these parts become more specialised and consequently more interdependent, and at the same time more definite and fewer in number.

In the following table we have, as far as it was possible,

style the transition was easy. In the latter, the column departed still more from the rules established by antiquity; it was lengthened out of all proportion, and degenerated into a group of slender pillars. Towards the end of the Middle Ages, the fact of the numerous relations which subsisted between Italy and all parts of Europe, and of the continued existence in that country of the principles and specimens of ancient architecture, led to a return to the established rules of the Greeks and the Romans. This return produced a change in the appearance of architectural monuments in Europe. This epoch, which was called the Renaissance period, brought back the different orders to reasonable and true proportions, and architecture has continued in this state, with more or less variation, to the present day. In a future lesson we shall give a brief account of the various styles of architecture that have prevailed in Great Britain at various periods.

LESSONS IN GREEK.—IX.

THE THIRD DECLENSION *(continued)*.

NOUNS WHOSE STEM ENDS IN A CONSONANT.

c. The Nominative appends σ to the stem.

OF this sub-division the first class has a stem which ends in a *p* sound, or in a *k* sound; that is, in either *β*, *π*, *φ*, or in *γ*, *γγ*, *κ*, *χ*. Observe that *σ* with a *p* sound makes *ψ*; and with a *k* sound, makes *ξ*.

Singular.

	Storm.	*Raven.*	*The gullet (throat).*
Nom.	ἡ λαιλαψ.	ὁ κοραξ.	ὁ λαρυγξ.
Gen.	λαιλἄπ-ος.	κορἄκ-ος.	λαρυγγ-ος.
Dat.	λαιλἄπ-ι.	κορἄκ-ι.	λαρυγγ-ι.
Acc.	λαιλἄπ-α.	κορἄκ-α.	λαρυγγ-α.
Voc.	λαιλἄψ.	κοραξ.	λαρυγξ.

Plural.

Nom.	λαιλἄπ-ες.	κορἄκ-ες.	λαρυγγ-ες.
Gen.	λαιλἄπ-ων.	κορἄκ-ων.	λαρυγγ-ων.
Dat.	λαιλἄψ-ι.	κοραξ-ι.	λαρυγξ-ι.
Acc.	λαιλἄπ-ας.	κορἄκ-ας.	λαρυγγ-ας.
Voc.	λαιλἄπ-ες.	κορἄκ-ες.	λαρυγγ-ες.

Dual.

N.A.V.	λαιλἄπ-ε.	κορἄκ-ε.	λαρυγγ-ε.
G.D.	λαιλἄπ-οιν.	κορἄκ-οιν.	λαρυγγ-οιν.

Here belong the adjectives in *ξ* (gen. *-γος*, *-κος*, *-χος*) and *ψ* (gen. *-πος*), as *ὁ, ἡ ἁρπαξ*, *-ἄγος* (Latin *rapax*, English *rapacious*); *ὁ, ἡ ἡλιξ*, *-ῐκος*, *æqualis*, of the same age; *ὁ, ἡ μωνυξ*, *-ὕχος*, one-hoofed, having solid hoofs (*μονος*, alone, one, and *ονυξ*, a hoof); and *ὁ, ἡ αιγιλιψ*, *-ῐπος*, lofty.

VOCABULARY.

Αγων, *-ωνος*, ὁ, a contest in the public games.	Και—*και*, both—and.	Συριγξ, *-ιγγος*, ἡ, a shepherd's pipe, Pandean (from the rural divinity, Pan) pipes.
Αθηναιος, ὁ, an Athenian.	Κολαξ, *-ἄκος*, ὁ, a flatterer.	Τεττιξ, *-ῐγος*, ὁ, the grasshopper.
Αιξ, *αιγος*, ἡ, a she-goat.	Κρωζω, I croak.	Φεναξ, *-ἄκος*, ὁ, a deceiver.
Αλεκτρυων, *-ονος*, ὁ, a cock.	Μαστιξ, *-ῐγος*, ἡ, a whip, scourge.	Φορμιγξ, *-ιγγος*, ἡ, the harp.
Αλλα, but, *μεν*—*δε*, particles denoting a contrast.	Μυρμηξ, *-ηκος*, ὁ, the ant.	*Ωιδη, *-ης*, ἡ, song, ode (from *ᾀδω*, I sing).
Ελαυνω, I drive.	Ορτυξ, *-ῦγος*, ὁ, a quail.	Ωψ, *ωπος*, ἡ, the countenance, fair.
Ἱππος, *-ου*, ὁ, a horse.	Ορχηθμος, *-ου*, ὁ, a dance.	
	Οψ, *οπος*, ἡ, voice (Latin, *vox*).	
	Πολυπονος, *-ον*, laborious.	

EXERCISE 25.—GREEK-ENGLISH.

1. Οἱ *κορακες κρωζουσιν*. 2. *Τους κολακας φευγε*. 3. *Απεχου του φενἄκος*. 4. Οἱ *ανθρωποι τερπονται φορμιγγι και ορχηθμῳ και ᾠδῃ*. 5. Οἱ *ἱπποι μαστιξιν ελαυνονται*. 6. Αἱ *φορμιγγες τους των ανθρωπων θυμους τερπουσιν*. 7. *Τεττιξ μεν τεττιγι φιλος, μυρμηκι δε μυρμηξ* (sc.† *εστιν*). 8. Οἱ *ποιμενες προς τας συριγγας ᾀδουσιν*. 9. *Παρα τοις Αθηναιοις και ορτυγων και αλεκτρυονων αγωνες ησαν*. 10. Οἱ *ποιμενες τας των αιγων αγελας εις τους λειμωνας ελαυνουσιν*. 11. *Μυρμηκων και ορτυγων βιος πολυπονος εστιν*. 12. *Πολλοι αγαθην μεν ωπα, κακην δε οπα εχουσιν*.

EXERCISE 26.—ENGLISH-GREEK.

1. I avoid a flatterer. 2. Ravens croak. 3. You are delighted by the harp. 4. Dances delight men. 5. They drive the horses with (dat.) a whip. 6. The minds of men are led by the harp. 7. The pipe (plural) delights shepherds. 8. The she-goats are driven to the meadow. 9. The shepherd sings to the pipe. 10. The daughter has a beautiful face, but a bad voice.

Of another class under this head, the stem ends in a *ι* sound, that is, in either *δ*, *τ*, *κτ*, *θ*, or *νθ*. The nouns in the ensuing table are *ἡ λαμπας* (instead of *λαμπαδ*), a torch; *ἡ κορυς* (instead of *κορυθ*), a helmet; *ὁ, ἡ ορνις* (*ορνιθ*), a bird; *ὁ αναξ* (*ανακτ*), a king; and *ἡ ἑλμινς* (*ἑλμινθ*), a tapeworm.

Singular.

Nom.	λαμπας.	κορυς.	ορνις.	αναξ.	ἑλμινς.
Gen.	λαμπἄδ-ος.	κορὕθ-ος.	ορνῐθ-ος.	ανακτ-ος.	ἑλμινθ-ος.
Dat.	λαμπἄδ-ι.	κορὕθ-ι.	ορνῐθ-ι.	ανακτ-ι.	ἑλμινθ-ι.
Acc.	λαμπἄδ-α.	κορυν.	ορνῖν.	ανακτ-α.	ἑλμινθ-α.
Voc.	λαμπας.	κορυς.	ορνῖς.	αναξ.	ἑλμινς.

Plural.

Nom.	λαμπἄδ-ες.	κορὕθ-ες.	ορνῐθ-ες.	ανακτ-ες.	ἑλμινθ-ες.
Gen.	λαμπἄδ-ων.	κορὕθ-ων.	ορνῐθ-ων.	ανακτ-ων.	ἑλμινθ-ων.
Dat.	λαμπᾶ-σι.*	κορὖ-σι.*	ορνι-σι.*	αναξ-ι.*	ἑλμῐ-σι.*
Acc.	λαμπἄδ-ας.	κορὕθ-ας.	ορνῐθ-ας.	ανακτ-ας.	ἑλμινθ-ας.
Voc.	λαμπἄδ-ες.	κορὕθ-ες.	ορνῐθ-ες.	ανακτ-ες.	ἑλμινθ-ες.

Dual.

N.A.V.	λαμπἄδ-ε.	κορὕθ-ε.	ορνῐθ-ε.	ανακτ-ε.	ἑλμινθ-ε.
G.D.	λαμπἄδ-οιν.	κορὕθ-οιν.	ορνῐθ-οιν.	ανακτ-οιν.	ἑλμινθ-οιν.

The noun *ὁ, ἡ παις*, child, has in the vocative *παι*.

Here belong the adjectives in *ις* and *ι* (gen. *-ἰδος*, *-ἰτος*), as *ὁ, ἡ ευχαρις*, *το ευχαρι* (gen. *-ἰτος*), pleasing, graceful: also those in *ας* (gen. *-ἄδος*), as *ὁ, ἡ φυγας* (gen. *φυγἄδ-ος*), an exile, or banished person: those, too, in *ης* (gen. *-ητος*), as *ὁ, ἡ αργης* (gen. *-ητος*), white: those, moreover, in *ως* (gen. *-ωτος*), as *ὁ, ἡ αγνως* (gen. *αγνωτος*), unknown: and those in *ις* (gen. *-ἰδος*), as *ὁ, ἡ αναλκις* (gen. *αναλκῐδος*), without strength; *ἡ πατρις* (sc. *γη*, land), gen. *πατρῐδ-ος*, one's native country: finally, those in *ὑς* (gen. *ὕδος*), as *ὁ, ἡ νεηλυς* (gen. *νεηλὕδος*), recently come.

VOCABULARY.

Αδελφη, *-ης*, ἡ, a sister.	case acts as an *intensive*, that is, it strengthens the force of the verb.	Ὁμοιοτης, *-ητος*, ἡ, likeness, resemblance.
Αδελφος, *-ου*, ὁ, a brother.	Ερις, *ερῐδος*, ἡ, strife.	Παις, *παιδος*, ὁ, ἡ, a child, son, daughter
Ἁπας, *ἁπασα*, *ἁπαν*, (*ἁ*, giving the force of together [*ἁ* from *ἁμα*, together]), all together, so of combination.	Ερως, *-οτος*, ὁ, love (English *erotic*, as in erotic poems).	Πας, *πασα*, *παν*, every; in the plural, *παντες*, all.
Απορια, *-ας*, ἡ, want of means, destitution, need.	Κακοτης, *-ητος*, ἡ, baseness.	Πενης, *πενητος*, ὁ, ἡ, poor.
Γελως, *-ωτος*, ὁ, laughter.	Κατακρυπτω, I conceal.	Πλουσιος, *-α*, *-ον*, rich.
Εγειρω, I stir up, arouse, awaken.	Κολαζω, I punish, chastise.	Πλουτος, *-ου*, ὁ, wealth
Ελπις, *ελπῐδος*, ἡ, hope.	Κουφος, *-η*, *-ον*, light, light-minded.	Φιλοχρημοσυνη, *-ης*, ἡ, love of money, avarice.
Ενεγειρω, *εγειρω* with *εν*, which in this	Μακαριζω, I account happy, congratulate.	Φροντις, *-ῐδος*, ἡ, care.
	Νεοτης, *-ητος*, ἡ, youth.	Χαρις, *-ῐτος*, ἡ, loveliness, pleasingness, favour, benefit, gratitude (Latin *gratia*, English *gratis*).
	Νυξ, *νυκτος*, ἡ, night.	

EXERCISE 27.—GREEK-ENGLISH.

1. Οἱ *ορνιθες ᾀδουσιν*. 2. *Χαρις χαριν τικτει, εριν εριν*. 3. *Μακαριζομεν την νεοτητα*. 4. *Απορια τικτει εριδας*. 5. *Πλουσιοι πολλακις την κακοτητα πλουτῳ κατακρυπτουσιν*. 6. *Ω καλε παι, στεργε τον αγαθον αδελφον και την καλην αδελφην*. 7. *Ἡ φιλοχρημοσυνη μητηρ κακοτητος ἁπασης εστιν*. 8. Οἱ *πενητες πολ-*

* The *iota*, which is *subscript* with small letters, is written *by the side* of capitals, but not sounded; thus *ᾠδη* becomes *Ωιδη*, and *ᾀδω* becomes *Αιδω*.

† Note, *sc.* stands for *scilicet* (that is, *scire licet*), and points out that a word is understood, that is, left out, and is to be supplied; *sc.* is therefore equivalent to our *that is*, or *supply*; so here, *sc. εστιν* means that the verb *εστι*, *is*, being omitted by the author, must be supplied by the reader.

* Instead of *λαμπαδσι*, *κορυθσι*, *ορνιθσι*, *ανακτσι*, and *ἑλμινθσι*.

λακις εισιν ευδαιμονες. 9. *Ἡ σοφια εν τοις των ανθρωπων θυμοις θαυμαστους των καλων ερωτας ενεγειρει*. 10. *Ὁ θανατος τους ανθρωπους φροντιδων απολυει*. 11. *Ἡ φιλια δια ὁμοιοτητος γιγνεται*. 12. *Οινος εγειρει γελωτα*. 13. *Εν νυκτι βουλη τοις σοφοις γιγνεται*. 14. Οἱ *σοφοι κολαζουσι την κακοτητα*. 15. Οἱ *ανθρωποι πολλακις κουφαις ελπισι τερπονται*.

EXERCISE 28.—ENGLISH-GREEK.

1. Birds sing. 2. Favour is begotten by favour, strife by strife. 3. By (dat.) wisdom (there) is awakened in men's minds a wonderful love of good things. 4. I am delighted with the song of birds. 5. The songs of birds delight the shepherd. 6. We delight in (dat.) birds. 7. Men follow kings. 8. Men obey the king.

There are neuter nouns which belong to this class. The stem of these neuter nouns ends in *τ* and in *κτ*, as *γαλα*, milk, *γαλακτ-ος*, of milk. As the laws of euphony do not endure a *τ* or *κτ* at the end of a word, the *τ* and the *κτ* disappear in the nominative, or pass (as in *ους*, gen. *ωτος*, an ear) into *σ*. Thus, *το σωμα*, *σωματος*, a body; *το γονυ*, *γονατος*, a knee; *το γαλα*, *γαλακτος*, milk, and *το ους*, *ωτος*, an ear, are declined as follows:—

Singular.

Nom.	σωμα.	γονυ.	γαλα.	ους.
Gen.	σωμἄτ-ος.	γονἄτ-ος.	γαλακτ-ος.	ωτ-ος.
Dat.	σωμἄτ-ι.	γονἄτ-ι.	γαλακτ-ι.	ωτ-ι.
Acc.	σωμα.	γονυ.	γαλα.	ους.
Voc.	σωμα.	γονυ.	γαλα.	ους.

Plural.

Nom.	σωμἄτ-α.	γονἄτ-α.	γαλακτ-α.	ωτ-α.
Gen.	σωμἄτ-ων.	γονἄτ-ων.	γαλακτ-ων.	ωτ-ων.
Dat.	σωμᾶ-σι.*	γονᾶ-σι.*	γαλαξ-ι.*	ω-σι.*
Acc.	σωμἄτ-α.	γονἄτ-α.	γαλακτ-α.	ωτ-α.
Voc.	σωμἄτ-α.	γονἄτ-α.	γαλακτ-α.	ωτ-α.

Dual.

N.A.V.	σωμἄτ-ε.	γονἄτ-ε.	γαλακτ-ε.	ωτ-ε.
G.D.	σωμἄτ-οιν.	γονἄτ-οιν.	γαλακτ-οιν.	ωτ-οιν.

Like *γονυ* (stem *γονατ*) decline *το δορυ*, a spear, *δορἄτος*, *δορἄτι*, etc.; dat. pl. *δορᾶσι*.

VOCABULARY.

Αμαρτημα, *-ἄτος*, *το*, a failing, a fault, sin.	Ἱδρως, *ἱδρωτος*, ὁ, sweat.	Σπενδω, I pour out, make a libation.
Ἁπτομαι, I hang on something, I touch.	Ἱκετης, *-ου*, ὁ, an entreater, petitioner.	Σπευδω, I hasten.
Βασταζω, I bear, carry.	Μικρος, *-α*, *-ον*, small.	Ταυτολογια, *-ας*, ἡ, saying the same thing again, repetition.
Βοηθημα, *-ἄτος*, *το*, help.	Μυθος, *-ου*, ὁ, a speech, word.	Φαυλος, *-η*, *-ον*, radically bad.
Γευομαι, I taste.	Νυμφη, *-ης*, ἡ, a nymph.	Χρημα, *-ἄτος*, *το*, a thing for use; in the plural, goods, property.
Γυμναζω, I exercise.	Ποικιλος, *-η*, *-ον*, various, variegated.	Χρηστος, *-η*, *-ον*, useful, good.
Διαμειβομαι, I exchange.	Πραγμα, *-ἄτος*, *το*, a deed, thing.	Χωρισμος, *-ου*, ὁ, a separation.
Εθιζω, I accustom.	Ῥημα, *ῥημἄτος*, a thing spoken, a word.	
Θεραπεια, *-ας*, ἡ, care, service.		

EXERCISE 29.—GREEK-ENGLISH.

1. *Εν χαλεποις πραγμασιν ολιγοι ἑταιροι πιστοι εισιν*. 2. Οἱ *ἱκεται των γονατων ἁπτονται*. 3. *Ὁ θανατος εστι χωρισμος της ψυχης και του σωματος*. 4. *Ὁ πλουτος παρεχει τοις ανθρωποις ποικιλα βοηθηματα*. 5. *Μη πειθου κακων ανθρωπων ῥημασιν*. 6. *Μη δουλευε, ω παι, τῃ του σωματος θεραπεια*. 7. Οἱ *Ἑλληνες ταις Νυμφαις κρατηρας γαλακτος σπενδουσιν*. 8. *Εθιζε και γυμναζε το σωμα συν πονοις και ἱδρωτι*. 9. Οἱ *αδολεσχαι τειρουσι τα ὠτα ταις ταυτολογιαις*. 10. *Την ψυχην εθιζε, ω παι, προς τα χρηστα πραγματα*. 11. Οἱ *φαυλοι μυθοι των ωτων ουχ ἁπτονται*. 12. *Τοις ωσιν ακουομεν*. 13. *Μη εχθαιρε φιλον μικρου ἁμαρτηματος ενεκα*. 14. *Γευου, ω παι, του γαλακτος*. 15. Οἱ *στρατιωται δορατα βασταζουσιν*.

EXERCISE 30.—ENGLISH-GREEK.

1. O young men, exercise your (the) bodies with labour and sweat. 2. We strive after good deeds. 3. Many men delight in gold. 4. From a good deed arises glory. 5. We admire the good words of the wise. 6. The good deeds of good men are admired. 7. The soldiers fight with (dat.) spears. 8. I do not exchange the wealth of virtue for (dat.) kings. 9. Obey ye not the words of the bad.

* For *σωματσι*, *γονατσι*, *γαλακτσι*, *ωτσι*.

KEY TO EXERCISES IN LESSONS IN GREEK.—VIII.

EXERCISE 21.—GREEK-ENGLISH.

1. Pay respect to the old man. 2. Worship the divinities. 3. Shepherds guard flocks. 4. Avoid the bad man as a perilous harbour. 5. Without the divinity man is not happy. 6. God dwells in the upper air. 7. Often severe cares waste away the minds of men. 8. Follow good leaders, O beloved (O friend). 9. O young man, get out of the way of the aged. 10. Often the people have an unjust disposition (as their) leader. 11. God is the punisher of those who are too elated. 12. Have a sound mind. 13. O God, bestow good fortune on old men. 14. Huntsmen capture lions.

EXERCISE 22.—ENGLISH-GREEK.

1. Οἱ *αγαθοι παιδες τους γεροντας θεραπευουσι*. 2. Οἱ *γεροντες θεραπευονται ὑπο των αγαθων παιδων*. 3. Οἱ *σωφρονες νεανιαι εικουσι της ὁδου τοις γεροντι*. 4. *Ἑπεσθε, ω φιλοι, αγαθῳ ἡγεμονι*. 5. *Εχομεν αγαθους ἡγεμονας*. 6. *Ὁ λεως πολλακις ἑπεται κακοις ἡγεμοσι*. 7. *Ὁ Θεος παρεχει ευτυχιαν τοις σωφροσι*. 8. Οἱ *λεοντες θηρευονται ὑπο των θηρευτων*. 9. *Το Θειον σεβομεθα*.

EXERCISE 23.—GREEK-ENGLISH.

1. Love your father and your mother. 2. Be not thou a slave to the belly. 3. Rejoice, O dear youth, in thy good father and thy good mother. 4. Consult not with a bad man. 5. There were many beautiful temples to (in honour of) Demeter (Ceres). 6. The good daughter willingly obeys her dear mother. 7. Good men are admired. 8. Often a bad son is born of a good father. 9. I hate the bad man. 10. Shining glory follows good men. 11. Persephone (Proserpine) was the daughter of Demeter (Ceres). 12. O dear daughter, love thy mother. 13. Virtue is an honourable prize for a wise (skilful) man. 14. Good sons love their fathers and their mothers. 15. The Greeks worship Demeter. 16. O dear youths, obey your fathers and your mothers. 17. O dear father, gratify thy beloved daughter.

EXERCISE 24.—ENGLISH-GREEK.

1. *Ω νεανιαι, στεργετε τον πατερα και την μητερα*. 2. *Αἱ αγαθαι θυγατερες τοις πατρασι και ταις μητρασι πειθονται*. 3. Οἱ *πολιται την Δημητερα σεβονται*. 4. *Τῃ Δημητρι ἑπεται ἡ Περσεφονη*. 5. *Τον αστερα θαυμαζομεν*. 6. *Ω θηρευται, μη δουλευετε τῃ γαστρι*. 7. *Αγαθη μητηρ αγαθην θυγατερα στεργει*. 8. *Ω μητερ και πατερ, στεργετε τους παιδας*. 9. *Ὁ ανηρ εχθαιρεται*. 10. *Τον ανδρα εχθαιρουσι*. 11. *Τοις σοφοις ανδρασι πειθονται*. 12. *Τῃ Δημητρι ἑπομαι*. 13. *Πολλακις εξ αγαθου πατρος και μητρος γιγνονται κακοι υἱοι*.

RECREATIVE NATURAL HISTORY.

THE CAMEL FAMILY.

IT is not often that one sees a camel in this country. Our knowledge of it is derived from accounts of Eastern travel, in which we find it, as a rule, to receive a fair share of notice; so that we have come to associate its name with turbaned men and veiled women, flat-roofed houses and gilded minarets, pyramids and obelisks, but more than all with sandy deserts. When we do get an occasional glance at it, it is in one of our travelling menageries or at a zoological garden; and sometimes amidst all the pageantry of a circus procession, where, but for its odd, hump-backed appearance, it would be unnoticed among the gilded chariots, armoured knights, and the fantastically dressed men and women, headed by a more noisy than musical brass band. Far different are the processions in which the camel has been wont to travel. In the East, among hundreds of its fellows forming a caravan, it has been burdened with baggage, provisions, or riders, and has patiently trod on its weary way under a burning sun, on scorching sands, to the tune of the monotonous song sung by an Arab guide. Yet, notwithstanding the hardships to which it must be subjected, for days without water, and fed with next to no food, travellers tell us that the camels there are fine animals compared with the specimens one meets with here, which only give us an exaggerated idea of their ungainly appearance and lumbering gait. Indeed, if external beauty had to be taken as a mark of the value of an animal, the camel would not be worth much; but just as the sober plumage of the nightingale is no index of the value set upon it by admirers of its song, so the ugly exterior of the camel affords no idea whatever of its real value to man, who has learnt to appreciate its many genuine qualities.

appended a typical and familiar example or examples to each class; so that the student may have a concrete idea of each, which will at least assist his memory, and perhaps suggest much of the structure of the class to which it is appended. The derivation of the names is also given, so that these terms, which are so useful for the purpose of expressing definitely each class, may not be considered as mere senseless jargon:—

TABLE OF THE SUB-DIVISIONS OR CLASSES OF THE ANIMAL KINGDOM.

DIVISIONS.	SUB-DIVISIONS OR CLASSES.	EXAMPLES.
PROTOZOA.	*Gregarinidæ* (gregarius, *associating together*).	Internal parasite of a humble-bee.
	Rhizopoda (ῥιζα, *a root*; πους, *a foot*).	Sun animalcule.
	Polycystina (πολυς, *many*; κυστις, *a bag*).	
	Thalassicollidæ (θαλασσα, *the sea*; κολλα, *jelly*).	Sea jellies.
	Spongidæ.	Sponge.
	Infusoria (infundo, *to pour in*; *i.e.*, animals obtained by pouring water on different matters).	Vorticella.
CŒLENTERATA.	*Hydrozoa* (ὑδωρ, *water*; ζωον, *a living being*).	Medusa.
	Actinozoa (ακτις, *a ray or beam*).	Sea anemone, and sea daisy.
ANNULOIDA.	*Echinodermata* (εχινος, *hedgehog*; δερμα, *skin*).	Sea urchin, sea cucumber.
	Helminthozoa (ἑλμινς, *a maggot*).	Tape-worm.
ANNULOSA.	*Annelida* (anellus, *a little ring*).	Earth-worm.
	Crustacea (crusta, *a hard rind*).	Lobster, crab, wood-louse.
	Arachnida (αραχνη, *a spider*).	Spider, mite.
	Myriopoda (μυριος, *numerous*; πους, *a foot*).	Hundred-legs.
	Insecta (inseco, *to cut up*).	Wasp, butterfly.
MOLLUSCOIDA.	*Polyzoa* (πολυς, *many*; *i.e.*, compound animals).	Sea mat.
	Brachiopoda (βραχιων, *arm*).	Lamp shell animal.
MOLLUSCA.	*Ascidioda* (ασκος, *a flask*; ειδος, *a form*).	Tunicate.
	Lamellibranchiata (lamella, *a plate*; branchiæ, *gills*).	Cockle, mussel.
	Branchiogasteropoda (βραγχια, *gills*; γαστηρ, *stomach*).	Whelk, limpet.
	Pulmogasteropoda (pulmo, *a lung*.)	Snail, slug.
	Cephalopoda (κεφαλη, *head*).	Nautilus, squid.
VERTEBRATA.	*Pisces* (piscis, *a fish*).	Perch, shark.
	Amphibia (αμφι, *both*; βιος, *life*.	Frog, newt.
	Reptilia (repo, *to creep*).	Lizard, turtle, snake.
	Aves (avis, *a bird*).	Duck, eagle.
	Mammalia (mamma, *a dug*).	Kangaroo, ox.

Protozoa.—Although we have given under the branch Protozoa a number of classes such as are to be found in treatises on these animals, the characters upon which these classes have been formed are so very unsatisfactory that it is better to give a general description of these animals as a whole.

In all the animals higher than the Protozoa tissues are found which have a definite complex structure, the most constant and the ultimate element of which is a cell which is a little round or oval bag with fluid contents, and often a more or less solid minute lump, called a nucleus. Many of the parts of the higher animals are entirely made up of immense multitudes of these cells closely pressed together, and none of these animals, when perfect, but exhibit a cellular structure in some of their parts. In the Protozoa, however, no structure, cellular or other, has been found. We may take as a type of the simple Protozoa the animal called the amœba, which is found in fresh water-ditches. It seems to consist of a little elastic mass of jelly-like consistence, without cells or structure of any kind. If this little lump of glue-like matter be placed in a watch-glass under water, and observed with a microscope, it soon protrudes from its rounded exterior projections, which become extended into what may be called temporary limbs. With these it moves about, fixing some in the direction in which it is travelling; it then draws the remainder of its body towards them, while they grow shorter and disappear in the general mass, and fresh ones are put forth from any other part of the body, as the animal wills. The higher animals are bound together by membranes, and moved by muscles; but how these little creatures are held together and move is a mystery, since they have no muscular tissue, and no cellular membranes.

The mode of eating, if so it may be called, is equally simple and strange. Some of them swallow almost every substance they come near which is not too big to be surrounded by their elastic bodies. They, however, have no mouths, gullets, or stomachs, but they first gather their false limbs around the food, and then press it into the substance of their bodies, or extend themselves around it until they close it in. Whatever good can be obtained from it is dissolved, and then it is squeezed out again. A creature nearly allied to amœba has received the appropriate name of Pamphagus mutabilis, or the ever-changing universal swallower. The temporary projections are very changeful in the same animal, but they are very different in character in the different animals. In the amœba they are few, large, and thick; but in the actinophrys they are long, thin, tapering, and stretch away in all directions, like the rays of light from the sun when veiled or surrounded with thin clouds. Like these sunbeams they neither unite nor branch, hence the animal is called the ray or sun animalcule. Another form, called Gromia, sends out projections which branch and re-branch, and run into one another wherever they meet. All these temporary limbs are called pseudopodia, which means *false legs*; and the possession of them has given them the name of root-footed animals, because of their fancied resemblance to the roots of a tree. The body substance from which they are formed is called *sarcode*. This term *sarcode* is a good illustration of the use and the necessity of technical terms. The Greek word σαρξ (sarks) means flesh, and the term *sarcode* is well applied to express the fleshy substance of these animals; but if the English word *flesh* had been used, it would convey a totally false idea, because, as we have seen, it is the main peculiarity of these animals that their substance is *unlike* flesh. Thus, by taking the word *sarcode*, and applying it to that kind of fleshy substance possessed by Protozoa as distinguished from all other kinds of flesh, we have established a definite and useful term. The body substance of these simple animals is not, however, wholly alike throughout. Sometimes it breaks up into fine fragments in the internal parts, and becomes *granulated*, as it is called, and sometimes it exhibits a great many holes or cavities. These are, however, temporary modifications. On the other hand, there are usually to be found in the substance of the sarcode two kinds of constant organs which retain their places. One of these is called the *contractile vesicle*, which keeps constantly slowly growing and then suddenly collapsing. The other is a knot of opaque matter, called the nucleus. The former is probably a respiratory organ for pumping fresh aërated water into the deeper substance of the body from the outside, and the latter is the reproductive organ.

Thus we see that the sarcode is able to perform a great many functions, such as locomotion, secretion, deglutition (swallowing), and digestion, although the means whereby it does all this is unknown. The nature of the sarcode is now receiving the attention of the patient German investigators, and it will probably turn out that its structure is not so simple as was once supposed. However, these animals are good examples of the want of differentiation of parts, as we should naturally expect, since all naturalists have placed them lowest in the animal scale.

Hitherto we have confined ourselves to the description of the simple forms of the Protozoa, but many of these animals have the power of reproducing, by buds from their sides, fresh lumps of sarcode like the original one, and these remain in connection with one another, and so form very complex animals. These complex forms usually secrete on their outsides a shell whose form is often regular, complicated, and beautiful, in proportion as the process of budding is regular and symmetrical. We indicate some of the methods by which budding produces complex shells:—

1. Suppose the little lump of sarcode send forth a narrow neck on one side, and another little mass is developed at its end; and then this should send forth another neck in the same straight line with the first, and the process be continued while a shell is secreted to envelope the whole, it will then be in the shape of a beaded rod.

2. If the second neck be not in the same straight line with the first, but a little to one side and in the same plane, and this mode of growth go on, a shell like that of the nautilus will be produced.

3. If, in addition to being on one side of the line of the first, it be raised a little out of its plane, this method will produce a shell like that of a trochus or top-shell, the first segment of which will be at the apex of the shell, and the last at the mouth.

4. If, as is sometimes the case, the first or second segment is not content to put forth one neck at a time, but sends out numerous ones all round the same plane, and these each put forth one to form a fresh circle outside the first, a discoid shell of concentric circles will be formed, whose outward form will be like that of a penny-piece.

These methods do not by any means exhaust the process by which the budding of the Foraminifera (as the shelled Protozoa are called) produce shells, but are only examples of them.

The animals called Polycystina produce most beautiful shells, differing, however, in composition from those of the Foraminifera, in that they are composed of flint and not of chalky substance; the first being represented by the chemical formula SiO_2, and the last by $CaCO_3$. These shells, of both kinds, derive much interest from the fact that they are now being deposited in immense numbers on the bed of the Atlantic Ocean. In surveying for the purpose of laying the Atlantic telegraph, a number of cut quills, with their open ends downward, were attached to the sounding-lead, and these ran into the mud and brought it up in their tubes. On examination under the microscope it was found to consist almost entirely of the empty shells of once living things. Thus it was found that an immense tract of sea-bottom in mid-ocean, which the offscourings of the land—sand, mud, etc.—never reach, was being strewn with chalk and flints by these little animals which, living in the water above, first gathered these substances from the sea, and dying, bequeathed them to form a stratum below. The great chalk formation, whose long, massive, rounded downs are found distributed all over northern Europe, it is supposed, once formed the bed of an ocean, and were thus formed. These chalk ranges are unstratified—that is, they are not formed of thin layers one at top of the other, as sediment strewn by tidal currents would be: they are also composed of carbonate of lime and nodules of flint. These peculiarities, together with their wide extent, accord well with this supposition as to their origin. What vast, varied, and unexpected results are brought about by unnoticed and apparently insignificant causes by Him with whom nothing is sudden and nothing single!

The massing together of amœba-like animals, or animated portions of sarcode, produces also other animals of quite a different type, with certain parts of which we are most of us well acquainted. The sponges which chemists sell are the fibrous skeletons of these compound animals. The branching fibres, which spring from a common base, and then reunite to form a dense, closely-woven mass traversed by many canals and porous throughout, are, when they grow from their submarine Levantine rock, clothed all over with living sarcode. This is believed to be composed of elementary particles which run and are fused together, or are divided, according to the volition of the individual parts. Many sponges have, besides the horny skeleton, spicules, or sharp angular spines lying in the substance of their bodies, and projecting beyond their surfaces, so as to protect them from being devoured by their enemies. Both these spicules and the horny skeleton are of almost infinite variety in the different species, and exhibit another instance of how simple a form, when endowed with life, may produce very complex products.

The most interesting part of the economy of sponges is the method by which a circulation of sea-water is maintained through them. This circulation is absolutely necessary to bring both food and fresh aërated water to these fixed animals. The simple inspection of the skeleton of a large Turkish sponge shows that there are on its outside two kinds of holes—the large round ones, which lead down to the great canals, and the smaller pores, which lie between them. If a living sponge be watched, while at work under water, especially if the experiment be aided by placing some finely-powdered indigo in the water, it will be found that from each of the large holes (oscula) there gushes a fountain of water, which is sucked in through the smaller pores. Lieberküln and Carter discovered that this circulation was kept up in the following manner:—The system of canals which commences in the deeper substance of the sponge beneath the small pores, unites into larger and larger water-courses, until the final ones deliver into the great excurrent canals which end externally in the oscula. In the course of the secondary canals small chambers are situated, which are lined with sponge particles, each of which has a long movable bristle. Each of these bristles is used, like Mrs. Partington's broom, to sweep out the waters of the ocean in one direction, towards the large excurrent canals, while fresh water flows in from behind. Professor Huxley aptly compares a sponge to a submarine city. It has roads, streets, and alleys, and the inhabitants live in houses fronting these thoroughfares, and the trade is kept up by individual but combined efforts.

The Infusoria have been by some cut off from the other Protozoa, as being of a higher grade, because they possess definite mouths, often continued inward as free hanging gullets, and the substance of their bodies is so far differentiated that it may be divided into three layers—an outside cuticle, bearing the cilia and locomotive organs; below this, the layer in which the fixed organs are placed; and, the movable mass which rotates in the centre.

Notwithstanding these differences, Professor James Clark, of Pennsylvania, is now endeavouring to show that there is a regular gradation of animals which connects the infusoria with the sponges, and that, contrary to previous suppositions, some of the sponge particles probably have mouths.

One of the Infusoria, which may be taken as a type of the class, is called the vorticella, and it is a most interesting animal to watch. It may be found almost wherever a little animal matter is allowed to decay under water. It consists of a cup set on a long stalk. The cup has a lid and a lip. The lid can be drawn into the cup, and the lip can be closed over it—thus transforming the cup into a ball. These animals are seen to be perpetually extending themselves on their stalks, protruding their discs, and setting the circles of fine hairs which are set on them in motion; and then suddenly the stalk is shortened by throwing it into a spire. Thus the cup is snatched back, and at the same time closed.

Perhaps the highest animal belonging to this sub-kingdom is the noctiluca. This animal has the power of emitting light when excited, and perhaps there is no more splendid sight in nature than that which is presented on a warm summer night when a rippling wave charged with these animals breaks upon the shore. It instantly becomes fringed with a bright green phosphorescent light, which flashes along the beach, as it strikes it obliquely, in hues to which the finest shot silk, or even the green and purple which glances from the neck of the starling, are poor and dull.

HISTORIC SKETCHES.—XVII.

THE MASSACRE OF GLENCOE.

"As for Mac Ian of Glencoe and that tribe, if they can be well distinguished from the other Highlanders, it will be proper, for the vindication of public justice, to extirpate that set of thieves." So wrote King William III., by the hand of the Master of Stair, to the commander of the royal troops in Scotland, in January, 1692. The words were part of a letter of instructions to the king's general, respecting the conduct he was to pursue towards the Highland chiefs, to whom a summons had been made to come in and make submission to the Government before the 31st of December, 1691. They were words of general or particular significance, according to the way in which the reader chose to read them, and according to the circumstances under which they were written. The letter was worded thus ambiguously by design, in order that the Secretary of State, who was to give further instructions upon it, might choose which interpretation he liked; and he chose an interpretation which had the effect of covering his master with shame, though posterity has done that master the justice to remove the blame from his shoulders and to place it where it is due.

"The massacre of Glencoe" was on this wise:—Ever since the Revolution in 1688 had turned out the house of Stuart from the throne, there had been more or less of disaffection in certain parts of the kingdom to the rule of the new dynasty. In the Highlands of Scotland, where the sentiment of devotion to the exiled princes was most firmly engrafted on the people, and where it was most difficult to follow it for the purpose of rooting it out, disaffection was all but universal. The chiefs of clans, or heads of great families, there, were petty sovereigns, ruling absolutely over all their tribes, jealous of each other, ready to quarrel, and being ignorant and half barbarous, ever

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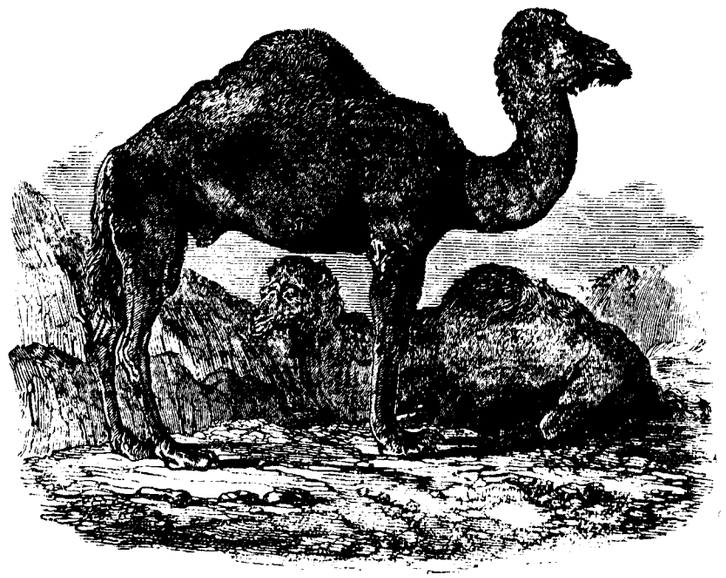
Its form is an exception to a general rule. If one were to take the skeleton of a horse or a cow and cover it with skin, the form of a horse or cow would be plainly discerned, but if the skeleton of a camel were dealt with in like manner it would scarcely be recognisable as a camel, for it would be minus the hump. The hump or humps, for there are sometimes two, are masses of fatty tissue which are quite unsupported by bone.



THE SOUTH AMERICAN LLAMA.

The one-humped variety, which is employed in Arabia, North Africa, Syria, and Persia, is known as the Arabian camel; and the two-humped variety used in Central Asia is called the Bactrian camel.

The Arabian camel seldom exceeds nine feet in height to the top of its hump. It has a small and strongly arched head, small ears, eyes with horizontal elongated pupils, very mobile nostrils, which appear simply like two slits in the skin, and an upper lip split down the centre, the two halves of which are susceptible of separate movements. The senses of sight and hearing are very keen, and the sense of smell is also very acute. Its head is carried on a long, arched neck, which proceeds from the strangely humped body. The legs look almost too slim for the body they have to bear, and on the breast, knees, and insteps there are callosities which have been supposed to be produced by the manner of loading the animal. This appears to be a mistake, as the young camel is born with them. The feet are cloven, and the two toes on each foot have on the last joint a short and hooked nail. A hard, callous sole covers the bottoms of the toes, and enables them to walk easily on loose sand where most other animals would soon be exhausted. Its home is really the desert; for in richer lands where food is abundant it becomes larger and coarser, and loses its most valuable quality, which has been partly inherited and partly acquired by training, viz., that of being able to live on little food, and of passing many days without any water at all. Thus in Tartary and Syria the camels have large frames, big heads and necks, coarse legs, and long hair adapted for protecting them against the cold winters of these countries. They may be roughly divided into riding camels, or dromedaries, and burden-camels, a division corresponding exactly to our own of riding-horses and cart-horses. The burden-camel will carry a load of 400 lbs., and walk two and a half miles an hour; while the dromedary, which is finer, lighter, and quicker in its movements, with no load but its rider, *girbeh* or water-skin, and a little food, will travel a hundred miles a day for four or five days without injury.



THE DROMEDARY, OR ARABIAN CAMEL.

Riding a camel is no easy matter to one who is not used to it. It is as difficult and uncomfortable as riding a horse is to some one unused to equestrian exercise. People who have tried camel-riding also complain of a nausea and headache which its peculiar gait produces. It has been said that this arises from ignorance of the proper way of riding, an art which is soon acquired, as General Colston observes that after the rider has once mastered the proper method of mounting and dismounting, most people who are accustomed to horseback may learn in a single day to ride and manage a camel. The art of easy camel-riding consists chiefly in not permitting your camel to walk, except in deep sand or over steep rocky ground where you cannot help it. The camel's walk is a most back-breaking and skin-abrading operation; but if the rider presses him into a gentle pace, which is the natural gait of the dromedary, he moves both legs on the same side together. His motion then feels like that of a very easy trotting horse, and he will keep it up at the rate of five miles per hour for whole days together. With every increase in the rapidity of his gait he becomes more uncomfortable to ride.

The camel has an arduous life. Let us follow it for a single day along one of the caravan routes, and see what it has to suffer. Amidst the strong language of the drivers and the loud protestations of the camels, who do not fail to complain in their way when too heavy a load is put on them, all is got ready for the start. The desert is entered, and now commence the troubles of the caravan party. The heat is literally stifling, drinking up the water in the water-skins, and making them shrink to half their size; making articles of iron too hot to touch, so that gun barrels blister one's hands, and the stirrups blister one's feet. Where flattened zinc barrels are used for carrying the water, as is often the case in military trains, the water within them literally boils. The skin peels off under the fierce heat of the vertical sun, against which the white helmets and umbrellas of Europeans appear to afford little protection. And what with the overpowering glare reflected from the sand, and the dust with which the air is charged, the traveller is nearly blinded. Besides, the air that blows, having passed over leagues of heated ground, is enough to scorch up everything it blows against. Distant objects appear to tremble and dance in the most curious fashion—an idea of which may be obtained by viewing a distant object through the heated air which ascends from a chimney top. The tantalising effects of mirage are observed: parching for a drink at some cool stream, the traveller sees, apparently not far off, what he supposes to be tall trees on the margin of a refreshing pool. Alas! it is an illusion created by the distorting power of the heated air-currents, rising from the earth's surface as from a furnace. Patiently the camels trudge along, bearing the terrible conditions as no other beast could, and it seems in every way provided for. The callous skin which covers the bottom of its feet prevents the inconvenience which would otherwise arise from the burning sand on which it treads; the elevation of its head and the acuteness of its sight and smell enable it to discern the green oasis while still afar off, and to scent the refreshing air; its overhanging brow and long eyelashes shield it from the intense glare of the sun's light; its slit-like nostrils, which it can open and shut at will, are specially adapted for keeping out the fine sand with which the air is charged; and its peculiar stomach—with a store of liquid within the cubical cellules of its walls—enables it to dispense with a frequent supply of water, one of the most precious of articles on these arid deserts. The hump on its back is regarded as a natural store of nourishment, and when the animal is insufficiently supplied with food the hump gradually diminishes in size. The fat of which it is composed appears to be consumed in some strange manner, until this reservoir of energy is exhausted. Hence the Arabs look to the state of the hump with considerable solicitude when about to commence a journey, and when it has been much impaired by hardship, three or four months of repose and copious nourishment are required to bring it to its normal state.



THE BACTRIAN CAMEL.

Its natural abstemiousness, further developed by training, is so great that a camel laden with five hundred pounds' weight, travelling twenty to thirty miles a day under a scorching sun, receives no other food than a few handfuls of grain, a limited number of dates, or a small pellet of maize paste. It will often go eight or ten days without drinking. Its natural food

ready to settle the quarrel by the arbitrament of the sword. To the King of Scotland and England they confessed a certain sort of allegiance, which they were quite ready to renounce whenever the king's pleasure ran counter to their own; but when they once threw in their lot with him they stuck as close as burrs; and no one could have more utterly devoted adherents. Trained from childhood to regard implicit obedience to their own chief as the highest virtue, their services were of immense importance to him with whom, for the time being, their chief was on terms of friendship; and so thorough was their blind attachment, that while they would go through fire and water for such a one so long as the friendship lasted, they would not scruple to murder him the very moment that the chief's sentiments altered. They were rough men, lived rough lives, and held it more honourable to live by plunder than by toil; and they possessed those vices, as well as those virtues, which are incidental to savages who dwell in the face of nature, and are but slightly influenced by the voice of civilisation. Much sentimental matter has often been written about the Highlanders, chiefly by those who never knew what their chief characteristics were; and in popular novels their virtues have been extolled, while their numerous vices have been hidden or varnished over, and their manners and customs have been presented with that enchantment which distance lends to the view. While there was much that was admirable in the Highlanders—much to excite the most exalted respect for their courage, their endurance, their devotion, their hospitality—there was much also to condemn in their revengefulness, their thievishness, their brutality. Few of them were given to honest labour for procuring themselves a livelihood, and many of them were, not to put too fine a point on it, no better than King William's letter described them, "a set of thieves." They lived in the mountains, as their name implied; and protected by their hills, which they knew how to defend by their indomitable bravery—protected also by their poverty, they were long able to defy the authorities in the Lowlands. They preserved with religious care their allegiance to the Stuart princes, who found among them, on the two great risings against the house of Hanover in 1715 and 1745, their most hardy and most faithful adherents. Some of the heads of clans were members of the Scotch nobility, and these swayed the political influence of their followers according to their own interests at court; so that it often happened that as interests conflicted, clans were opposed to one another, and when they were so, it was an opposition to the death, for enmity was cherished among them to the entire exclusion of forgiveness.

Some of the more powerful clans had given in their allegiance to King William and Queen Mary; but these clans were for the most part amenable to military coercion by the Government, while the rest were influenced by bribes, either of money or favour, and were ready at any moment to turn against the hand that patted them. But by far the greater number of the clans remained in a state of chronic disaffection, would not own sovereign allegiance to any one, and remained independent of any king save their own chiefs. The trouble they gave was enormous; the necessity of keeping up a strong force to check them, most annoying and costly; and the nucleus they furnished for the gathering of a hostile army in the heart of Scotland, most dangerous to the peace of the kingdom.

Statesmen in London were more concerned for the pacification of the Scotch Highlands than for any other matter of domestic policy. They tried all sorts of ways to effect the object; they played off one chieftain against another, sowed the seeds of dissension between them, bribed, flattered, threatened, and, whenever they had the chance, used force; but all means failed, and the Highlands remained a bugbear and a thorn in the side of the rulers, until, many years later, Mr. Pitt conceived the idea of utilising the courage and the hardihood of the men by employing them as soldiers in the service of the state. Not until the Highland regiments were raised were the Highlands pacified, and certainly in 1691, the time treated of in this sketch, they were the homes of men who were ready for any desperate enterprise against the Government.

Sir John Dalrymple, Master of Stair, was William's Prime Minister for Scotland. He was a man who hated the marauding mountaineers with an implacable hatred, and would gladly have given his voice in favour of any project for crushing out their spirit by harsh means. He disbelieved in anything short of extirpation, and did his best to dissuade the Government from a policy of lenity, which they were willing to adopt. Contrary to his wish, it was determined to try the effect of a conciliatory present of £15,000, which was to be divided among the several chiefs, and John Campbell, Earl of Breadalbane, was chosen to be the agent for distributing it. He was to treat with the chiefs, and buy their friendship for so much; and he was to hint that, if this plan did not succeed, or if the chiefs should afterwards go from their bargain, there would be no more gentle treatment, but an overwhelming force to overawe them. The earl was not very successful in his negotiations. The chiefs came to his house at Glenorchy, but they could not agree about the price, and one of them, Macdonald of Glencoe, came to an open quarrel with the king's representative. Lochiel, head of the Camerons, joined with Macdonald, and there were local claims, not thought of by the Government, and which Breadalbane had not power to settle, that prevented an apportionment of the money. Negotiation was protracted, the Master of Stair was losing his patience, and, before the Earl of Breadalbane could give an account of his proceedings, had taken steps more in accordance with his own view of things.

Proclamation was made at Edinburgh, calling upon the Highland chiefs to submit themselves to King William and Queen Mary before the 31st of December, 1691, and threatening that those who did not take the oaths of allegiance by that date should be treated as traitors and public enemies. Several months were allowed for the rebel chiefs to come in; the Earl of Breadalbane's negotiations went slowly forward; and the Government, on the other hand, were earnest in their preparations to act up to the spirit of the proclamation that had been issued.

Naturally enough, the chiefs were unwilling to make submission. They hesitated, they blustered, they would die rather than submit. Some of them actually made preparations to resist the royal troops, and collected stores of provisions and warlike material. But as the time drew near, and the attitude of the Government remained firm and threatening, doubts entered the minds of some whether it would not, after all, be over-hazardous to continue obstinate. A comparison of their resources with those of the Government showed at a glance how hopeless it was for them to persevere; and gradually they gave way, pocketed their pride, and, presenting themselves before the sheriffs, took the oaths. By the 31st of December all had submitted, except Macdonald of Glencoe.

Macdonald had delayed, partly out of unwillingness to go, partly out of bravado. He was ambitious of the honour of remaining out after powerful rivals had submitted, and he waited, perhaps in the hope that other chiefs would be laggards besides himself, and that, united, they would be able to offer such a stout resistance to the Government as would compel better terms than an unconditional surrender. But when he found that all the rest had given in their adhesion, and that if he persisted in obstinacy, he would have to face the wrath and to cope with the strength of the king, he resolved to take the oaths.

Not until the 31st of December, the very last moment, did Mac Ian (Macdonald of Glencoe was so called in the Highlands) set out with his principal men, to take the oaths at Fort William. Arrived at the fort, he found that Colonel Hill, the governor, had not any power to administer the oaths, and that he must go to Inverary, the residence of the nearest competent magistrate. Colonel Hill gave him a letter of recommendation to the sheriff of Argyleshire, Sir Colin Campbell of Ardkinglass, and Mac Ian went on his way; but "the way was long, the wind was cold," the pitiless storms of a winter in the Highlands impeded the old man in his journey, and it was not till the sixth day after the expiration of the term fixed by the amnesty proclamation that Mac Ian appeared before the sheriff at Inverary.

Overcome by the entreaties of Mac Ian, and by the letter of Colonel Hill, certifying that the rebel chief had offered himself at Fort William on the 31st of December to be sworn, Sir Colin Campbell administered the oath, and sent an explanatory certificate to Edinburgh, showing why he had departed from the strict words of the proclamation.

Mac Ian went back to his home in the pass of Glencoe, glad at having made his peace, his mind having no misgivings about the ratification of his accepted allegiance. The news went up to London that Mac Ian of Glencoe had not submitted, and by the time the further news of his submission arrived, steps had been taken to punish him. The Master of Stair was greatly

rejoiced at the prospect of being able to make an example, and the Earls of Breadalbane and Argyll, with whom Mac Ian was at private war, rejoiced at the prospect of taking a bloody revenge. The intelligence of Mac Ian's submission was a blow to all three, and they cast about how they might fend it off.

In an age when persons arraigned on criminal charges were condemned to death on failure to sustain some technical objection to the indictment, it is not surprising to find that even a Secretary of State should take advantage of an informality in order to press matters against an inveterately hated antagonist. Substantially, of course, it made no difference whatever, whether submission was made on the 31st of December or on the 6th of the following January, and the attempt made by Mac Ian on the earlier date might well be taken to show the animus with which he acted on the latter. But this was not the way in which the Secretary looked at the case. He desired a loophole out of which he might fling Mac Ian and his people, and he found it in the fact that Mac Ian had not surrendered by the prescribed day. He knew it would be fatal to his purpose to furnish the king with all the information he himself had, and in speaking on the subject, the Master of Stair suppressed the evidence that Mac Ian had, though tardily, given in his allegiance. In those days news was slow in travelling, and the royal pleasure was taken as if the Macdonalds of Glencoe were still contumacious; but the royal pleasure seems to have been, even then, that the outlaws should but be repressed with a strong hand, their valley occupied, and examples made of such as should be guilty of flagrant breaches of the public peace. Certainly there is not any warrant for supposing that King William or his other ministers were at any time privy to the plan which the Master of Stair was maturing in his brain. To him it was a source of deep regret that any of the clans had submitted. He had hoped to make a clean sweep of them all. The Macdonalds of Glencoe he determined should not escape. So the order quoted at the beginning of this sketch was sent down to the Commander of the Forces, and the Master of Stair wrote full and particular instructions to explain how this generally-worded order was to be carried out.

With zealous care the Secretary of State and his friends, Breadalbane and Argyll, studied the geography of Glencoe, and took the necessary measures to bar the ways out of it when once the Macdonalds should become fugitives. The chiefs beyond the passes from Glencoe were secured by promises, by appeals to their hatred and their interest; and when this was done, the conspirators proceeded to devise a scheme by which they might fall on the Macdonalds unawares, and slay them all, men, women, and children. The season was winter, and the Master of Stair reckoned on its help to finish his work, if per- adventure any of his prey should escape to the wood or the thicket. The plot was laid with devilish cunning.

Lieutenant-Colonel Hamilton, second in command to Colonel Hill, of Fort Willlam, was selected as the military executioner. Hill was reckoned too humane, too squeamish, to undertake such a business, and he was simply ordered to place a strong detachment under his junior's command. "Better not meddle with them than meddle to no purpose. When the thing is resolved, *let it be secret and sudden.*" These were the Secretary's instructions to Hamilton, whose brain readily thought of a method for strictly obeying them.

A hundred and twenty men were chosen from a regiment lately raised by the Earl of Argyll, and therefore for clan reasons deadly opposed to the Macdonalds; they were put under the command of a Captain Campbell, commonly called Glenlyon, whose niece was married to the second son of Mac Ian, and were marched on the 1st of February, 1692, to Glencoe. The fears of the clansmen were allayed by the king's officers, who assured them they came but as friends, and that all they wanted were food and quarters. These were accorded cheerfully, the men were distributed through the community, the officers were lodged with the chief's kinsman; Highland hospitality was largely extended to men who came as travellers and friends, and Mac Ian little thought the advent of his guests was in any way connected with his tardy journey to Inverary.

All went happily for nearly a fortnight, Glenlyon and Lindsay were treated like members of Mac Ian's own family, and there was no hint in the conduct of the officers of the danger that was threatening their hosts. Yet all the while Glenlyon was secretly informing Hamilton of what he saw, and receiving his instructions in return. Those instructions, the final instructions, were to begin operations at 8 a.m. on the 13th of February, and to kill every Macdonald in Glencoe under the age of seventy. Hamilton intended to come with 400 men for the purpose of cutting off fugitives, but in any case Glenlyon was to fall on at the time and date agreed.

There was not any suspicion of guests who were eating and drinking at the clansmen's tables, sleeping in their huts, and interchanging the offices of friendship with them, until a few hours before the massacre began, and then the suspicions of John Macdonald, son of Mac Ian, were allayed as soon as aroused by the assurances of Lindsay, that they were only about to march against the Glengarry men, who had been giving some trouble. Sharp at five o'clock, Glenlyon began the work by shooting his host and family, and then the fiendish slaughter went on all through Glencoe. Mac Ian was shot through the head, his wife was so maltreated that she died next day, and the chief's sons had a hairbreadth escape, having only time to fly ere the human bloodhounds could come upon them. The rattle of musketry mingled grimly with the groans of the dying and the shrieks of the wounded, and the red glare of the burning houses—for the soldiers set fire to the dwellings which had sheltered them—lighted the way to the destruction which was meant to be universal. But Hamilton was delayed on the road, and did not appear in time; Glenlyon's men bungled at their work, and the result was that at least half of the people escaped. When Hamilton came he found the work unfinished, and though he committed a few more cold-blooded murders by way of wreaking vengeance, he was unable to follow the bulk of the fugitives into the fastnesses which were known only to them.

It was a long time before the truth leaked out. The perpetrators of the massacre kept the thing quiet, and the surviving sufferers by it were not in a position to make themselves heard. Rumour, then revelations by men in their cups, then the complaint of Mac Ian's sons, gradually brought the affair at Glencoe into prominence. The story was disbelieved at first, as being simply impossible; but fresh facts continued to present themselves till the mass of evidence became enormous, and there was a cry all over Scotland for an inquiry into the circumstances attendant on the slaughter of the Macdonalds of Glencoe. The Scottish Parliament took the matter in hand, and King William was at length obliged, for the honour of his Government, to order an inquiry by a commission.

The result of the inquiry was to fix the entire guilt of the massacre upon the Master of Stair, whose letters and papers of instructions were produced. The subordinates, Hamilton, Glenlyon, Lindsay, and some more, were voted by the Parliament to be murderers, and they fled for their lives before the request of the Estates that they might be prosecuted for their crimes. For the Master of Stair, the Estates left him to the judgment of the king, his master, whom they voted to have had no knowledge of what the Master intended, and whose letter to the commander of the troops they declared was not capable of the interpretation put upon it by the Secretary. The king simply dismissed the Master of Stair from his posts, and refused to prosecute him for the murder; and finding that so many persons were implicated in the affair, and that it would be inconvenient to prosecute them all, while he could not punish a few only where all were guilty, proclaimed soon afterwards a general amnesty. For the actual participators in the massacre of Glencoe, the only punishment that was inflicted upon them was that described by Macaulay, the punishment "which made Cain cry out that it was greater than he could bear; to be vagabonds on the face of the earth, and to carry wherever they went a mark from which even bad men should turn away sick with horror."

LESSONS IN GERMAN.—XXVII.

SECTION LI.—VERBS REQUIRING THE DATIVE OR ACCUSATIVE.

SOME verbs govern the dative or accusative, according to their signification, as:—Laß mir eins von deinen Büchern, leave me one of your books. Laß mich zwei Worte mit deiner Mutter sprechen, let me speak two words with your mother. Er bekommt das Geld, he gets the money. Diese Speise bekommt mir nicht, this food does not agree with me.

consists of thorny shrubs, date-leaves, and the leaves and branches of the tamarisk.

Besides its use as a beast of burden the camel affords sustenance to the Arabs by its flesh and milk, and hair for the manufacture of cloth, even now, as in the days when John the Baptist had raiment of camels' hair. In the face of these various facts one can well understand Buffon's observation that gold and silk are not the real riches of the East, but that the camel is its chief treasure. Indeed, it is so precious to the Arab that he exhibits as much solicitude for its welfare when young as he does for the horse, and from its earliest days it is educated for the work it has to perform when it has arrived at maturity. A few days after birth it is taught by its Arab owner to crouch down to receive a suitable weight, which is put on its back, and this is gradually increased as it grows larger and stronger. It is also trained to do without sleep, and to bear privations such as it will meet with in its future desert experience. It is likewise practised in running and other severe exercises, so that at the end of its course of training it is an animal thoroughly to be relied on.

The camel is all-important to the life of the Bedouin, for besides its other uses, which we have spoken of, it is, along with his sheep, employed even as a sort of currency; he pays tribute in camels, gives hostages in camels, and is fined in them, as the following incident, narrated by Buckhardt, will show. Bokhyt and Djolan, two Arabs, quarrelled and fought. Bokhyt called Djolan "a dog," and words leading in a very short time to blows, Bokhyt received a blow upon the arm for his insult. Bokhyt then cut Djolan's shoulder with a knife. Thus the judge summed up:—

Bokhyt owes to Djolan:—

For the insulting expression . . .	1 sheep.
For wounding him in the shoulder . .	3 camels.

Djolan owes to Bokhyt:—

For the blow upon his arm.	1 camel.

There was therefore due to Djolan, as the result of their dispute, two camels and one sheep.

The camel is grouped, along with hoofed animals like the pig, horse, and ox, in the order *Ungulata*, this name being derived from the Latin word *ungula*, a hoof or claw. The order is further subdivided in a manner which is easily understood. If you examine the hoof of a horse it is found to be whole, and in no way divided; if, on the other hand, the hoof of a pig be examined it will be seen that it is split. One might therefore speak of the horse as a *one-toed* animal, and of the pig as a *two-toed* animal, or, to take more comprehensive terms still, we might use the words *odd-* and *even-toed*. *Artiodactyla* is the naturalist's word for *even-toed* animals; and *Perissodactyla* he employs in the same way for *odd-toed*. These are the subdivisions of the *Ungulata*, which are founded on the nature of the hoof. The camel, with its cloven feet, evidently belongs to the *Artiodactyla*, along with the pig, hippopotamus, deer, and ox. Of course, there are many families of animals in the *Artiodactyla*, and the camel belongs to the one which is called the *Camelidæ*. It includes not only the camels we have described, but also the humpless llamas, which are to the New World what the camels are to that old continent whence nations are supposed to have first sprung. There are three kinds of llama, the *Huanaco*, *Paca* or *Alpaca*, and the *Vicugna*, and with a very short account of these three varieties we must conclude this paper.

When the Spaniards invaded South America they found the domesticated guanaco, or llama, as useful to the inhabitants as we have seen the camel to be to Oriental nations, for not only was it employed as a beast of burden, but its flesh was used for food, its skin for making leather, and its wool was spun and made into cloth. As a beast of burden it has now been almost superseded by the horse, so that it is seldom used save for crossing the difficult roads of the Cordilleras. It would seem not improbable that the llama has degenerated, for on the plains of South America fossil bones of a kind of llama have been found which fully equalled the camel in size. The llama of the present is not so large as a horse; has a small and well-set head; callosities on breast, knees, and hock; and a coarse, hairy coat, varying in colour from white and brown to grey and black.

The paca and the vicugna, much less in size than the llama, are both remarkable for the fineness of their wool, and various attempts have been made to acclimatise them in Europe. The French have brought up numbers in the Jardin des Plantes, Paris, with the object of introducing them on the Pyrenees, Alps, Cevennes, and the mountains of the Vosges. It has even been suggested that they might be introduced into this country, and naturalised in the mountainous districts of Scotland and Wales. Such an experiment, if carried out successfully, would undoubtedly lead to what would become a continuous source of national wealth. Alpaca, as is well known, has during recent years been much employed as a fabric, and has become a valuable material for manufacturing purposes.

LESSONS IN ENGLISH.—XXII.

THE GREEK ELEMENT—GREEK STEMS.

THE prefixes and suffixes of which I have treated, are connected with certain roots or stems. So far as these stems are of Saxon birth, you need little instruction in them; they belong to your mother tongue, and, in general, are as readily understood by you as the words which denote the members of your body, or the food that you eat. With other stems you are not acquainted. Among the words I gave you for exercise in composition in the last lesson, there are words for the meaning of which you have probably had to resort to a dictionary. Such a word is *accessary*. Now *accessary* being made up of the Latin words ad, *to*, cedo, *I go*, and the termination *ary*, would have occasioned you no difficulty had you been familiar with the foreign or exotic stems of our language. In origin those stems are various. Chiefly they are derived from the Latin, as in the word *accessary*. Some come from the Greek; others are of different parentage. These must all be separately considered. I begin with an example of

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meaning.*	*Stems.*	*English Words.*
Αδελφος,	a-del'-phos,	*a brother,*	*adelph,*	Philadelphia.
Φιλος,	phil'-os,	*a friend, loving,*	*phil,*	philosophy.
Σοφος,	soph'-os,	*wise,*	*soph,*	sophist.

Now let me explain the process I here intend. Adelphos is found in Philadelphia, but not in its full form. It is found as it appears under "Stems;" for adelphos, passing into Philadelphia, loses *os*, and takes *ia*. By this time you know enough of the changes in language to be aware that these changes in the terminations do not affect the root-meaning, or the essential import of the word. Prefixes and suffixes convert verbs into nouns, and adjectives into adverbs; or they may modify the signification; they may even reverse it, but they nevertheless leave the import of the stem still traceable after it has undergone their influence. Philadelphia, then, has clearly something to do with adelphos, *a brother*. What that something is, you find indicated in the next Greek word and its stem, namely, philos, *loving*, and *phil*. Putting the two together, you have *Philadelphia*, and putting the two meanings together, namely, *love* and *brother*, you obtain *brotherly-love*, as the import of the word under consideration. Remembering that Philadelphia is the name of a town in the United States, you are reminded that the name, *brotherly-love*, was given to it by its founder Penn, as indicative of the spirit with which he dealt with the original inhabitants of that region. Passing on to the next word, *philosophy*, I find at the beginning of it the same *phil* of which I have already spoken. But I find, also, *sophy*. What am I to do with *sophy?* First, I know that the *y* may represent the Greek *ia*, as is set forth in the remarks on suffixes. Changing the one into the other, I thus get *sophia*. Now, by referring to the next line in my list of words, I see one which is very like *sophia;* that is, *sophos*. I already know enough of the changes which words undergo to find reason for thinking that *sophia* is connected with *sophos* in meaning and source as well as in form. The idea is confirmed by my seeing that *soph* is given as the stem of *sophos*. Now *soph* is equivalent to our *wise;* here *love* and *wise* must be put together, and so I learn that philosophy is the *love* of what is *wise*, or the *love of wisdom*. Such being the case, a philosopher must be one who *loves wisdom*.

But *soph* is given as the origin of *sophist*. *Sophist* obviously consists of two parts; the part which is given—that is, soph, meaning *wise*—and *ist*. What is this *ist?* Let me think. Have I not had *ist* before? Oh, yes, I remember, *ist* is a suffix, a Greek suffix, and denotes a partisan, one who follows a party in an opinion; like Baptist, one who observes baptism. Sophist, then, must be one who pursues wisdom, one who is given to wisdom. Now such is the meaning of the word, and such is the whole meaning of the word as taught by etymology, or the doctrine of tracing out the root-signification of words. And here you have an instance of the shortcomings of etymology. So far as I have yet gone you see no difference between philosopher and sophist, for both are students of wisdom. Yet, if you meet with the two in a narrative or a discussion, you find that their meanings are different; at least, a philosopher is spoken of with respect, a sophist is spoken of slightingly.

I have entered into these details in order to show you that history must be taken as an ally to etymology in the study of languages. In the case before us history supplies the lacking information. From history we learn that the sophists were a set of Greek teachers who, not content to be called philosophers or lovers of wisdom, pretended to be sophoi or wise men, and came to be designated sophistai, *sophists*, disparagingly. A sophist, then, you thus learn, is a pretender to wisdom; and as all pretenders are obliged to resort to trickery, so a sophist is one who, by unsound and cunning arguments or delusive appeals, aims, for his own purposes, to produce a false impression. Knowing what a sophist is, you easily infer the meaning of sophism, or a means by which the sophist works; and sophistry, his art. Advanced thus far, you have no difficulty with sophist*ical*, nor with sophist*ically*.

Turn your attention for a moment to the English representatives given above, and observe generally that in representatives, whether designated English or foreign, I mean the radical parts of the words, in each case the radical or essential elements of each word. Now, you have above these three combinations of letters—namely, adelph, phil, and soph. These three parts are the parents of all the words of which I have just treated, and connected with them is all the information I have here set forth. When I have added, that what I have said is only a very small part of what I might have said, you will have some idea of the extent and value of etymological studies.

The branching of these three stems may be exhibited thus:—

adelph, Philadelphia; phil, philosophy, philosopher, philosophically; soph, sophist, sophism, sophistry, sophistical, sophistically.

Do not suppose that I have chosen these three terms because they were specially prolific. I took adelph because it begins with the first letter of the alphabet. The other words followed of course. So far from the series being very prolific, one member of it, adelph, gives birth to only one word, and that word is etymologically unproductive.

My chief object, however, in going into this detail was to lay before you the principle on which the following list of words is drawn out, and the manner in which you are to study them. If you will faithfully, diligently, and perseveringly study these lists, combining with them the knowledge communicated in previous lessons, you will make rapid progress, and acquire a superior familiarity with the English language in all its elements.

Having done with this triplet of words, and pursuing the order of the alphabet, I come to other Greek terms found in English:—

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meaning.*	*Stems.*	*English Words.*
Αεθλος,	a-eth'-los,	*a combat,*	*athlet,*	athletic.
Αγωγος,	a-go'-gos,	*a leader,*	*agog,*	demagogue.
Δημος,	de'-mos,	*the people,*	*demo,*	democracy.
Κρατος,	krat'-os,	*strength,*	*krat* (crat),	aristocracy.
Αριστος,	a-ris'-tos,	*best,*	*aristo,*	aristocratic.

In these lists I do not give the meanings of the English words in the fifth column, lest you should be turned away from the efforts by which, from the aids furnished, you ought to be able to gather the significations yourself. When, however, it may appear desirable, I will quote instances from good authors of the employment of the words, and so you will obtain another kind of assistance. The most effectual teaching is that which leads persons to teach themselves.

"David's combat (with Goliath) compared with that of Dioxippus the Athenian *athlete*."—*Delaney*.

"The legislature of the kingdom (of England) is entrusted to three distinct powers, entirely independent of each other: first, the king; secondly, the lords, spiritual and temporal, which is an aristocratical assembly of persons selected for their piety, their birth, their wisdom, their valour, or their property; and thirdly, of the House of Commons (the representatives of the democracy)."—*Blackstone*, "*Commentaries*."

EXERCISES FOR PARSING.

Philadelphia (φιλαδελφια) is the word employed by the Apostle Paul in his Epistle to the Romans (xii. 10). Philadelphia, as employed by the Apostle to the Gentiles, is rendered in our English version by "brotherly love." A word of the same origin is used by the Apostle Peter, where (1 Pet. iii. 8) he gives the injunction "love as brethren." Sophos (σοφος) is the Greek term found in that text: "Professing themselves to be *wise* they became fools." (Rom. i. 22.) The words just cited accurately describe the character of a sophist. A word derived from sophos is the word employed in this question: "Whence hath this man this *wisdom?*" (Matt. xiii. 54.) Our word *athletic* has a word of the same origin in the words, "Ye endured a great *fight* (αεθλον) of afflictions." (Heb. x. 32.) The Greek *demos* (δημος) is, in the original, used in the passage, "The *people* gave a shout." (Acts xii. 22.) Kratos (κρατος) is in the New Testament represented by these English words—namely, *strength* (Luke i. 51), *power* (Eph. i. 10), and *dominion* (1 Pet. iv. 11).

EXERCISES IN COMPOSITION.

Words with their proper prepositions to be formed into sentences.

	Foreign Representatives.
Adjust to,	just, *just, right.*
Admonish of,	mone, *to remind.*
Admission to, into,	miss, *sent (mission).*
Admit of,	mitt (miss), *to send.*
Advantage over,	avant, *before.*
Advise of,	vis, *sight, vision.*
Advocate for,	voco, *to call.*
Affection for,	fici (fac, fec), *making.*
Affinity to,	fini, *an end (final).*
Agree with, to, on,	grat, *pleasing.*
Agreeable to,	grat, *pleasing.*
Alienate from,	alien, *another's (an alien).*

Questions: Where is the difference between *to agree with* and *to agree to?* also between *agree to* and *agree on?* Form illustrative sentences.

Where is the difference between *admonish* and *admonish of?* Form illustrative sentences.

Besides working each term in this list into a simple sentence, work into simple sentences words formed from them; as, *admonition, admission, advocacy, agreement, alienation*, taking care to employ the proper prepositions.

LESSONS IN DRAWING.—XX.

IN drawing the human figure a *restricted practice of mere imitation* cannot be considered, for various reasons, otherwise than a failure. We will briefly consider this, and also include the study of animals, wherein we shall perceive that the amount of knowledge requisite for drawing from animal life is as varied as the subject itself. If we begin with the lowest grade and end with the highest, we shall find our knowledge of their characters, habits, and physical development must increase in proportion as we ascend the scale. That *feeling for form* which is beyond, and independent of, the simple ability of drawing objects of still life only, first shows its influence where *life* begins; or, in other words, where *life-giving power and will control the action of the body;* and this feeling, stimulated by the knowledge we have said to be necessary, will expand as it ascends to the study of man. The eye must be prepared to see something beyond the simple line that gives the boundary of the figure. It is true the line must be imitated, but the question is, *how* to conduct and *regulate the imitation*, since it must have an expression according to the infinite variety of circumstances under which it may be placed. For as *life* is in the body, it is the *fact of its existence* that makes all the difference between drawing it, as we would a piece of furniture, or, in consequence of its freedom of action, *as the exponent* of a motive having its origin in the *will*. Therefore it must be evident that there is a graduated scale of ability extending throughout the whole range of art, commencing with objects of the simplest and lowest kind, where it may be only necessary to note the *positions of parts*

VOCABULARY.

Ab'helfen, to remedy.
Ab'ſchwören, to abjure, forswear.
An'ſehen, to behold, look at, perceive.
Auf'geben, to give up, (with dat.) to impose a task.
Beſie'gen, to vanquish, subdue.
Eid, *m.* oath.
Falſch, false.
Koſten, to taste, cost.
Läugnen, to deny.
Leid, *n.* affliction, pain.
Muthig, courageous.
Nach'ahmen, to imitate.
Naſe, *f.* nose.
Paſſi'ren, to pass, happen.
Pilot', *m.* pilot.
Sachſe, *m.* Saxon.
Scharen, *m.* loss, hurt.
Schlech'tigkeit, *f.* badness, vileness.
Selten, seldom.
Sogleich', immediately.
Stärke, *f.* strength.
Steuern, to steer, (with dat.) to check.
Ue'belſtand, *m.* misfortune, inconvenience.
Um'kehren, to return, turn round.
Un'artig, ill-behaved, rude, naughty.
Unſterb'lichkeit, *f.* immortality.
Vernünf'tig, discreet, judicious.
Verſich'ern, to assure, to make sure.
Voll'ſtändig, completely.
Wie'derſehen, to see again.

RÉSUMÉ OF EXAMPLES.

Der General' ſchwor ſeinen Glauben ab, und wurde Mu'ſelmann. — The general abjured his faith, and became (turned) Mussulman.

Ehe der Richter mich nach etwas fragte, mußte ich einen Eid ab'legen. — Before the judge asked me concerning anything, I was obliged to take an oath.

Ich werde kommen, um Ihr neues Gemäl'de an'zuſehen. — I will come in order to look at your new painting.

Sieht man mir an, daß ich krank geweſen bin? — Does one see by my appearance that I was sick?

Er iſt ein verlor'ner Sohn; ich gebe ihn auf. — He is a lost (prodigal) son; I give him up.

Was Sie mir auf'gegeben haben, habe ich gethan'. — What you enjoined on me I have done.

Guten Menſchen mußt du nach'zuahmen ſuchen. — Good men thou must seek to imitate.

Er ahmt dem Franzo'ſen nach, und trägt einen Schnurrbart. — He imitates the Frenchman, and wears moustaches.

Als der König dieſe Stadt paſſir'te, wurde ſie erleuch'tet. — As the king passed this city it was illuminated.

Viele Straßen der Stadt ſind ſehr ſchmutz'ig; dieſem Uebelſtande ſollte die Polizei' ab'helfen. — Many streets of the city are very filthy; this nuisance the police should remedy.

Er ſteu'erte das Schiff glücklich durch die Fel'ſenriffe. — He steered the ship fortunately through the reefs of rocks.

EXERCISE 98.

1. Die alten Sachſen ſchworen ihren Göttern ab, nachdem ſie Karl der Große vollſtändig beſiegt hatte. 2. Indem er dieſe That durch einen falſchen Eid abſchwor, läugnete er die Unſterblichkeit der Seele. 3. Man ſieht ihm die Schlechtigkeit an den Augen an. 4. Ich habe die Hoffnung, meine Angehörigen wiederzuſehen, nicht aufgegeben. 5. Ich hatte meinem Bedienten befohlen, mich zu rufen, ſobald Sie kämen. 6. Da ich meinen Namen rufen hörte, kehrte ich ſogleich um. 7. Wenn ich dir nachahmen wollte, würde ich bald kein Geld mehr haben. 8. Es iſt ihm ſchon oft begegnet, daß er ſeine Brille ſuchte und ſie auf der Naſe trug. 9. Der König paſſirt heute noch dieſe Stadt. 10. Steure dein Schiff durch die zürnenden Wellen, muthiger Pilot! 11. Ein vernünftiger Vater ſteuert frühe dem unartigen Betragen ſeiner Kinder. 12. Selten habe ich Geld, aber immer Schulden,—wenn ich nur dieſem Uebelſtande zu ſteuern wüßte! 13. Was hülfe es dem Menſchen, ſo er die ganze Welt gewönne, und nähme doch Schaden an ſeiner Seele? 14. Seine Stärke half dieſe Leiden tragen. 15. Die Köchin koſtete die Speiſen. 16. Es koſtete mir Freiheit und Vaterland. 17. Es koſtete ihm ſeinen erſten Sohn. 18. Er verſicherte mich die Wahrheit dieſer Sache. 19. Man hat ſich des Diebes verſichert. 20. Gute Sitten muß man nachzuahmen ſuchen.*

EXERCISE 99.

1. Teach your children to imitate good behaviour. 2. He imitates his father in all his habits. 3. Judicious parents check the rude behaviour of their children in time. 4. Steer courageously the ship through the rolling sea. 5. It often happened that he looked for his book, and found it in his pocket. 6. The ships which go to Australia must cross the equator. 7. You should seek to imitate the example of your brother. 8. I behold his innocence in his manners. 9. To deny the immortality of the soul is as much as to forswear God. 10. The police made sure of the thief. 11. Imitate always the good, but never the bad.

* Nachahmen is commonly employed with the *dative* of a *person* and *accusative* of a *thing*.

SECTION LII.—VERBS REQUIRING TWO ACCUSATIVES; ALSO THOSE GOVERNING THE ACCUSATIVE WITH THE DATIVE.

Several verbs in German, as in English, govern two accusatives, as:—Er lehrt mich die deutſche Sprache, he teaches me the German language. Gott nannte das Licht Tag, und die Finſterniß Nacht, God called the light day, and the darkness night. Man nennt ihn nur den guten Walther (Pfeffel), they call him only the good Walter. (§ 132. 2.)

Verbs signifying "to compare, to give, to take away," etc., govern the accusative and the dative (§ 129. 1), as:—Wem ſoll ich dich vergleichen? to whom shall I liken thee? Sie gaben ihm einen Ehrentitel, they gave him a title of honour. Die Feinde nahmen ihm Alles, the enemy took from him all (everything).

VOCABULARY.

Abſicht, *f.* view, intention.
Achtung, *f.* esteem, respect.
An'denken, *n.* remembrance, keepsake.
An'vertrauen, to confide to.
Beſchei'den, modest.
Beweis', *m.* testimony.
De'müthig, humble.
Empö'rer, *m.* rebel.
Erpro'ben, to prove, test.
Geheim'niß, *n.* secret.
Geißel, *f.* scourge.
Heuchler, *m.* hypocrite, dissembler.
Hun'nenkönig, *m.* king of the Huns.
Klar, clear.
Lehre, *f.* instruction, lesson.
Le'bensgeſchichte, *f.* history of life.
Lie'bevoll, affectionately.
Mehrmals, several times.
Miß'handeln, to misuse, ill-treat.
Neu'gierde, *f.* curiosity.
Prinzeſ'ſin, *f.* princess.
Reichen, to reach, extend.
Schelten, to scold, chide.
Schimpfen, to disgrace (to call names).
Schönheit, *f.* beauty.
Taufen, to christen, baptise.
Te'lemach, Telemachus
Treue, *f.* fidelity.
Tyrann', *m.* tyrant.
Uebere'inſtimmen, to accord, to correspond.
Ue'berfluß, *m.* superabundance.
Vergan'genheit, *f.* time past, things past.
Verlei'hen, to endow, to bestow.
Verrä'ther, *m.* betrayer, traitor.
Verſchwie'genheit, *f.* secrecy, discretion.
Verſöh'nung, *f.* reconciliation.
Vorzug, *m.* preference.
Weigern (ſich), to decline.

RÉSUMÉ OF EXAMPLES.

Herr, lehre mich deinen Weg. — Teach me thy way, O Lord.

Er nannte ihn ſeinen lieben Sohn. — He called him his beloved Son.

Man (Sect. XXV. 4) heißt ihn den Vater der Waiſen und den Tröſter der Wittwen. — They call him the father of the orphan, and the comforter of the widow.

Den Feigling ſchimpft man einen Haſen. — They call a coward a hare.

Er giebt ſich viele Mühe um dich. (Gellert.) — He gives himself much trouble about you.

Gieb mir immer den erquick'enden Troſt, daß ich dich bald freu'diger wie'derſehen werde. (Weiße.) — Well, give me the refreshing consolation that I shall soon see you more joyful again.

Dir ein Bild ſind ſie gege'ben. (Schiller.) — To thee are they given (as) a picture.

EXERCISE 100.

1. Den Fürſten, der ſein Volk mißhandelt, nennt man einen Tyrannen. 2. Er fragt mich nach Dingen, die ich ihm nicht nennen kann. 3. Schilt mich was (Sect. LXIX. 1) du willſt, nur nicht einen Verräther. 4. Diejenigen Leute muß man Heuchler nennen, die ſchön reden und ſchlecht handeln. 5. Man hat die Prinzeſſin Louiſe getauft. 6. Ich fragte ihn dies nicht aus Neugierde. 7. Attila, der Hunnenkönig, nannte ſich die Geißel Gottes. 8. Ich nenne Den meinen Freund, der mich nicht auf meine Vorzüge, ſondern auf meine Fehler liebevoll aufmerkſam macht. 9. Er heißt Alles Feinde und Empörer, was nicht mit ihm iſt. 10. Der Lehrer ſchalt den Schüler einen faulen Knaben. 11. Ich fragte ihn vergebens nach ſeinem Namen. 12. Ich verdiene nicht, daß mich das Volk einen Verräther nennt. 13. Ich gebe Ihnen dieſes Andenken zum Beweiſe meiner Liebe und Achtung. 14. Wie gern verzeihen Eltern ihren Kindern die begangenen Fehler, wenn ſie dieſelben herzlich bereuen. 15. Er erzählte mir mehrmals ſeine Lebensgeſchichte. 16. Sie vergaben mir mein Unrecht, und reichten mir die Hände zum Beweiſe ihrer Verſöhnung. 17. Wohl dem Menſchen, dem die Natur einen geſunden Geiſt und einen klaren Verſtand verlieh, aber noch wohler dem, welchem ſie ein demüthiges und beſcheidenes Herz ſchenkte.

EXERCISE 101.

1. Mentor taught Telemachus the art of governing. 2. They will teach him this language. 3. The time past gives to men the best instruction for the future. 4. In his last letter he wrote to me the following news. 5. The rich should contribute a little from their superabundance with pleasure to the poor. 6. He showed me the beauty of nature. 7. I trusted him with the secret with the intention to test his discretion and fidelity. 8. Görgey is called a betrayer of his country by his own people. 9. He chides me with being a fool, as I declined to follow those principles which do not correspond with my inclinations. 10. The "Popular Educator" teaches the English, French, and German languages (say, language) in the easiest manner. 11. My adversary extended to me his hand as a sign of his reconciliation.

SECTION LIII.—PREPOSITIONS REQUIRING THE GENITIVE.

The prepositions mittelſt, oberhalb, ungeachtet, vermittelſt, vermöge, etc. (§§ 109, 110), govern the genitive, as:—Oberhalb der neuen Brücke iſt der Fluß breit und tief, above the new bridge the river is broad and deep. Aller Mühe ungeachtet gelang es nicht, notwithstanding all the pains it did not succeed. Mittelſt ſeines Beiſtandes ſetzten wir es durch, by means of his assistance we carried it through (achieved the design). Das kannſt du vermöge deines Verſtandes begreifen, that canst thou, by dint of thy understanding, comprehend. Vermittelſt Uebergabe kam die Stadt in Feindes Hände, by means of surrender, the town came into (the) enemy's hands. Zufolge ſeines Verſprechens mußte er kommen, in consequence of his promise, he was obliged to come.

VOCABULARY.

Amt, *n.* office, charge.
Aengſtlich, anxious.
Au'ßerhalb, without, out of, outside.
Beſorgt', solicitous.
Bleich, pale.
Dieſſeit, on this side.
Empfeh'len, to recommend.
Erlaub'niß, *f.* permission.
Gallier, Gaul.
Halben, *or* halber, for the sake of, on account of.
Herrſchen, to reign, prevail.
Hunger, *m.* hunger.
In'nere, inner, internal.
In'nerhalb, within.
Jenſeit, beyond, on the other side.
Kraft, by virtue of.
Kreuz, *n.* cross.
Landhaus, *n.* country-house, villa.
Längs, along.
Laut, according to, in consequence of.
Mittelſt, by means of.
O'berhalb, above, at the upper part of.
Pappel, *f.* poplar.
Schlüſſel, *m.* key.
Seil, *n.* rope.
Thal, *n.* vale, valley.
Trotz, in defiance of, in spite of.
Ueberzeu'gung, *f.* conviction.
Umher'gehen, to go about.
Un'geachtet, notwithstanding.
Un'terhalb, below, at the lower end of.
Unterſtütz'en, to support, assist.
Unweit, not far off.
Verbot', *n.* prohibition.
Verhaf'ten, to arrest.
Vermittelſt, by means of. (See Mittelſt.)
Vermö'ge, by means of. (See above.)
Verzweif'lung, *f.* despair, despondency.
Wegen, on account of, by reason of.
Zufol'ge, in pursuance of, in consequence of.
Zurück'kehren, to return.
Zuſage, *f.* promise, word.

RÉSUMÉ OF EXAMPLES.

Au'ßerhalb der Stadt haben ſich die Reichen ſchöne Land'häuſer erbaut'. — Outside the town the rich have built for themselves beautiful villas.

Laut eines kai'ſerlichen Befehls' mußten die Bürger ihre Waffen ab'geben. — In consequence of an imperial command, the citizens were forced to give up their arms.

Während des ſie'benjährigen Krieges bela'gerte Friedrich II. die Stadt Prag. — During the seven years' war Frederic II. besieged the city (of) Prague (§ 123. 6).

Wegen ſeines geſel'ligen und munteren Betra'gens liebte man ihn. — On account of his social and cheerful deportment they loved him.

EXERCISE 102.

1. Die Kinder konnten wegen des ſchlechten Wetters keinen Spaziergang machen. 2. Dieſſeit des Fluſſes ſteht ein ſchönes Landhaus. 3. Er that es der Ehre halber. 4. Innerhalb der Stadt herrſcht Hunger und Verzweiflung. 5. Jenſeit des Berges iſt ein ſchönes Thal. 6. Kraft ſeines Amtes verhaftete er den Dieb. 7. Laut ſeines Briefes erwarten wir ihn heut. 8. Längs des Stromes ſtehen viele Pappeln. 9. Mittelſt eines Seiles zog er ihn hinauf. 10. Vermittelſt eines falſchen Schlüſſels kam er in dieſes Haus. 11. Oberhalb der Brücke ſteht ein Kreuz. 12. Anſtatt des Kaffees trinkt er Waſſer. 13. Trotz des ſtarken Regens geht er ſpazieren (Sect. LXIV. 1). 14. Unterhalb dieſes Dorfes liegt eine ſchöne Wieſe. 15. Ungeachtet des Verbotes ſeines Vaters beſuchte er das Theater. 16. Unweit dieſes Waldes ſah ich einen großen Vogel. 17. Vermöge ſeines Reichthums kann er die Armen unterſtützen. 18. Während der letzten Zeit ſah er ſehr bleich aus. 19. Wegen des Krieges fliehen die reichen Einwohner. 20. Seiner Zuſage zufolge kehrte er zurück.

EXERCISE 103.

1. He did it in spite of his relations. 2. I found myself quite happy beneath the humble roof of that countryman. 3. Everything below the sun is subject to change. 4. What had you for dessert besides melons and grapes? 5. The poor emigrants hope to live better on the other side of the ocean. 6. He persevered in spite of all opposition. 7. The Gauls directed their toilsome march along the sea shore. 8. It is beneath the dignity of an honest man. 9. Greenwich is within five miles of London. 10. He ought to be spared on account of his age. 11. He is a nobleman by right of his birth.

KEY TO EXERCISES IN LESSONS IN GERMAN.

EXERCISE 17 (Vol. I., page 103).

1. Der Schreibtiſch des tapfern Polen. 2. Das Leben eines Prinzen iſt unſicher. 3. Der tapfere Pole mit dem lebhaften Geſichte iſt ein Feind des Franzoſen. 4. Iſt er ein Freund des guten Hauptmanns? 5. Jener Soldat iſt der Bruder ſeiner ſchönen Couſine. 6. Der fleißige Sohn des heitern Deutſchen hat ein gutes Gewiſſen.

EXERCISE 18 (Vol. I., page 103).

1. Has this draper good cloth? 2. Yes, he has good cloth, and this tanner has good leather. 3. What has the barber? 4. He has good soap. 5. Who has good hay? 6. This peasant has good hay. 7. What has the blacksmith? 8. He has good iron, and his brother, the paper-dealer, has good paper, red, blue, and white. 9. Have you red or white wine? 10. I have neither red nor white (wine). 11. Your wine is sweet, but this here is sour. 12. Your red wine is strong, and the white wine of my neighbour is weak. 13. Has this miller good flour? 14. Yes, and this peasant has good grain, good oats, and good barley. 15. This girl has a fine voice. 16. My brother has something beautiful, and I have nothing ugly. 17. This man has only a little money, and the other has none at all.

EXERCISE 19 (Vol. I., page 103).

1. Hat mein Bruder, der Schneider, ſchwarzes oder rothes Tuch? 2. Der Freund meines Bruders hat gutes Papier, rothes, blaues und weißes. 3. Der Sohn des Buchbinders hat etwas von dem Barbier. 4. Die ſchöne Tochter des alten Schmiedes hat einen Hund und eine Katze. 5. Der fleißige Tiſchler hat etwas Schönes. 6. Der Tuchhändler iſt ein Sohn des fleißigen Kaufmanns. 7. Der alte Gerber hat die ſchlaue Katze und den treuen Hund nicht geſehen. 8. Iſt der Zimmermann zu Hauſe? Nein, er iſt nicht zu Hauſe. 9. Haben Sie etwas genommen? Ich habe nichts genommen. 10. Hat Brunnenwaſſer einen ſüßen, oder einen ſalzigen Geſchmack? Es hat keinen ſalzigen Geſchmack, ſondern einen ſüßen Geſchmack.

EXERCISE 20 (Vol. I., page 119).

1. These new tables are great. 2. The white hats are beautiful. 3. These forks are of silver. 4. Have you silver or gold knives and spoons? 5. We have silver ones. 6. The good boys have beautiful pears. 7. Diligent scholars have long exercises. 8. These old soldiers have old books. 9. The cutler has beautiful new knives. 10. The joys of this man are his lovely children. 11. The pulpits in these churches are high. 12. The old lady's nieces are diligent. 13. The preacher's girls are good children. 14. The Dutchmen are cleanly and honest. 15. This market-woman has the great, ripe pears of the peasant. 16. The great, ripe pears of this market-woman are palatable. 17. Has this lady your good (lady) friend's thimble? 18. No, she has your good friend's thimble. 19. Has Miss Louisa your good mother's new parasol? 20. No, she has your good brother's umbrella. 21. Has the little daughter of this lady a music-master? 22. No, because she is yet too young; but her sister has not only a music-teacher, but also a teacher of painting. 23. Who has your brother's books? 24. His (lady) friend's sister has the books. 25. Has your old neighbour's daughter my young friend's gold watch? 26. No, she has her neighbour's silver watch. 27. The leaves of these trees are yellow, but their fruit is ripe and good. 28. The rats are troublesome guests. 29. This old merchant has great riches. 30. This cavalry and that infantry are both equally good. 31. The chancellor's little son is the king's favourite. 32. This painter's friend has very beautiful paintings.

and their extent, until as we ascend to life and intelligence, we make the further discoveries that difficulties arise of a fresh nature, and that it will be indispensable to direct our attention to other branches of knowledge to help us in our efforts. It must be admitted that the human figure is the most interesting and sublime study in Nature. Whilst other objects are only represented for the sake of their forms, in this case the forms must be made subservient to, and are employed to represent, the intentions of the mind. Therefore, it is not only the power of imitative drawing that is necessary, but the ability to *adapt that power* to purposes of a much higher grade than those which relate to form only. Here is the reason why different men profess different branches of art. If the practice of art depended upon the power of imitation only, no one who is sufficiently skilful with his pencil need confine himself to one especial study; but that which makes art valuable, and at the same time difficult, is something which extends beyond the practice of mere imitation. Mark the various expressions so commonly seen in many countenances, betraying more meaning than words can give. A *look* of sympathy or of anger is read at once, and he who receives it hesitates not a moment in realising its intended meaning, although not a syllable has been uttered. Who has ever yet succeeded in portraying that divine look that Christ

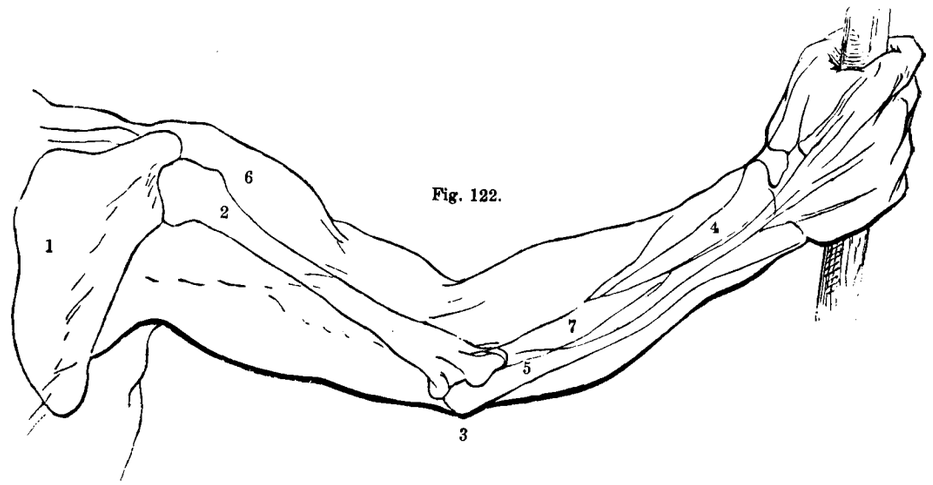


Fig. 122.

cast at Peter, expressive of all that had gone before in their fellowship with each other, of all that related to their sufferings and trials, both past and present, reminding Peter of his professions, and telling him of his weakness? And though not a word was said, Peter understood its meaning so thoroughly, that "he went out and wept bitterly." It is very evident that to be able to represent such a scene as this, a very high standard of that which is comprehended by the *power of drawing* must be attained. We can see where it extends, but we cannot see its limits.

To explain the exact kind of knowledge capable of affording assistance to the draughtsman in every case would indeed be very difficult. To sum it up in a few words, we may say, all is useful that helps us to understand the construction of the object to be drawn; and, in animal life, how the various impulses of the mind and will command the action of the body. It ought to be the desire of every one who wishes to perfect himself in the particular branch of art which he has chosen, whatever it may be, to seek out every kind of information that can assist him in his object. We will instance one case only to illustrate the rest. The flower-painter, to gain any position at all in the art, must know something of botany, which teaches him the construction of flowers and their classification. With such an auxiliary as botany, will not his work be more satisfactory, and will he not be less likely to overlook many facts connected with his pursuit which would be deemed indispensable by a competent judge? Therefore there *are latent difficulties* which the power of mere imitation can never overcome, and which oblige us to seek farther for assistance in branches of knowledge which do not immediately belong to drawing, but which must have an important influence in our ultimate success.

The knowledge necessary to assist us in drawing the human form is derivable from many sources; the first and most important is that of *anatomy*. We have in the last lesson directed the student where he may conveniently obtain information upon this part of the subject. We propose now to give him some directions how he is to apply it. We advise him to study the skeleton first, and make himself familiar with the names of the bones, and their several protuberances, and the way in which they are connected with each other, either by ball and socket, as in the hip-joint, or in the form of a hinge, as in the elbow and knee. He would do well to make a drawing of the skeleton, and then from the plates and descriptions cover it with the muscles, as in Figs. 122, 123, being very particular to notice their origin, insertion, and their use. Two or three hours of persevering study in this way will do more for him when he comes to draw from casts, or from life, than months of labour from copies without it. In short, if he relies on copies only, it is more than doubtful if he will ever do anything at all satisfactory; and should his ambition lead him to design for himself, with the intention of employing his work for any art or decorative purpose, he would be totally at a loss without a knowledge of the anatomical construction of the body, and he has no business to feel any surprise if he fails. These remarks must not discourage; on the contrary, we hope they will induce all to seek the readiest and shortest way to attain the requisite qualification. We must bear in mind that this branch of art is a very different matter to that which includes trees, houses, or ornament. The body is subject to such constant changes of position that it is impossible to omit those instructions which relate to and explain its construction and development. The arm in one position is very different when that position is changed. The same limb in repose is completely altered in action, and, in order to overcome the difficulties arising from these changes, the *construction* of the limb *must be understood*. There are those whose ambition goes no farther than copying copies for mere amusement. These need not trouble themselves beyond following the system of *arrangement*, about which we have said so much in our early lessons, applicable to objects of *still life;* because they have then only to copy straight and curved lines—that is, to treat the subject as composed only of such lines. Now we feel that if we leave our pupils, especially those who have to employ figure-drawing for useful and practical purposes, with no further instructions than those which will enable them to imitate a printed lithograph, we should fail in our duty. Therefore we proceed, with all who are disposed to accompany us, regardless of difficulties and discouragements,

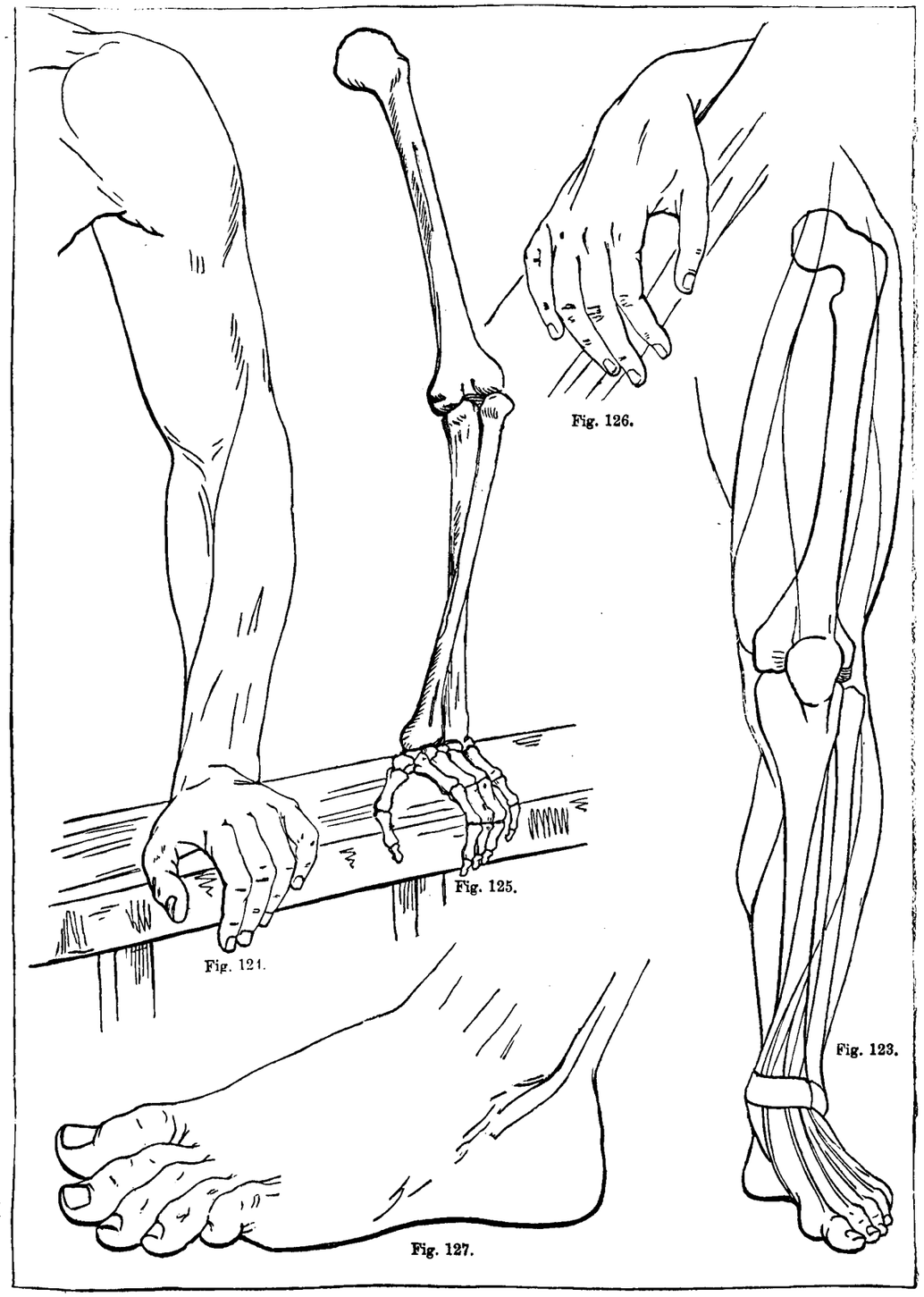


Fig. 126.

Fig. 125.

Fig. 121.

Fig. 123.

Fig. 127.

LESSONS IN BOTANY.—XVII.

SECTION XXXI.—SOLANACEÆ, OR THE NIGHTSHADE TRIBE (*continued*).

THE capsicum (*Capsicum annuum*) is another of the *Solanaceæ*. It is an annual, originally a native of India, but cultivated now in Europe, Africa, America, and Australia. Its berry is conical, smooth, and shining, green when unripe, passing gradually into a beautiful coral-red. In this pod resides a resinous balsamic acrid principle named *capsicine*. Cayenne pepper is capsicum fruit reduced to powder.

The beautiful tomato, or love-apple (*Lycopersicum esculentum*), a native originally of the West Indies, is now cultivated in European gardens, more especially in those of Spain and Italy. In the former country it serves as a daily article of food for persons of almost every grade of society.

We now arrive at the genus *Solanum*, from which the order *Solanaceæ* takes its name. It is very numerous in species. Its generic characters may be enumerated by a rotate corolla, and anthers not opening by longitudinal fissures, but by two points at their summits. The most common species of the genus *Solanum* is the *Dulcamara*, or bitter-sweet, a plant which is found growing in almost every hedge in the vicinity of London, known by its sombre foliage, its pendent cymes of pretty flowers, and its deep-red berries.

By far the most important, however, amongst the genus *Solanum* is the potato, or *Solanum tuberosum*, a plant originally a native of the Cordilleras, or high mountains of Peru and Chili.

It is supposed that this useful vegetable was first brought into Spain in the early part of the sixteenth century, by some of the Spaniards who invaded Peru under Pizarro, and ultimately succeeded in annexing it to the Spanish dominions in the New World. The term potato is, in all probability, derived from the Spanish *batata*, a word which was originally applied to the sweet and succulent root called beet, or beetroot. The tuber and its principal use as a vegetable became known in Italy and other parts of Southern Europe soon after its introduction into Spain; but the potato was unknown in England until 1586, when Sir Walter Raleigh returned from an unsuccessful attempt to found the colony of Virginia, which was not permanently settled until 1607. The chief result, indeed, of Sir Walter Raleigh's expedition was the introduction of the potato into England and Ireland. It is asserted that the potato was first brought to this country by Sir John Hawkins in 1563; while, by others, the credit of having introduced a vegetable which forms such an important adjunct to the mid-day meal is ascribed to Sir Francis Drake. It is, however, most probable that it was brought from North America by Sir Walter Raleigh, who set about turning the knowledge of its habits and uses to good account by successfully attempting its culture on a large scale in his Irish estates near Youghal, in county Cork.

The student will remember that the potato is not a root, but a tuber. He will also remember the botanical significance attached to the word tuber, which is a sort of aggregation of underground buds studded upon a dense mass of starchy matter and gluten designed for their nourishment.

Tobacco (*Nicotiana Tabacum*, Fig. 162) is another plant belonging to the natural order we are considering, and the use—some will say abuse—of which is too well known to require comment.

When Christopher Columbus, in 1492, first set foot in the island of Cuba, he saw, amongst other strange customs, the natives gather the leaves of a plant, dry these leaves, roll them into the form of a torch, light the torch, put the unignited end in the mouth, and breathe the smoke. Such is the first account we have handed down to us of the manufacture and uses of a "mild Havannah." Subsequently, when Columbus and his gold-hunting associates gained the main continent of America, they saw a similar custom everywhere in force amongst all classes, slightly varied as to detail, some using pipes, and others preferring the Cuban method of cigar-smoking. Nor were chewing and snuff-taking unknown to the Mexicans and Peruvians. The Mexican priests, in particular, were in the habit of taking snuff profusely, for the purpose of clearing their brains and exalting their intellects. From the aborigines of America, tobacco first passed to the Spaniards, then to the Portuguese, then to the English, and it is now everywhere; and despite a great deal of opposition shown to it, there is no great reason to suppose that tobacco-chewing, smoking, or snuff-taking will ever be abolished.

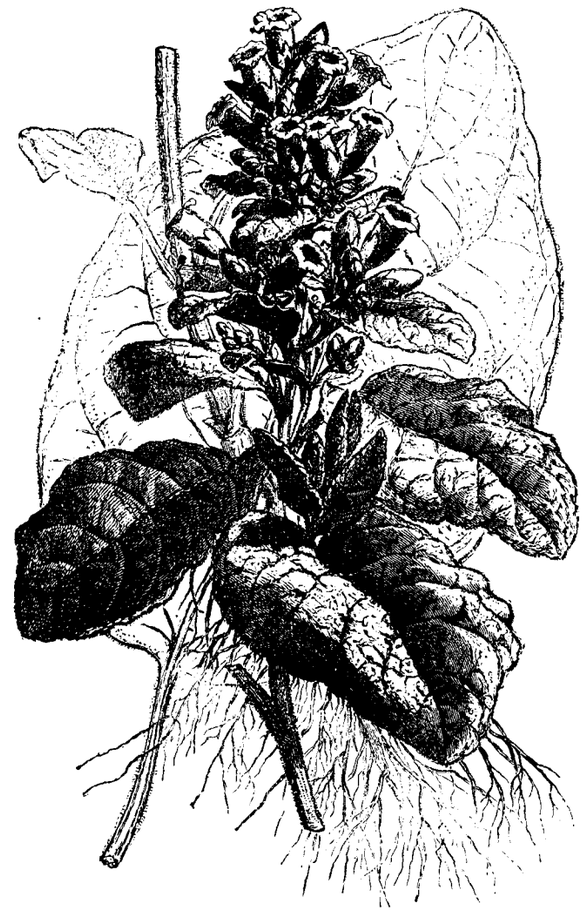


162. THE TOBACCO PLANT (NICOTIANA TABACUM).

Tobacco was first brought into Europe by Jean Nicot, French ambassador at the court of Portugal; hence the name *Nicotiana* given to the genus. It was this ambassador who, we are told, offered the first pinch of snuff to Catherine de Medicis. The queen was much pleased with the sensation, history informs us, took to "snuffing" with great ardour, and becoming the acknowledged patroness of snuff, tobacco was called in consequence *Herbe de la Reine*. Sir Walter Raleigh took some tobacco from Virginia to England, and became remarkably fond of its use. His example was soon followed even by the most refined courtiers. James I., every person knows, entertained a furious hatred against tobacco. In the year 1619 he fulminated an edict against it, but tobacco was more powerful than the king. Pope Urban VIII., in 1624, next set to work to check the use of tobacco, against which he launched a special bull. The pope did not succeed better than the king. Next in the list of tobacco-stoppers came the Sultan Amurath IV., the Shah of Persia, and the Grand Duke of Muscovy. These potentates more especially directed their efforts to restrain the habit of snuff-taking; and disdaining argument, which had so signally failed under James—disdaining, also, religious enactments, which had not been more successful under the pope—this precious trio of Oriental worthies thought that the shortest way to check the habit of snuffing would consist in cutting off people's noses. This remedy they carried, we are told, pretty liberally into execution.

The origin of the word tobacco has been traced to various sources. By some it is said to be derived from Tabacca, a province of Yucatan, in Mexico. Others, with an equal degree of probability, trace the derivation of the word to Tobago, one of the British West India Islands, near Trinidad, belonging to the Windward group. Humboldt, however, says that the word tabacco was used by the Caribbee islanders as the name of the pipe in which they smoked the dried leaves of the plant, and that the Spaniards ultimately applied this designation to the plant itself. Its culture is attended with some difficulty, as a slight frost will often tend to check the growth of the young plants, if it does not cause a more serious injury, and destroy a great part of the crop. Tobacco is largely cultivated in all parts of Southern and Western Europe, except Great Britain and Ireland, where its culture is prohibited by Act of Parliament. Its cultivation in this country was forbidden in 1684; but in 1779 permission was given to the Irish farmers to grow tobacco, and this privilege—if privilege it can be called—was enjoyed by the Irish until 1831, when an act was passed to revive the former act, under which the cultivation of the plant had formerly been prohibited.

The petunia, a beautiful specimen of our half-hardy herbaceous perennials, is closely allied to the tobacco plant, its name being derived from *petun*, the Brazilian name for tobacco. It makes a showy appearance in the borders during the summer and autumn, but requires to be protected under glass during the winter and early spring.



163. BLOSSOM, ROOTS, AND LEAVES OF THE MEXICAN TOBACCO PLANT (NICOTIANA RUSTICA).

SECT. XXXII.—LEGUMINOSÆ, OR THE LEGUMINOUS TRIBE.

The structural characteristics of the fruit termed by botanists a *legume* we shall presently enumerate; meanwhile, we will inform the reader that a *legume* is merely another name for *pod*, the sort of fruit borne by the pea, clover, laburnum, and many others which will easily suggest themselves.

Characteristics: Calyx free and monosepalous; corolla of five petals, perigynous or hypogynous, regular or irregular; stamens double the number of petals, or occasionally indefinite, perigynous; pistil composed of one carpel; fruit, a legume; seed, dicotyledonous; embryo straight or curved, exalbuminous; leaves, alternate, stipulate.

This is an exceedingly large and very valuable order of vegetables, all of which present strong marks of family resemblance, and, moreover, possess a similarity of chemical and physiological qualities.

The great universal characteristic of the plants of this tribe is that from which they derive their name *Leguminosæ*: let us, therefore, examine the anatomy of a *legume*. A *legume*, then, is nothing more than a long, flat carpel, for the most part containing many seeds, and splitting, when arrived at maturity, into two halves. The seeds, it will be remembered, all grow from one commissure or junction line in the inside of the carpel.

As regards relative dimensions, legumes differ considerably, some being longer than they are broad, others the reverse. This circumstance, however, gives rise to no physiological distinction between the two.

As the *Leguminosæ* form an exceedingly numerous order, and comprehend plants amongst which differences of structure exist insufficient to justify their formation into different orders, they are divided into groups, the distinctions between which will presently come under consideration. One of these groups, perhaps the most important, is the Pea tribe, the members of which are sufficiently familiar to all of us. Independently of the existence of a pod, in these plants there is another striking peculiarity; the flowers are shaped very much like butterflies. Hence arises the denomination papilionaceous (from *papilio*, the Latin for butterfly), by which the pea sub-division of the *Leguminosæ* is known.

Let us now study one of these flowers a little in detail. The calyx is made up of five sepals, all of which unite in a tube. The corolla is made up of five petals, not all, however, of equal size. One of them is considerably larger than the others, and rises behind them. This petal has acquired among botanists the distinctive name of *vexillum* or *standard*. The two shorter petals which stand in front of the *standard* are termed *alæ*, or *wings*. The remaining portion of the corolla, formed like a boat, from which circumstance it derives the appellation *carina*, or *keel*, is composed of two petals slightly united.

Next observe the stamens, and you will find they are collected in groups, or, to use the expression of Linnæus, they are "adelphous." All the common papilionaceous flowers are adelphous; but many foreign species, especially certain natives of New South Wales, *Pultenæas Gompholobiums, Daviesias*, etc., are not.

Next come the plants, which, although bearing legumes or pods, are not provided with papilionaceous flowers. This division comprehends all the Cassias and their allies. Lastly, we have the Mimosa tribe, the great characteristic of which is the possession of flowers with a regular corolla and indefinite stamens.

and with a feeling of determination on their part to obtain as great a power of drawing the human figure as is possessed by those who made the copies they are striving to imitate.

In Figs. 122, 123 we give specimens of the mode in which the anatomical construction of the human figure is to be studied, which we earnestly recommend our pupils to adopt, hoping they will be fully persuaded of the necessity of such a course. In our explanations we do not intend to go through the whole body, but only a small portion of it, as an example of the method we recommend, deeming it quite sufficient for our purpose; after which we trust all will be able to continue the study for themselves. We advise them to make the whole of the drawing, including the bones and muscles, first with a lead-pencil; then go over the outline of the bones with black ink, and the muscles with red; afterwards number the bones, and underneath write out their names. For instance (Fig. 122):—1. The *scapula*, or shoulder-blade. 2. The *humerus*, the upper and large bone of the arm. 3. The *olecranon*, or point of the elbow. 4. The *radius*. 5. The *ulna*; the two last-named bones together form the fore-arm. The *ulna* and *radius* and the *humerus* form the hinge-joint at the elbow. The *radius* is attached by a ligament outside the elbow-joint; at the wrist it becomes the base of support for the hand: thus the arm is capable of performing a rotatory motion, and so enables us to turn the palm of the hand downward, as in Figs. 124, 125. The muscles may be treated in the same way, as follows:—6. The *deltoid*, the large muscle that covers the shoulder as it descends the arm; it arises from part of the *clavicula*, or collar-bone, and from along the upper edge of the *scapula*, the shoulder-blade. It is composed of several lobes or parcels of flesh, which all join in one tendon, and are inserted into the *humerus*, about half-way below its head. Its use is to raise the arm from the side, the first motion preparatory to striking. 7. The *extensor digitorum* arises from the outer protuberance of the *humerus*, and from the hinder part of the *radius* and *ulna*. At the wrist it divides into three tendons, which are inserted into the bones of the first three fingers. Its use, as its name signifies, is to extend the fingers—that is, to draw them back in opening the hand. If our pupils will provide themselves with some simple work on the structure of the human form, and do as we have directed them above, they will gain an amount of anatomical knowledge which will create a confidence in drawing the human figure that no other kind of practice could possibly equal. We also advise that the practice for some time should be restricted to outline only, working from good drawings, and from plaster casts especially. We purposely postpone our remarks upon shading for the present.

LESSONS IN FRENCH.—XXXV.

SECTION LXXVIII.—GOVERNMENT OF VERBS (*continued*).

1. MANY French verbs govern their object by means of prepositions, while the corresponding English verbs require no preposition before their object. Other French verbs govern their object through prepositions different from those used in English. We give here a few verbs coming under those two classes, commencing with the first:—

2. Verbs which have a preposition before a noun in French, but have none in English:—

Abuser de, *to abuse.*	Manquer à, *to offend, to fail.*	S'approcher de, *to approach.*
Convenir à, *to suit.*	Médire de, *to slander.*	Se méfier de, *to mistrust.*
Déplaire à, *to displease.*	Obéir à, *to obey.*	Se servir de, *to use.*
Désobéir à, *to disobey.*	Pardonner à, *to forgive.*	Se souvenir de, *to remember.*
Douter de, *to doubt.*	Plaire à, *to please.*	Survivre à, *to survive.*
Échapper à, *to escape.*	Ressembler à, *to resemble.*	
Jouir de, *to enjoy.*		

3. Verbs governing their object through different prepositions in the two languages:—

Féliciter de, *to congratulate for.*	Remercier de, *to thank for.*	Se passer de, *to do without.*
Gémir de, *to grieve for.*	Rire de, *to laugh at.*	S'informer de, *to inquire about.*
Louer de, *to praise for.*	Rougir de, *to blush at.*	Songer à, *to think of.*
Penser* à, *to think of.*	S'affliger de, *to grieve for.*	
Profiter de, *to profit by.*		

* **Penser**, meaning *to have an opinion*, requires the preposition **de**:—
Que pensez-vous de lui? *What is your opinion about him?*

MISCELLANEOUS EXAMPLES.

N'avez-vous pas abusé de notre patience?	*Have you not abused our patience?*
Nous en avons abusé.	*We have abused it.*
Vous avez désobéi à vos parents.	*You have disobeyed your parents.*
Vous pardonnerez à vos ennemis.	*You will forgive your enemies.*
Vous penserez constamment à vos devoirs.	*You will think constantly of your duties.*
Vous y penserez constamment.	*You will think of them constantly.*
Ne riez-vous pas de nos erreurs?	*Do you not laugh at our mistakes?*
Nous n'en rions point.	*We do not laugh at them.*
Ne ressemble-t-il pas à son père?	*Does he not resemble his father?*

EXERCISE 151.

Arrangement, m. *arrangement.*	Conduite, f. *conduct.*	Peintre, m. *painter.*
Circonstance, f. *circumstance.*	Devoir, m. *duty.*	Prochain, m. *neighbour.*
Cœur, m. *heart.*	Faute, f. *fault.*	Sellier, m. *saddler.*
Complaisance, f. *kindness.*	Malheur, m. *misfortune.*	S'informer, 1. ref. *to inquire.*
	Ne—plus, *no more.*	Succès, m. *success.*
	Nouvelle, f. *news.*	

1. Cet arrangement vous convient-il? 2. Il ne me convient pas, mais il convient à notre parent. 3. Cela ne déplaît-il pas au peintre? 4. Votre conduite lui déplait beaucoup. 5. Ne craignez-vous pas d'abuser de la patience de votre ami? 6. Je crains d'en abuser. 7. Ne pensez-vous jamais à vos devoirs? 8. J'y pense tous les jours. 9. Avez-vous pensé à votre frère aujourd'hui? 10. J'ai pensé à lui, et je me suis souvenu de ses bontés. 11. A-t-il eu soin de son père, et lui a-t-il obéi? 12. Il lui obéit constamment. 13. Ne lui a-t-il jamais désobéi? 14. Il lui a désobéi plusieurs fois, mais il gémit de sa faute. 15. Ne les remerciez-vous pas de leur complaisance? 16. Je les en remercie de tout mon cœur. 17. Le sellier vous a-t-il félicité de votre succès? 18. Il m'en a félicité. 19. N'avez-vous pas ri de notre malheur? 20. Nous n'en avons pas ri, nous ne rions jamais des malheurs d'autrui. 21. Ne vous souvenez-vous pas des nouvelles que je vous ai apprises? 22. Je ne m'en souviens plus. 23. Votre père ne vous a-t-il pas défendu de médire de votre prochain? 24. Il me l'a défendu. 25. Nous nous sommes informés de toutes les circonstances de cette affaire.

EXERCISE 152.

1. Have you not abused your friend's kindness? 2. I have not abused his kindness, I have abused his patience. 3. Does not your conduct displease your parents? 4. My conduct does not please them. 5. Why have you not obeyed your father? 6. I have obeyed him (*lui*). 7. Have you not laughed at my mistakes? 8. I have not laughed at your mistakes. 9. Has the young man laughed at the painter's mistakes? 10. He has not laughed at his mistakes. 11. Has your saddler laughed at your cousin's misfortunes? 12. He has not laughed at his misfortunes. 13. Do you ever laugh at the misfortunes of others? 14. We never laugh at our neighbour's misfortunes. 15. Do you remember the lesson which you learnt yesterday? 16. I do not remember it (*en*). 17. Does that young lady resemble her mother? 18. She does not resemble her mother. 19. Have you thanked your friend for his kindness? 20. I have thanked him for it. 21. Has your mother forbidden you to read that book? 22. She has forbidden it (*me l'a*). 23. Why do you not forgive your enemies? 24. I forgive them with all my heart. 25. Do you not think of your duties? 26. I think of them (*y*) every day. 27. Have you congratulated your friend? 28. I have congratulated him on his success. 29. Have you not slandered those gentlemen? 30. I never slander my neighbour. 31. Does that house suit you? 32. It suits me, but it does not suit my father. 33. Does that house suit the painter? 34. It suits him very well, but it is too small for me.

SECTION LXXIX.—COMPLEMENT OF ADJECTIVES (§ 85).

1. The complement of an adjective is generally a noun or a verb completing its signification. This complement is usually connected with the adjective by means of a preposition.

2. That preposition is often different in French from that connecting the corresponding English adjective with its complement.

3. When an adjective follows the verb **être** used impersonally, the preposition **de** connects that adjective with its complement:—

Il est nécessaire de travailler pour vivre.	*It is necessary to labour in order to live.*

4. The following adjectives are connected with their complement by prepositions different in French and English:—

Amoureux de, *in love with.*	Exact à, *exact in.*	Mécontent de, *displeased with.*
Bon à, *good for.*	Fâché de, *sorry for.*	Poli envers, *polite to.*
Bon pour, *kind towards.*	Inquiet de, *uneasy about.*	Propre à, *fit for.*
Chéri de, *beloved by.*	Insolent avec, *insolent towards.*	Rebelle à, *rebellious towards.*
Content de, *pleased with.*	Ivre de, *intoxicated with.*	Reconnaissant de, *grateful for.*
Cruel à, *cruel towards.*		Rempli de, *filled with.*
Désolé de, *grieved for.*		

MISCELLANEOUS EXAMPLES.

N'êtes-vous pas content de vos progrès?	*Are you not pleased with your progress?*
J'en suis fort content.	*I am very much pleased with it.*
Votre domestique est-il exact à remplir ses devoirs?	*Is your servant exact in fulfilling his duties?*
Avez-vous rempli de vin cette bouteille?	*Have you filled that bottle with wine?*
Avez-vous rempli d'argent votre bourse?	*Have you filled your purse with money?*
Je l'en ai remplie.	*I have filled it with it.*
Il est très facile de blâmer les actions d'autrui.	*It is very easy to blame the actions of others.*
Il est glorieux de mourir pour sa patrie.	*It is glorious to die for one's country.*
Il est plus agréable de voyager en été qu'en hiver.	*It is more agreeable to travel in summer than in winter.*

EXERCISE 153.

Abatt-re, 4. ir. *to cut down.*	Chagriné, e, *vexed.*	Pommier, m. *apple-tree.*
Achat, m. *purchase.*	Encre, f. *ink.*	Prunier, m. *plum-tree.*
Arrach-er, 1. *to pull up.*	Fend-re, 4. *to cleave, split.*	Roi, m. *king.*
Aubergiste, m. *innkeeper.*	Gloire, f. *glory.*	Sci-er, 1. *to saw.*
Bois à brûler, m. *firewood.*	Liberté, f. *liberty.*	Tonneau, *cask.*
	Nettoy-er, 1. *to clean.*	
	Peuple, m. *people.*	

1. Ce héros n'était-il pas amoureux de la liberté et de la gloire? 2. Il en était amoureux. 3. Ce roi n'était-il pas chéri de son peuple? 4. Il en était chéri. 5. Ces négociants ne sont-ils pas contents de leur achat? 6. Ils n'en sont pas contents. 7. N'êtes-vous pas chagriné de ne pouvoir nous accompagner? 8. J'en suis désolé. 9. Savez-vous de quoi l'aubergiste a rempli ce tonneau? 10. Il l'a rempli de vin. 11. De quoi ferez-vous remplir cette bouteille, quand vous l'aurez fait nettoyer? 12. Elle est déjà remplie d'encre. 13. N'êtes-vous pas bien fâché d'avoir fait abattre vos pommiers? 14. J'en suis bien content, car ils n'étaient bons à rien. 15. N'est il pas nécessaire de faire arracher ces pruniers? 16. Il n'est pas nécessaire de les faire arracher. 17. Est-il possible de fendre ce morceau de bois? 18. Il est possible de le fendre. 19. Êtes-vous exact à nettoyer vos habits? 20. J'y suis très exact. 21. De quoi avez-vous rempli votre bourse? 22. Je l'ai remplie d'argent. 23. Est-il nécessaire de faire scier votre bois à brûler? 24. Il est nécessaire de le faire scier. 25. N'êtes-vous pas reconnaissant des services qu'on vous rend? 26. J'en suis très reconnaissant.

EXERCISE 154.

1. Are you not grieved with having lost your money? 2. I am vexed that I have lost my purse. 3. With what will you fill that bottle? 4. I will have it filled with ink. 5. Is it not necessary to have our wood sawed? 6. It is necessary to have our fire-wood sawed. 7. Your garden is too small, is it not necessary to have some plum-trees pulled out? 8. It is necessary to have some plum-trees cut down. 9. Have you filled your friend's purse with silver? 10. I have filled it with gold. 11. Are all your bottles filled with wine? 12. They are all filled with ink. 13. Are you sorry to have filled your bottles with ink? 14. I am glad to have filled them with ink, for I want ink. 15. Are you pleased with this book? 16. I am pleased with it. 17. Is that land good for anything? 18. It is good for nothing. 19. Is that lady beloved by her children? 20. She is beloved by her friends and by her children. 21. Are you grateful for those services? 22. I am grateful for them. 23. Is it not possible to split that piece of wood? 24. It is not possible to split it. 25. Is it agreeable to travel in winter? 26. It is not so agreeable to travel in winter as in summer. 27. It is easy to blame others. 28. Is it not glorious to die for one's country? 29. It is glorious to live and to die for one's country. 30. Have you filled the inkstand (*encrier*) with it? 31. I have filled it with it. 32. Would it not be necessary to pull up all those trees? 33. It would not be necessary to pull them all up, for my garden is very large. 34. Henry the Fourth (*quatre*) was beloved by his people.

KEY TO EXERCISES IN LESSONS IN FRENCH.

EXERCISE 38 (Vol. I., page 147).

1. Avez-vous besoin de votre domestique? 2. Oui, Monsieur, j'ai besoin de lui. 3. Votre beau-frère a-t-il besoin de vous? 4. Il a besoin de moi et de mon frère. 5. N'a-t-il pas besoin d'argent? 6. Il n'a pas besoin d'argent, il en a assez. 7. Votre frère est-il fâché de sa conduite? 8. Il est bien fâché de sa conduite, et bien fâché contre vous. 9. A-t-il bien soin de ses livres? 10. Il en a bien soin. 11. Combien de volumes a-t-il? 12. Il en a plus que vous, il en a plus de vingt. 13. De quoi le jeune homme a-t-il besoin? 14. Il a besoin de ses effets. 15. Avez-vous besoin de vous reposer? 16. Votre frère n'en est-il pas étonné? 17. Il en est étonné. 18. Avez-vous envie de lire les livres de votre frère? 19. J'ai envie de les lire, mais je n'ai pas le temps. 20. Avez-vous le temps de travailler? 21. J'ai le temps de travailler, mais je n'ai pas le temps de lire. 22. Le jeune frère a-t-il soin de ses effets? 23. Il en a bien soin. 24. Ce petit garçon a-t-il peur du chien? 25. Il n'a pas peur du chien, il a peur du cheval. 26. Avez-vous besoin de pain? 27. Je n'en ai pas besoin. 28. Êtes-vous content de la conduite de votre frère? 29. J'en suis content. 30. Votre frère a-t-il envie de lire mon livre? 31. Il n'a pas envie de lire votre livre, il est fatigué. 32. Ce jeune homme est-il fâché contre vous ou contre ses amis? 33. Il n'est fâché ni contre moi, ni contre ses amis. 34. Avez-vous besoin de mon dictionnaire? 35. J'ai besoin de votre dictionnaire et de celui de votre frère.

EXERCISE 39 (Vol. I., page 148).

1. Does your mother like reading? 2. Yes, Miss, she likes it much better than her sister. 3. What hat does your nephew wear? 4. He wears a silk hat, and I wear a straw hat. 5. Does that lady love her children? 6. Yes, Sir, she cherishes them. 7. Do you furnish those merchants with goods? 8. I furnish those merchants with goods, and they give me money. 9. Do your companions like fine clothes? 10. Our companions like fine clothes and good books. 11. Are you looking for my brother? 12. Yes, Sir, I am looking for him, but I do not find him. 13. Does your brother lose his time? 14. He loses his time and money. 15. Do we always lose our time? 16. We lose it very often. 17. Do you owe much money? 18. I owe enough, but I do not owe much. 19. Do you sell your two houses to our physician? 20. I sell only one, I keep the other for my sister-in-law. 21. Do you receive money to-day? 22. We receive but little. 23. Does your joiner finish his work early? 24. He finishes it late. 25. At what hour does he finish it? 26. He finishes it at half-past twelve. 27. We finish ours at twenty minutes to ten.

EXERCISE 40 (Vol. I., page 148).

1. Votre compagnon aime-t-il la lecture? 2. Mon compagnon n'aime pas la lecture. 3. Votre père aime-t-il les bons livres? 4. Il aime les bons livres et les bons habits. 5. Devez-vous plus de vingt dollars? 6. Je n'en dois que dix, mais mon frère en doit plus de quinze. 7. Avez-vous tort de finir votre travail de bonne heure? 8. J'ai raison de finir le mien de bonne heure, et vous avez tort de ne pas finir le vôtre. 9. Recevez-vous beaucoup d'argent aujourd'hui? 10. Je n'en reçois guère. 11. Donnons-nous nos meilleurs livres à ce petit enfant? 12. Nous ne les donnons pas, nous le gardons parce que nous en avons besoin. 13. Vendez-vous vos deux chevaux? 14. Nous ne vendons pas nos deux chevaux, nous en gardons un. 15. Finissez-vous votre travail ce matin? 16. Oui, Monsieur, je le finis ce matin de bonne heure. 17. Votre beau-frère aime-t-il les beaux habits? 18. Oui, Madame, il aime les beaux habits. 19. Cherchez-vous mon neveu? 20. Oui, Monsieur, nous le cherchons. 21. Perd-il son temps? 22. Il perd non-seulement son temps, mais il perd son argent. 23. Combien d'argent a-t-il perdu aujourd'hui? 24. Il a perdu plus de dix dollars. 25. Votre menuisier finit-il votre maison? 26. Il finit ma maison et celle de mon frère. 27. Vendez-vous de bons chapeaux? 28. Nous vendons des chapeaux de soie, et les chapeaux de soie sont bons. 29. Quel âge votre compagnon a-t-il? 30. Il a douze ans et sa sœur en a quinze. 31. Votre frère aime-t-il la viande? 32. Il aime la

LESSONS IN LATIN.—XVII.

THE NUMERALS.

As in English, so in Latin, the numerals have various forms. Thus we say, one, first, one each, once. One, and the corresponding two, three, etc., we call *cardinal* (from cardo, -ĭnis, m., *a hinge*), because they are the chief numbers, those on which the others hinge. First, second, third, etc., we call *ordinals* (from ordo, -ĭnis, m., *an order* or *series*), because they show the order or place in a series which a person or thing holds. One each, two each, three each, etc., may be called *distributives*, because they distribute the numbers severally to persons or things, declaring how many each possesses. Once, twice, thrice, etc., are called *adverbial* numerals, because they imply some verb, and state how often the action of the verb takes place. You may see a full view of the Latin numerals in all their forms in the ensuing table, with the English figures on the left hand, and the corresponding Latin characters on the right hand.

TABLE OF NUMERALS.

	Cardinal.	*Ordinal.*	*Distributive.*	*Adverbial.*	
	unus, -a, -um, *one.*	primus, -a, -um, *first.*	singuli, -æ, -a, *one each.*	semel, *once.*	
1.	unus, *one.*	primus, *first.*	singuli, *one each.*	semel, *once.*	I.
2.	duo, *two.*	secundus, *second.*	bini, *two each.*	bis, *twice.*	II.
3.	tres, *three.*	tertius, *third.*	terni, *three each.*	ter, *thrice.*	III.
4.	quatuor, *four.*	quartus, *fourth.*	quaterni, *four each.*	quater, *four times.*	IV.
5.	quinque, *five.*	quintus, *fifth.*	quini, *five each.*	quinquies, *five times.*	V.
6.	sex, *six.*	sextus, *sixth.*	seni, *six each.*	sexies, *six times.*	VI.
7.	septem, *seven.*	septĭmus, *seventh.*	septēni, *seven each.*	septies, *seven times.*	VII.
8.	octo, *eight.*	octāvus, *eighth.*	octōni, *eight each.*	octies, *eight times.*	VIII.
9.	novem, *nine.*	nonus, *ninth.*	novēni, *nine each.*	novies, *nine times.*	IX.

The English of the numerals that follow can be easily supplied by the learner.

	Cardinal.	*Ordinal.*	*Distributive.*	*Adverbial.*	
10.	decem.	decĭmus.	deni.	decies.	X.
11.	undĕcim.	undecimus.	undeni.	undecies.	XI.
12.	duodĕcim.	duodecimus.	duodeni.	duodecies.	XII.
13.	tredĕcim.	tertius decimus.	terni deni.	terdecies.	XIII.
14.	quatuordĕcim.	quartus decimus.	quaterni deni.	quaterdecies.	XIV.
15.	quindĕcim.	quintus decimus.	quini deni.	quindecies.	XV.
16.	sedĕcim.	sextus decimus.	seni deni.	sedecies.	XVI.
17.	septendĕcim.	septĭmus decimus.	septeni deni.	septies decies	XVII.
18.	duodeviginti.	duodevicesimus.	duodeviceni.	duodevicies.	XVIII.
19.	undeviginti.	undevicesimus.	undeviceni.	undevicies.	XIX.
20.	viginti.	vicesimus.	viceni.	vicies.	XX.
21.	unus et viginti.	unus et vicesimus.	viceni singuli.	vicies semel.	XXI.
22.	duo et viginti.	alter et vicesimus.	viceni bini.	vicies bis.	XXII.
28.	duodetriginta.	duodetricesimus.	duodetriceni.	duodetricies.	XXVIII.
29.	undetriginta.	undetricesimus.	undetriceni.	undetricies.	XXIX.
30.	triginta.	tricesimus.	triceni.	tricies.	XXX.
40.	quadraginta.	quadragesimus.	quadrageni.	quadragies.	XL.
50.	quinquaginta.	quinquagesimus.	quinquageni.	quinquagies.	L.
60.	sexaginta.	sexagesimus.	sexageni.	sexagies.	LX.
70.	septuaginta.	septuagesimus.	septugeni.	septugies.	LXX.
80.	octoginta.	octogesimus.	octogeni.	octogies.	LXXX.
90.	nonaginta.	nonagesimus.	nonageni.	nonagies.	XC.
99.	undecentum.	undecentesimus.	undecenteni.	undecenties.	XCIX.
100.	centum.	centesimus.	centeni.	centies.	C.
101.	centum et unus.	centesimus et primus.	centeni singuli.	centies semel.	CI.
102.	centum et duo.	centesimus et alter.	centeni bini.	centies bis.	CII.
200.	ducenti, -æ, -a.	ducentesimus.	duceni.	ducenties.	CC.
300.	trecenti.	trecentesimus.	triceni.	trecenties.	CCC.
400.	quadringenti.	quadringentesimus.	quadringeni.	quadringenties.	CD.
500.	quingenti.	quingentesimus.	quingeni.	quingenties.	D.
600.	sexcenti.	sexcentesimus.	sexceni.	sexcenties.	DC.
700.	septingenti.	septingentesimus.	septingeni.	septingenties.	DCC.
800.	octingenti.	octingentesimus.	octingeni.	octingenties.	DCCC.
900.	nongenti.	nongentesimus.	nongeni.	nongenties.	CM.
1,000	mille.	millesimus.	singula milia.	millies.	M.
2,000	duo milia.	bis millesimus.	bina milia.	bis millies.	MM.
100,000	centum milia.	centies millesimus.	centena milia.	centies millies.	CCCLOOO.
1,000,000	decies centum milia.	decies centies millesimus.	decies milia.	decies millies.	CCCCLOOOO.
2,000,000	vicies centum milia.	vicies centies millesimus.	vicies milia.	vicies millies.	

On this table, I submit to you the following remarks. Unus, duo, and tres are declined as follows:—

N.	unus	una	unum.
G.	unius	unius	unius.
D.	uni	uni	uni.
Ac.	unum	unam	unum.
Ab.	uno	una	uno.

Where specially observe that the genitive ends in ius, and the dative in i. I put together in a form easy of remembrance the words declined like the preceding example:—

Pronouns that make IUS *in the genitive and* I *in the dative.*

unus, ullus, nullus.
solus, totus, alius.
uter, alter, neuter.

Observe that the ius and the i of the masculine gender remain in the feminine and the neuter. Uter forms its genders thus: uter, m., utra, f., utrum, n. Alter, thus: alter, m., altera, f., alterum, n. But neuter, thus: neuter, m., neutra, f., neutrum, n. So in their compounds: by adding que, uter becomes uterque, which signifies *both*, and is formed thus: nom. uterque, m., utrăque, f., utrumque, n.; gen., utriusque; dat., utrique; so, nom., unusquisque, m., unaquæque, f., unumquodque, n.; gen., uniuscujusque; dat., unicuique. Alius in the neuter, has aliud; in the genitive singular, alius (contracted from alīius), and dative alīi. In alteruter, *one of two*, commonly uter alone is declined thus:—

N.	alteruter, m.	alterutra, f.	alterutrum, n.
G.	alterutrius	alterutri	alterutrius.

Declension of duo, duæ, duo, *two.*

	M.	F.	N.
N. & V.	duo	duæ	duo.
G.	duōrum	duārum	duōrum.
D. & Ab.	duobus	duabus	duobus.
Ac.	duo *or* duos	duas	duo.

Tres, m., tres, f., tria, n., *three.*

	M.	F.	N.
N. & V.	tres	tres	tria.
G.	trium	trium	trium.
D. & Ab.	tribus	tribus	tribus
Acc.	tres	tres	tria.

Milia is declined like tria, thus: milia, milium, milibus, milia. Milia requires after it a genitive; for instead of saying, as we do, ten thousand men, the Latins said, decem milia hostium, *ten thousands of men;* but mille considered as a whole, a thousand, is indeclinable: thus, dux cum mille militibus, *a general with a thousand soldiers.* The ordinals are declined like nouns of the first and the second declension. The distributives are also declined after the same manner. Mark that singuli is in the plural. The plural is necessitated by the meaning, inasmuch as the adjective is a distributive, for distribution implies more than one; thus the Latins said, inter singulos homines, *among the men severally.*

If now you carry your eye down the numbers, you will find that for every separate number from one to nine, there is a separate word. With ten (*decem*) a new series begins, which goes on to nineteen, when again at twenty (*viginti*) a new word begins a new series. In centum and in mille, you also find new words and the commencements of new series. From eleven (*undecim*) to seventeen (*septendecim*) inclusive, each consecutive word is compounded of decem and a number taken from the first series. When they come to eighteen, instead of saying after their former manner, and as we say in English, eight, ten, the Romans said, *two from twenty*, duo de viginti. Having passed twenty, they made use of it to form the numbers between twenty and thirty; thus: unus et viginti, *one and twenty;* they also said, viginti unus, viginti duo, viginti tres, viginti quatuor, and so forth. In all cases, eight and nine are expressed by subtracting two and one from the next ensuing new term; thus twenty-eight is duo de triginta, *two from thirty;* thirty-nine is undequadraginta, *one from forty;* so in the ordinals duodequadragesimus, undesexagesimus.

VOCABULARY.

Ago, 3, *I drive, I do.*
Ambo, *both* (declined like duo).
Annum ago, *I am in the — year.*
Assentator, -ōris, m., *a flatterer.*
Cognitus, -a, -um, *known*
Eques, -equĭtis, m., *horseman.*
Et—et, *and—and, both.*
Ex, prep., *out of, from.*
Exercitus, -ūs, m., *an army.*
Fidem habeo, *I repose confidence.*
Fides, -ei, f., *fidelity, trust.*
Inŏcŭla, -æ, m., *an inhabitant.*
Infidus, -a, -um, *unfaithful.*
Irrumpo, 3, *I break in.*
Major natu, *greater by birth;* that is, *older.*
Minor natu, *younger.*
Moderator, -ōris, m., *a governor.*
Natus, -a, -um, born.
Natus, -ūs, m., *birth.*
Neque, conj., *neither, nor.*
Neque—neque, *neither—nor.*
Nunc, *now, denoting a point of time;* whereas jam *denotes the present in relation to the past.*
Pars, partis, f., *a part* (E. R. *partial*).
Pedes, pedĭtis, m., *a footman, an infantry soldier.*
Post, prep., *after.*
Post Christum natum, *since Christ born;* that is, *since the birth of Christ.*
Pretium, n., *a price, worth* (E.R. *precious*).
Quotus, -a, -um, *how much? what?*
Societas, -ātis, f., *connection, society.*
Victoria, -æ, f., *victory.*
Vitium, n., *vice.*
Vix, adv., *scarcely.*

Alius is used with alius in a peculiar manner, nearly equal to our *one another, the one, the other, differently, in different ways,* as:

Alius alium occidit. *The one slays the other.*
Alii alio currunt. *They run in different directions.*

EXERCISE 67.—LATIN-ENGLISH.

1. Quota hora est? 2. Decima. 3. Estne sexta hora? 4. Quinta est hora. 5. Annus quo nunc vivimus, est millesimus octingesimus sexagesimus et octavus post Christum natum. 6. Pater meus agit annum quartum et sexagesimum. 7. Soror tua agit annum sexagesimum tertium. 8. Mater mea agit annum octavum et quinquagesimum. 9. Pater tuus agit quinquagesimum octavum annum. 10. Frater major natu agit annum tertium et tricesimum. 11. Frater minor natu agit annum alterum et vicesimum. 12. Soror major natu agit annum duodetricesimum. 13. Soror minor natu agit annum vicesimum. 14. In urbe sunt mille milites. 15. Duo milia hostium urbem obsident. 16. Aliud alii placet. 17. Aliud alii displicet. 18. Milites utriusque exercitūs sunt fortissimi. 19. Utrumque est vitium et omnibus credere, et nulli. 20. Perfidus homo vix ulli fidem habet. 21. Unius fidi homĭnis amicitia habet plus pretii quam multorum infidorum societas. 22. Soli sapienti vera vis virtutis est cognita. 23. Incolæ totius urbis de victoriâ exercitūs læti sunt. 24. Nullius hominis vita ex omni parte beata est. 25. Habeo duo amicos, ambo valde diligo. 26. Amicus meus habet duo filios et duas filias.

EXERCISE 68.—ENGLISH-LATIN.

1. The enemy breaks into our country with 10,000 soldiers. 2. A thousand soldiers defend the city. 3. The city is defended by 2,500 soldiers. 4. 28,000 cavalry and 13,500 infantry defend the country. 5. My father is in his seventy-fifth year. 6. My mother is in her sixty-third year. 7. My elder brother is in his thirty-seventh year. 8. My younger brother is in his thirtieth year. 9. My elder sister is in her thirty-fourth year. 10. My younger sister is in her eighteenth year. 11. What o'clock is it? (what is the hour?) 12. It is eleven o'clock. 13. How old art thou? (in Latin, What year dost thou lead?) 14. I am fifty-two. 15. We repose confidence in neither of the two, neither the faithless nor the flatterer. 16. The life of no one is happier than (the life) of the sage. 17. The father takes a walk (*ambulo*) with his two sons and two daughters. 18. Two faithful friends are one soul in two bodies. 19. Some things please some (persons), some others. 20. This displeases some one, that another. 21. God is the governor of the whole of life (in Latin, the whole life).

KEY TO EXERCISES IN LESSONS IN LATIN.—XVI.

EXERCISE 59.—LATIN-ENGLISH.

1. The king who governs the state ought to take care of the safety of the citizens. 2. All the citizens willingly obey a king whose government is mild and just. 3. The citizens respect a king to (with) whom the laws are sacred. 4. Happy is the king whom all the citizens love. 5. O king, who governest our state, thou art pleased (resolved) to honour good citizens, to terrify evil-doers, to succour the wretched, and to hear the request of the good.

EXERCISE 60.—ENGLISH-LATIN.

1. Reges qui civitates gubernant omnium civium salutem curare debent. 2. Boni homines libenter parent regibus quorum imperium est mite et justum. 3. Regibus quibus leges sunt sanctæ libenter parent boni cives. 4. Reges qui civibus cari sunt, sunt felices. 5. O reges, qui civitates gubernant, colere virum bonum magnumque debetis. 6. O Deus, colimus te cui placet miseris succurrere. 7. Hostes quibuscum confligitis patriam vestram devastant.

EXERCISE 61.—LATIN-ENGLISH.

1. Who calls me? 2. What art thou doing, my friend? 3. Who writes this letter? 4. What art thou thinking of? 5. What am I doing? 6. Why do I torture myself? 7. What friendship is there among the ungrateful? 8. What poem art thou reading? 9. What man is coming? 10. What poet is sweeter than Homer? 11. Whose voice is sweeter than the voice of the nightingale? 12. What sins do we most easily yield to? 13. Whatever is honourable is useful. 14. Whatever thou seest, runs (away) with (in the lapse of) time. 15. However the fact is, I defend my view. 16. Whatever opinion opposes virtue is false.

EXERCISE 62.—ENGLISH-LATIN.

1. Quid dicis? 2. Quis est ille homo? 3. Quæ est illa femina? 4. Quibus cum ambulat amicus tuus? 5. Quem quæris? 6. Quem librum legis? 7. Ad quem has literas scribis? 8. Quocunque modo res sese habent, sententiam tuam laudamus.

EXERCISE 63.—LATIN-ENGLISH.

1. If we fear death, some terror always hangs over us. 2. If fortune takes away his money from any one (a person), he is not on that account miserable. 3. Greece holds a certain small space of (in) Europe. 4. There is (inheres) in our minds as it were an augury (presage) of future ages. 5. God dwells in every good man. 6. Justice gives his due to every one according to his dignity. 7. The love of life is planted in every one of us.

EXERCISE 64.—ENGLISH-LATIN.

1. Malis aliqui terror semper impendet. 2. Quid terroris tibi impendet? 3. Si cupiam fortunam adimis, vituperaris. 4. Parvum quendam Græciæ partem tenent. 5. In unoquoque malorum hominum habitat malum. 6. Unicuique merita ejus tribuit justitia. 7. Pecuniam habent quidam.

EXERCISE 65.—LATIN-ENGLISH.

1. There are as many views as there are men. 2. That princes do wrong is as great an evil as that there arise very many imitators of princes. 3. As many kinds of orations as there are, so many kinds of orators are found. 4. As are the generals, so are the soldiers. 5. As is the king, so is the flock (people). 6. As princes are in the state, so the citizens are wont to be. 7. A good man does not despise wretched men, of whatever kind they are. 8. The goods of the body and of fortune, how great soever, are uncertain and perishable. 9. All the men that live love life. 10. All the writers there are speak of the justice of Aristides.

EXERCISE 66.—ENGLISH-LATIN.

1. Quot homines tot animi. 2. Quot pueri tot puellæ. 3. Quot patres tot matres. 4. Quantus est tuus mœror tantum est meum gaudium. 5. Quales sunt parentes tales sunt liberi. 6. Qualis pastor talis grex. 7. Res qualescunque sunt non contemno. 8. Ab omnibus scriptoribus, quotcunque sunt, justus prædicatur Aristides.

LESSONS IN GEOMETRY.—XVII.

THE circle affords us a ready means of constructing regular polygons of any number of sides; but before entering on this part of our subject, it will be necessary to say something about the *inscription* of the triangle and square *in* any given circle, and the *circumscription* of the triangle and square *about* any given circle, the triangle being equiangular and similar to a given triangle, both in the case of inscription in a square and circumscription about a square.

First, however, let us arrive at a clear understanding of what is meant when we speak of describing a figure, inscribing one figure within another, and circumscribing one figure about another. The latter part of each word is immediately derived from the Latin word scribo, *I write* or *draw;* the distinctive meaning of each of the three words given above depends on the meaning of the Latin preposition with which each word is commenced. In the first the prefix *de* gives the word the meaning of "writing down" or "copying off;" in the second the prefix *in* gives the word the signification of drawing a figure within the limits or boundary lines of another figure, but

viande et le pain. 33. Recevez-vous vos marchandises à deux heures? 34. Nous les recevons à midi et demi. 35. Nous les recevons à une heure moins dix minutes.

EXERCISE 41 (Vol. I., page 174).

1. Where are you going, my friend? 2. I am going to your father's; is he at home? 3. He is this morning. 4. Whence do you come? 5. We come from your house and from your sister's. 6. Who is at our house? 7. My neighbour is there to-day. 8. Where do you intend to take these books? 9. I intend to take them to the house of the physician's son. 10. Are you wrong to remain at home? 11. I am not wrong to remain at home. 12. Has the watchmaker good watches at home? 13. He has no watches at his house, he has some in his warehouse. 14. To whose house do you take your books? 15. I take them to the binder's. 16. Do you go to the Dutch captain's? 17. We do not go to the Dutch captain's, we go to the Russian major's. 18. Is he at your house or at your brother's? 19. He lives at our house. 20. Do we not live at your tailor's? 21. You do. 22. Whence does your painter come? 23. He comes from his partner's house. 24. Where do you take my shoes and my waistcoat? 25. I am taking your shoes to the shoemaker's and your waistcoat to the tailor's.

EXERCISE 42 (Vol. I., page 174).

1. Où votre ami va-t-il? 2. Il va chez vous ou chez votre frère. 3. N'a-t-il pas l'intention d'aller chez votre associé? 4. Il a l'intention d'y aller, mais il n'a pas le temps aujourd'hui. 5. De quoi avez-vous besoin aujourd'hui? 6. J'ai besoin de mon gilet qui est chez le tailleur. 7. Vos habits sont-ils chez le peintre? 8. Ils n'y sont pas, ils sont chez le tailleur. 9. Où demeurez-vous, mon ami? 10. Je demeure chez votre belle-sœur. 11. Monsieur votre père est-il à la maison? 12. Non, Monsieur, il n'y est pas. 13. Où votre domestique porte-t-il le bois? 14. Il le porte chez le capitaine russe. 15. Le monsieur qui est avec Monsieur votre père, demeure-t-il chez lui? 16. Non, Monsieur, il demeure chez moi. 17. A-t-il tort de demeurer chez vous? 18. Non, Monsieur, il a raison de demeurer chez moi. 19. D'où le charpentier vient-il? 20. Il vient de chez son associé. 21. A-t-il deux associés? 22. Non, Monsieur, il n'en a qu'un, qui demeure ici. 23. Avez-vous le temps d'aller chez nous ce matin? 24. Nous avons le temps d'y aller. 25. Nous avons l'intention d'y aller et de parler à Mademoiselle votre sœur. 26. Est-elle chez vous? 27. Elle est chez elle. 28. Avez-vous du pain, du beurre et du fromage à la maison? 29. Nous y avons du pain et du beurre. 30. Nous n'y avons pas de fromage, nous n'aimons pas le fromage. 31. Votre montre est-elle chez l'horloger? 32. Elle y est. 33. Avez-vous deux montres d'or? 34. Je n'ai qu'une montre d'or. 35. Qui a l'intention d'aller chez mon père ce matin? 36. Personne n'a l'intention d'y aller.

EXERCISE 43 (Vol. I., page 175).

1. Where am I going? 2. You are going to the hatter's. 3. Am I going to the bank? 4. You are going to the bank and to the concert. 5. Do I cut your wood? 6. You cut neither my wood nor my coat. 7. Do I wear a green hat? 8. You do not wear a green hat, you wear a black one. 9. Is your scholar going anywhere? 10. He is going to church, to school, and to market. 11. Is he not going to the hair-dresser's? 12. He is going nowhere. 13. Do you not wear red leather boots? 14. I wear black leather ones. 15. Do you not go to the banker's? 16. I do not go to his house, he is absent since yesterday. 17. Is he coming to the bank this morning? 18. He intends to come if he has time. 19. Has he a wish to go to the concert? 20. He has a great wish to go, but he has no ticket. 21. Do you live in this village? 22. Yes, Sir, I do. 23. Do you send this note to the post-office? 24. I send it to its address.

LESSONS IN GEOGRAPHY.—XXII.

EUROPE.

Position on the Earth's Surface.—The continent of Europe forms the north-western part of the Old World, or great triple continent in the eastern hemisphere, and lies wholly within the northern hemisphere, to the north-east, east, and south-east of the British Isles. It is situated almost wholly within the north temperate zone, with the exception of some of the extreme northern parts of Norway, Sweden, and Russia, which lie within the north frigid zone. The small map of the world on the plane of the horizon of London (see page 197) will show how favourably Europe is situated for commercial relations with the rest of the world, as it lies almost in the centre of the hemisphere which contains the greatest part of the land on the earth's surface, and is thus conveniently placed for carrying on an active export and import trade with all other parts of the globe.

Boundaries.—Europe is bounded on the north by the Arctic Ocean; on the south, by the Mediterranean Sea, the Sea of Marmora, the Black Sea, the Sea of Azof, and the chain of Mount Caucasus; on the east by Asia, which is separated from it by the chain of the Ural or Oural Mountains, the river Ural, and the Caspian Sea; and on the west by the North Atlantic Ocean.

Extent, Length, Breadth, etc.—This continent extends from lat. 36° 2′ N. to lat. 71° 10′ N., and from long. 9° 32′ W. to long. 68° E. Its greatest length, from Cape St. Vincent, in Portugal, to the north-eastern extremity of Russia in Europe, is about 3,500 miles; while its greatest breadth in a straight line from North Cape, in Norway, to Cape Matapan, the southern extremity of Greece, is about 2,450 miles. The most northerly point of Europe is usually considered to be the North Cape, in lat. 71° 10′ N. and long. 26° 1′ E.; the most southerly point is Tarifa Point, near Gibraltar, in lat. 36° 6′ N. and long. 5° 21′ W.; the most easterly point is the head of Kara Bay, the southernmost extremity of the Kara Sea, which lies to the south of Nova Zembla, very nearly in lat. 68° N., long. 68° E.; and the most westerly point is Cape Roca, near Lisbon, in lat. 38° 47′ N. and long. 9° 31′ W.

The surface of the land in Europe contains, according to the latest estimate, more than 3¾ millions of square miles, or more exactly 3,812,200 square miles; and its population is upwards of 280,000,000, or more exactly 283,000,000. This number, however, must be taken only as an approximation, on account of the constant increase, day by day, owing to the excess of the births over the deaths in every 1,000 of the population. Hence, there are in this continent on an average about 73 inhabitants to every square mile; but as Russia in Europe is reckoned to contain above two millions of square miles, or more than half of the continent, and to have a population of about 64 millions, or less than one-fourth of that of the whole continent, it follows that in Russia there are on an average about 30 inhabitants to every square mile, and in the rest of the continent on an average about 122 inhabitants to every square mile.

The surface of the inland seas belonging to Europe is estimated at nearly 1½ millions of square miles, or more accurately at 1,370,000 square miles, distributed in the following proportions:—The White Sea, in the North of Russia, 45,000; the Baltic, lying between Sweden and Russia, having Germany on the south, and Denmark at its entrance, 135,000; the Mediterranean Sea, lying south of Europe, 870,000; the Black Sea, south of Russia, 180,000; and the Caspian Sea, or Great Inland Lake, 140,000. The part of the Atlantic Ocean which flows between Great Britain and the continent, is called the German Ocean or North Sea; its passage on the south is called the English Channel, and at the narrowest part the Strait of Dover, which is about 20 miles across, and is reckoned 200 feet at its greatest depth. The entrance to the Baltic, or East Sea, is by a channel of which the part between Norway and Denmark is called the Skager-Rack, and the part between Sweden and Denmark the Cattegat. In the latter part there are three straits called the Sound, between Sweden and the Danish island of Zealand, about 2½ miles wide; the Great Belt, between Zealand and Fünen, about 8 miles wide; and the Little Belt, between Fünen and the peninsula of Jutland, or Continental Denmark, about three-quarters of a mile wide. In the northern part of the Baltic are the Gulfs of Bothnia, Finland, and Riga. On the west of France and north of Spain, lies a part of the Atlantic called the Bay of Biscay. South of Spain, between Europe and Africa, lies the entrance to the Mediterranean, called the Strait of Gibraltar, which is about 13 miles broad in the narrowest part, and about 1,000 feet deep.

The length of the Mediterranean is estimated to be about 2,300 miles, and its greatest depth upwards of 6,000 feet, or more than a mile and a furlong. Its waters are more salt than those of the Atlantic, from which a strong current runs continually into the former. The tides in the Mediterranean, owing to its narrow entrance, are very small, and in many places the ebb and flow are scarcely perceptible. The Gulf of Venice, or the Adriatic Sea, is an arm of the Mediterranean which lies east of Italy and south of the Austrian dominions; and the Archipelago (anciently the Ægean Sea), another arm between Greece and Asia Minor, studded with islands famous in ancient history. The waters of the Archipelago communicate with those of the Sea of Marmora (anciently the Propontis) through



to the utmost extent that the limits of that figure will permit; and in the third the prefix *circum* gives the word the meaning of drawing one figure round another. Inscription and circumscription indicate operations that are precisely the reverse of each other.

PROBLEM XLII.—*In a given circle to inscribe a triangle equiangular to a given triangle.*

Let A B C (Fig. 61) be the given triangle, and D E F the given circle: it is required to inscribe in the given circle D E F a triangle equiangular to the given triangle A B C. At any point D in the circumference of the circle D E F draw X Y as a tangent to the circle, and at the point D in the straight line X Y make the angle Y D F equal to the angle A B C, and the angle X D E equal to the angle A C B; and let the straight lines D E, D F cut the circumference of the circle D E F in the points E and F. Join E F. The triangle D E F, inscribed in the circle D E F, is equiangular to the given triangle A B C.

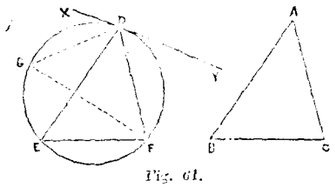


Fig. 61.

If it is desired to cut off a segment of a circle that shall contain an angle equal to a given angle, as in the above figure to cut off from the circle D E F a segment that shall contain an angle equal to the angle A B C, all that we have to do is to draw a tangent to the circle, and at the point of contact make an angle equal to the given angle, as the angle Y D F was made equal to the angle A B C. The leg D F of the angle Y D F must then be produced far enough to cut the circumference of the circle D E F in the point F. Any angle that may then be formed by drawing straight lines from D and F to *any point* in the segment, as the angle D E F or the angle D G F, is equal to the given angle A B C.

PROBLEM XLIII.—*About a given circle to circumscribe a triangle equiangular to a given triangle.*

Let A B C (Fig. 62) be the given triangle, and D E F the given circle about which it is required to circumscribe a triangle equiangular to the given triangle A B C.

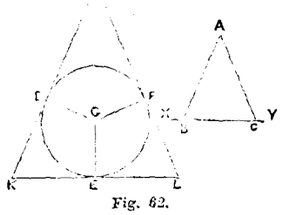


Fig. 62.

Produce B C, the base of the triangle A B C, both ways to X and Y. Draw K L touching the circle D E F in the point E, and from the centre G of the circle D E F draw the straight line G E perpendicular to K L. Then at the point G, in the straight line E G, make the angle E G F equal to the angle A C Y, and the angle E G D equal to the angle A B X. Through the points D and F draw the straight lines H K, H L, meeting each other in the point H, and the straight line K L in the points K and L. The triangle H K L circumscribed about the circle D E F is equiangular to the given triangle A B C.

PROBLEM XLIV.—*To inscribe a square in a given circle, and about the same circle to circumscribe a square.*

Let A B C D (Fig. 63) be the given circle, and E its centre. Through E draw the diameters A C, B D at right angles to each other, and join A B, B C, C D, and D A. The figure A B C D thus formed is a square, and it is inscribed in the given circle A B C D, as required.

To circumscribe a square about the circle A B C D, draw the diameters A C, B D as before. Through the points A and C draw the straight lines F G, H K parallel to B D, and through the points B and D draw the straight lines F K, G H parallel to A C. The figure F G H K thus formed is a square, and it is circumscribed about the circle A B C D, as required.

PROBLEM XLV.—*To inscribe a circle in a given square, and about the same square to circumscribe a circle.*

Let F G H K (Fig. 63) be the given square: it is required to inscribe a circle within the given square F G H K, and to circumscribe a circle about it. First bisect the sides F G, F K in the points A and B, and through A draw A C parallel to F K or G H, and through E draw B D parallel to F G or H K. From the point E, the point of intersection of the straight lines A C, B D, at the distance E A, E B, E C, or E D, describe the circle A B C D. This circle touches the sides of the given square F G H K, and is inscribed within it, as required.

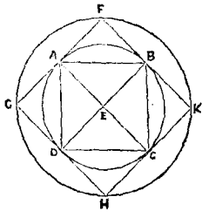


Fig. 63.

To circumscribe a circle about the given square F G H K, find the point E as before, and then from the point E as centre, with a radius equal to the straight line joining E with any one of the four corners of the square, describe the circle F G H K. The circumference of the circle F G H K passes through the other three corners of the square, and the circle F G H K is therefore circumscribed about the square F G H K, as required.

We may now pass on to the construction of regular polygons. The term *polygon* is derived from two Greek words, *πολυς* (pol'-use), *much* or *many*, and *γωνια* (go'nia), *an angle*, and means a figure that has many angles. Many-angled figures are also called multilateral or many-sided figures, from the Latin multus, *much* or *many*, and latus, *a side*. "Polygon" and "multilateral figure" are terms which may be considered to mean precisely the same thing, for a figure that has many angles must, of course, have many sides. It has, in fact, just so many sides as it has angles, and the most familiar illustration of this that can be given is that of a room, which, generally speaking, has just four sides and four corners or angles. The terms "*polygon*" and "multilateral figure" are applied, as we have been taught in Definition 33 (Vol. I., p. 53), to any figure that has more than four sides. A polygon may be regular or irregular—that is to say, its sides and angles may be equal or unequal. The student has already been shown the method of making triangles equal to given irregular polygons; and the construction of an irregular polygon of any number of sides, having its angles equal to angles of any prescribed *opening*, would be a thing that he could readily accomplish, provided that he has paid sufficient attention to our lessons to understand thoroughly all that we have advanced. It is with the construction of *regular polygons* only that we have now to do.

In Definition 34 we were further taught that polygons are divided into classes according to the number of their sides and angles. Some of these classes have no distinctive name, as will be seen from the following table; but many of them have a name by which the number of their sides can be recognised at once. Thus the polygon that has five sides and five angles is called a pentagon, from the Greek *πεντε* (pen'te), *five*, and *γωνια*, *an angle*; the polygon that has six sides and six angles is called a hexagon, from the Greek *ἑξ* (hex), *six*, and *γωνια*, *an angle*; and so on, the Greek or Latin word for the number of the sides, or some modification of it, being prefixed to the termination *gon*. A triangle would be called a trigon, and a square a tetragon, according to this system of naming figures from the number of their angles.

The number of degrees in the angle of any regular polygon may be found arithmetically by the following process:—

The angles formed by any number of lines meeting together in a point, such as the lines drawn from the angles of any polygon to any point within it, or, in the case of a regular polygon, to its centre, are together equal to four right angles, or 360 degrees. The greater the number of sides of any regular polygon, the less will be the angle at its centre, subtended by each of its sides; and to find the number of degrees contained in its opening, we have to do nothing more than to divide 360 by the number of sides. For example, in the regular pentagon, or five-sided figure A B C D E, in Fig. 64, it is clear that each of the five angles, A F B, B F C, C F D, D F E, E F A, formed by drawing straight lines from its five salient angles at A, B, C, D, E, to its centre, F, is equal to one-fifth of 360 degrees, or, in other words, is an angle of 72 degrees. We now wish to find the numerical value of any and all of the angles of the polygon in degrees. We know that the three interior angles of any triangle are together equal to two right angles, or 180

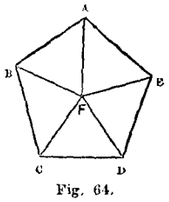


Fig. 64.

degrees; therefore, the three interior angles of any of the five equal and equiangular triangles, of which the pentagon in Fig. 64 is made up, are together equal to 180 degrees. Now the angle at the apex, F, of any of these angles was shown to be equal to 72 degrees, therefore the angles at the base are together equal to 180 − 72 degrees, or 108 degrees. But as the triangles which compose the pentagon are isosceles triangles, the angles at the base are equal to each other, and each of them contains 108 ÷ 2, or 54 degrees. Any angle of the polygon, which is, of course, composed of two of these equal angles, contains 108 degrees. The following is a table of regular polygons, from the triangle or trigon of three sides and angles to the polygon of twenty sides and angles, with the numerical value of the angle of each polygon in degrees, minutes, seconds, and fractional parts of a second; and the numerical values of the angles at the apex and base of the triangles into which each polygon may be divided by drawing straight lines from its salient angles to its centre.

TABLE OF REGULAR POLYGONS.

Name of Polygon.	No. of Sides	Angle at Apex of Triangle.	Angle at Base of Triangle.	Angle of Polygon.
Triangle or Trigon	3	120° 0′ 0″	30° 0′ 0″	60° 0′ 0″
Square or Tetragon	4	90° 0′ 0″	45° 0′ 0″	90° 0′ 0″
Pentagon	5	72° 0′ 0″	54° 0′ 0″	108° 0′ 0″
Hexagon	6	60° 0′ 0″	60° 0′ 0″	120° 0′ 0″
Heptagon	7	51° 25′ 42$\frac{6}{7}$″	64° 17′ 8$\frac{4}{7}$″	128° 34′ 17$\frac{1}{7}$″
Octagon	8	45° 0′ 0″	67° 30′ 0″	135° 0′ 0″
Enneagon or Nonagon	9	40° 0′ 0″	70° 0′ 0″	140° 0′ 0″
Decagon	10	36° 0′ 0″	72° 0′ 0″	144° 0′ 0″
Undecagon	11	32° 43′ 38$\frac{2}{11}$″	73° 38′ 10$\frac{10}{11}$″	147° 16′ 21$\frac{9}{11}$″
Dodecagon	12	30° 0′ 0″	75° 0′ 0″	150° 0′ 0″
Polygon of 13 sides	13	27° 41′ 32$\frac{4}{13}$″	76° 9′ 13$\frac{11}{13}$″	152° 18′ 27$\frac{9}{13}$″
,, ,, 14 ,,	14	25° 42′ 51$\frac{3}{7}$″	77° 8′ 34$\frac{2}{7}$″	154° 17′ 8$\frac{4}{7}$″
Quindecagon	15	24° 0′ 0″	78° 0′ 0″	156° 0′ 0″
Polygon of 16 sides	16	22° 30′ 0″	78° 45′ 0″	157° 30′ 0″
,, ,, 17 ,,	17	21° 10′ 35$\frac{5}{17}$″	79° 24′ 42$\frac{6}{17}$″	158° 49′ 21$\frac{11}{17}$″
,, ,, 18 ,,	18	20° 0′ 0″	80° 0′ 0″	160° 0′ 0″
,, ,, 19 ,,	19	18° 56′ 50$\frac{10}{19}$″	80° 31′ 34$\frac{14}{19}$″	161° 3′ 9$\frac{9}{19}$″
,, ,, 20 ,,	20	18° 0′ 0″	81° 0′ 0″	162° 0′ 0″

LESSONS IN MUSIC.—IX.

CHARACTER AND EFFECT OF PRINCIPAL NOTES.

DOH (being the "governing" note) gives a sense of POWER to the hearer, and of SECURITY to the singer in a greater degree than any other. The singer feels it to be the note to which he can, from any point, most easily return. It is more easy to perceive musical effects, than to find words that will sufficiently represent them; but if the names must be given, this note should be called (in reference to its effect in a slow movement) THE STRONG or *firm* NOTE.

SOH has a similar effect to DOH, but is not equal to it in power. It may be distinguished (when sung slowly) as THE GRAND or *clear* NOTE.

ME has a somewhat graver and softer effect than SOH. It may be denominated (especially in slow movements), THE STEADY or *calm* NOTE.

When DOH, ME, and SOH predominate in a tune, they contribute to its general character: if the movement be a quick one, great BOLDNESS and DECISION; and if the movement be a slow one, they give it DIGNIFIED SOLEMNITY. Of course, the power of any particular note to give a character to the tune in which it occurs, will depend on the frequency and the emphasis with which it is used, and will be modified, also, by the kind of "measure" and the rythmical arrangement in which it occurs. In studying the following examples, let the pupil always strike or sing the chord of the key-note, and part, at least, of the scale before he begins to sing the phrase; for our assertions in reference to the mental effects of notes are not true, unless the ear is first filled with "a sense" of the scale in which they occur.

For "dignified solemnity," notice the power of DOH, ME, and SOH in the following opening phrases from Handel. You will remark how, in each case, the great artist takes advantage of these bold and grand notes to bring out, by contrast, a very marked effect on some of the other notes, as with RAY on the word "fair," and with FAH on the word "Redeemer;" but of these notes we shall speak afterwards. You will also notice how the "triple time" (*trinary measure*), *in the second example*, allows increased emphasis and power to the great notes which so fully express the grand and sure confidence of faith.

KEY F.



KEY D.



To illustrate the peculiar effect of ME, when sung slowly—so full of SERENE REPOSE—it might be enough to refer to the calm and restful effect of the best known of all chants, of which the churches will never weary—Tallis's Gregorian Chant.

KEY F.



But another striking illustration occurs to us. A minister had heard, and had been greatly moved by Mendelssohn's song—"Oh! rest in the Lord." He preached on the text, and thought much of that repose which comes, not with weariness or sleep, but with living blessedness. Some time after, thinking on the power of the notes of the scale, it occurred to him that Mendelssohn must surely have expressed the idea of *rest in God*, chiefly by means of the third note of the scale, ME, which we have called the note of serene repose. "If by any other note," he said to himself, "that peculiar effect was produced on my mind so strongly, then the theory about mental effects must fall to the ground." He at once analysed the song, and found that the very first emphatic note was that which he had expected—that the power of this note was brought out, by placing it in ever-varying but most effective positions; and that, even when the key changes, the ear is surprised and pleased by the recurrence again of this same third note in the new scale. Among other studies in this delightful song, it was pleasant to notice the change in the manner in which the word "Lord" is expressed in the latter part of the song. At first, it is uttered with the firm and sure confidence of the note DOH; but, when that spirit of confidence has risen to a somewhat triumphant feeling, then it must use the "clear" and "grand" note SOH.

KEY C.



a narrow channel or strait called the Dardanelles (anciently the Hellespont), about half a mile in width at its narrowest part; those of the Sea of Marmora with those of the Black Sea (anciently the Euxine Sea) by the Strait of Constantinople (anciently the Thracian Bosphorus), which is still narrower than the former; and those of the Black Sea with those of the Sea of Azof or Azov (anciently the Paulus Mæötis, *the Mœotian Fen*), by the Strait of Yenikale (anciently the Cimmerian Bosphorus, *i.e.*, the Cimmerian *Ox-Ford*), about a mile and a half wide. The eastern part of the Mediterranean adjoining Turkey in Asia is called the Levant (from the French, *levant*, "rising"), because to the inhabitants along the northern and southern shores of the Great Sea the sun appears to rise in that quarter of the horizon. The waters of the Caspian Sea or Lake are not superficially (that is, on the surface of the land) connected with those of the Mediterranean, being separated from them by the Caucasian chain of mountains. Owing to the indentation of the continent of Europe by seas, bays, and gulfs, it has a greater line of sea-coast, in proportion to its size, than any other continent on the face of the globe; and lying almost wholly within the north temperate zone, it is better adapted for the health, convenience, and commercial intercourse of its inhabitants. Hence its superiority in point of power, intelligence, and wealth to all the other continents. The total length of its sea-coast is estimated at about 17,000 miles, or rather more than two-thirds the circumference of the globe.

In the north of Europe there are only two peninsulas worthy of particular notice, namely, the Great Scandinavian Peninsula, which includes Sweden and Norway, and lies between the Baltic Sea and the North Atlantic Ocean; and the Peninsula of Jutland, which includes Continental Denmark, and lies between the Cattegat and the North Sea. It is joined to the continent by the Isthmus of Schleswig or Slesvig, which is about 25 miles wide. In the south of Europe there are three peninsulas of great importance in history, namely, the Iberian or Spanish Peninsula, including Spain and Portugal, which lies between the Mediterranean and the Atlantic, and is separated from the rest of Europe by the mountain chain of the Pyrenees stretching from the Bay of Biscay to the Gulf of Lions; and Greece (anciently the Peloponnesus, *the Island of Pelops*), sometimes called the Morea, which is joined to the mainland called Hellas (anciently Achaia) by the Isthmus of Corinth, this isthmus being only about *four* miles wide at the narrowest part. To these peninsulas may be added the Crimea, which is the most southern part of Russia, and which is joined to the mainland by the Isthmus of Perecop, a neck of land only about five miles wide at the narrowest part.

SUMMARY OF BOUNDARIES.

NORTH.—Arctic Ocean.
SOUTH.—The Mediterranean Sea, the Sea of Marmora, the Black Sea, and the Caucasus Range.
EAST.—The Ural Mountains, Ural River, and Caspian Sea.
WEST.—The North Atlantic Ocean.

SUMMARY OF PRINCIPAL SEAS AND GULFS.

Adriatic, or Gulf of Venice, N. of Mediterranean.
Archipelago, N.E. of Mediterranean.
Baltic Sea, N. of Germany.
Biscay, Bay of, W. of France.
Black Sea, E. of Turkey.
Bothnia, Gulf of, Baltic.
Caspian Sea, S. of Russia.
Cattegat, North Sea.
English Channel, S. of England.
Finland, Gulf of, Baltic.
Genoa, Gulf of, S. of Piedmont.
Irish Sea, Isle of Man.
Kara Sea, N. of Russia.
Levant, E. of Mediterranean.
North Sea, or German Ocean, E. of Britain.
Sea of Azof, S. of Russia.
Sea of Marmora, S. of Turkey.
Skager-Rack, North Sea.
Taranto, Gulf of, S. of Italy.
White Sea, N. of Russia.

SUMMARY OF PRINCIPAL STRAITS.

Bonifacio, Strait of, S. of Corsica.
Bosphorus, or Strait of Constantinople, N.E. Sea of Marmora.
Dardanelles, or Hellespont, S.W. Sea of Marmora.
Dover, Strait of, English Channel.
Gibraltar, Strait of, Mediterranean.
Great Belt, Baltic.
Little Belt, Baltic.
Messina, Strait of, E. of Sicily.
North Channel, N. of Ireland.
Otranto, S. Adriatic.
Sound, Baltic.
St. George's Channel, Irish Sea.
Yenikale, or Kertch, N.E. Black Sea.

SUMMARY OF PRINCIPAL PENINSULAS.

Crimea—Russia.
Iberia—Spain and Portugal.
Italy—New Kingdom of Italy, Papal States.
Jutland—Denmark.
Morea—Greece.
Scandinavia—Sweden and Norway.

SUMMARY OF PRINCIPAL ISTHMUSES.

Corinth, N.E. of Morea.
Perecop, N. of Crimea.
Schleswig, S. of Jutland.

LESSONS IN ARITHMETIC.—XXXI.

SHORT METHODS OF REDUCTION WITH REFERENCE TO MONEY.

WE proceed to explain two or three artifices which are often of considerable use.

9. *To find out how much a Given Sum per Day amounts to in a Year.*

There are 240 pence in a pound, and $360 = 240 + 120$, or $240 + \frac{240}{2}$; and therefore one penny per day amounts to one pound and half a pound in 360 days.

Hence, to find how much a given sum per day amounts to in 360 days, we have only to reduce the sum to pence, and add half the number of pence to the result. This will give the number of *pounds* to which the sum will amount in 360 days. To find the amount in one year (365 days), we must add 5 times the sum per day to the pounds found by the first part of the process.

Thus 6d. a day is £9 2s. 6d. a year;
For 6d. + 3d. = 9d., and therefore 6d. a day amounts to £9 in 360 days, and therefore to £9 2s. 6d. in 365 days.

Observe that since a penny (after half of the number of pence has been added) corresponds to a pound for 360 days, a half-penny corresponds to 10s., and a farthing to 5s.

Thus 7d. a day will amount to £10 10s. in 360 days, and therefore to £10 12s. 11d. in 365 days.

For 7d. + ($\frac{1}{2}$ × 7d.) = 10½d., which corresponds to £10 10*s.* for the 360 days. Adding 5 × 7d., or 2s. 11d., we get £10 12s. 11d. for a year.

EXAMPLE.—Again, to find how much 2s. 6½d. a day amounts to in a year.

2s. 6d½. = 30½d.
30½d. + ½(30½d.) = 45¾d.,
and hence in 360 days 2s. 6½d. amounts to £45 15s., and therefore, in 365 days, to £45 15s. + 5 (2s. 6½d.), or to £46 7s. 8¾d.

10. *To reduce a Given Sum of Money to the Decimal of a Pound.*

1s. = $\pounds\frac{1}{20} = \pounds\frac{5}{100} = \pounds{\cdot}05$.

Hence, to reduce any number of shillings to the decimal of a pound, multiply the number by 5, and cut off two decimal places.

Thus 23 shillings are 1·15 of a pound.
„ 17 „ ·85 „

Again, by calculation, we find that a farthing is ·0010416 of a pound. Now the difference between this decimal and ·001 is ·0000416, or very nearly ·0000417; and ·001 = $\frac{1}{1000}$. Hence, as far as 3 decimal places are concerned, we may consider one farthing to be $\frac{1}{1000}$th part of a pound; and therefore, in reducing any sum below a certain amount to the decimal of a pound, we need only reduce it to farthings, and mark off 3 decimal places.

Thus 3¾d. = 15 *farthings*, and it is therefore ·015 of a pound correctly to three decimal places.

It is evident that when the number of farthings reaches a certain amount, the product of this number by ·0000417, which we neglect, will affect the 3rd decimal place. We will determine the point at which this takes place.

Now (·001 + ·0000417) 23 = ·023 + ·0009591 = ·023 to *three* decimal places.
But (·001 + 0000417) 24 = ·024 × ·0010008 = ·025 to *three* decimal places.

Hence, for sums of 24 farthings and upwards, we must *add* one to the number of farthings, and then cut off 3 decimal places as before. This we may do until the number of farthings is large enough to cause more than one to be carried to the 3rd place of decimals.

Thus 7¾d. = 31 farthings; and therefore, when reduced to the decimal of a pound, it is, correctly to 3 places, ·032.

Now 47 (·0000417) = ·0019599, which still only adds 1 in the 3rd decimal place; and therefore, as far as 48 farthings (one shilling), the above rule holds.

As soon as a shilling is reached, we find the decimal of a pound by the rule first given.

EXAMPLE.—Reduce 13s. 8⅓d. to the decimal of a pound.

13s. = £·65 of a pound.
8⅓d. = 36 farthings = £·037 correctly to 3 places.
Hence 13s. 8⅓d. = £·687 correctly to 3 places.

EXERCISE 50.

Find how much the following sums per day amount to in a year:—

1. 2d.	5. 1s. 5d.	9. 2s. 7¾d.
2. 3½d.	6. 1s. 1¾d.	10. 5s.
3. 5⅔d.	7. 1s. 3½d.	11. 7s. 3d.
4. 9½d.	8. 2s. 6d.	12. 8s. 7¾d.

Reduce to the decimal of a pound correctly to 3 decimal places, by the method of Art. 10:—

13. 3½d.	16. 2s. 3¾d.	19. £3 15s. 8¾d.
14. 5¾d.	17. 17s. 9½d.	20. £15 19s. 11½d.
15. 6d.	18. 18s. 9¼d.	

KEY TO EXERCISE 49, LESSON XXX. (Vol. II., page 234).

1. £·2375.	11. ·5625 acre.	21. 88 rods.
2. £·5375.	12. ·898809523 guinea	22. 10 h. 13 m. 9$\frac{3}{13}$ sec.
3. £·87916.	13. ·002739726 of a year, ·2.	23. 50 min. 42 sec.
4. ·5416 shilling.	14. ·0089285714, ·2.	24. 23·125.
5. ·25625 mile.	15. ·03266258384 . . .	25. 6s. 8d.
6. ·127083 day.	16. ·216.	26. ·4114285714.
7. ·046875 cwt.	17. 14s. 6d.	27. 17s. 9½d., ·0006.
8. ·2583 hour.	18. 2s. 7½d.	28. ·0042 . . . .
9. ·46875 lb.	19. 9d., 3·6 farthings.	29. 5s. 4½d. $\frac{8}{13}$ far.
10. ·7, ·1190476, ·0925.	20. 6 oz. 15$\frac{3}{13}$ drachms.	30. 196 cubic feet, 196$\frac{1}{13}$ cub. in.

LESSONS IN CHEMISTRY.—IX.

NITROGEN, AIR, ETC.

NITROGEN: SYMBOL, N — ATOMIC WEIGHT, 14 — DENSITY, 14.

NITROGEN is the chief constituent of the atmosphere, of which it forms four-fifths. From being an element of nitric acid, Chatal gave the gas the name here adopted, following the example of Lavoisier. The French chemists call it *azote*, from its inability to support life. It exists in almost all animal and in many vegetable products.

To prepare Nitrogen.—The simplest method is to deprive air of its oxygen. This may be done in several ways—

1. Pass air through a porcelain tube containing copper-turnings, which is surrounded by red-hot charcoal. The heated copper combines with the oxygen, and the nitrogen is received in a gas-holder.

2. In a capsule of Berlin ware (Fig. 31) float a piece of phosphorus on water; and, after having ignited it, place over it a bell-jar. The phosphorus takes all the oxygen to form phosphoric acid (P_2O_5), a solid, which is readily absorbed by the water, the gas remaining in the jar being nitrogen.

3. The oxygen may be absorbed from the air slowly, either by suspending in the jar a stick of phosphorus—in this case phosphorous acid (P_2O_3) is gradually formed—or by placing in a capsule a mixture of iron-filings and sulphur moistened with water. The experiment is arranged as the last, but must be untouched for at least twenty-four hours; by that time all the oxygen in the jar will have been absorbed by the mixture, and the water, rising to fill the place of the absorbed gas, will be found to occupy one-fifth of the jar.

There are other ways of obtaining nitrogen from its compounds, thus: if chlorine gas be passed into water impregnated with ammonia, the reaction will be—

$2NH_3$ (ammonia) + Cl_3 = $3NH_4Cl$ (sal-ammoniac) + N.

Care must, however, be taken that the ammonia be in excess, lest one of the most explosive of bodies—the chloride of nitrogen—be formed.

Properties.—The gas is colourless, inodorous, and tasteless. It is a little lighter than air, its specific gravity being 0·9713; its affinities are very low; it refuses to combine with other elements, except under peculiar circumstances. Hence it will not support combustion, and is fatal if breathed in a pure state; not that it has any poisonous qualities, but is incapable of supporting life.

THE ATMOSPHERE.

Around our globe rolls a gaseous ocean, which is a mixture of certain gases. Oxygen and nitrogen greatly preponderate over the others, and are found in the proportion of 4 volumes of nitrogen to 1 of oxygen. The chief use of the nitrogen seems to be to dilute the oxygen. That the atmosphere is not a chemical compound, but a mixture, may be thus proved:—

1. If 4 volumes of nitrogen and 1 of oxygen be mixed, no alteration, either in volume or temperature, will be observed, and air will be formed. In every case, when chemical combination takes place, there is invariably either an alteration in volume or temperature, or both.

2. If air from water, or from melted snow, be analysed, it will be found that oxygen is present in almost double the proportion in which it is found in the atmosphere. This fact has been already alluded to, as caused by water being capable of absorbing more oxygen than nitrogen. If, however, the gases were chemically combined, the water must absorb them as one body—air, and they would appear in the water in the same proportion as in the atmosphere.

The volumes of the gases in the air may be roughly ascertained by abstracting the oxygen from the air in a graduated bell-jar, by burning phosphorus as above described, being careful that the diminution of the volume be measured when the temperature has fallen to what it was at the commencement of the experiment. But the most accurate method is by the eudiometer (Fig. 32). The instrument is used thus:—

The tube is filled with water, then a portion is poured out. Place the thumb on the open end, and by properly inclining the tube, the air may be made to pass to the sealed end. The water is now made level, so that the air may be under no undue pressure, and the number of measures of it read off on the graduated scale. The open end is completely filled with water, and the instrument is inserted in a pneumatic trough, where hydrogen is passed into it, the quantity being at least more than half the air in the eudiometer. The instrument is again closed with the thumb, and the mixture of air and hydrogen transferred into the sealed end. The water in the two tubes is again levelled, and the volume of the mixture read off. The instrument is held firmly, as in the diagram, and the platinum wires, *a* and *b*, connected with the outside and inside coatings of a charged Leyden jar. The spark which passes in the tube fires the mixture, and the oxygen in the air and the hydrogen combine to form water. The temperature is allowed to equalise itself, and the water is again levelled and another reading made. It will be evident that the difference between the two last readings will give the quantity of gas which has gone to form the water in the explosion. Now we know that this consisted of all the oxygen in the air, and some of the hydrogen we introduced; but we also know that one-third of the quantity must be oxygen, this being the proportion by volume of the gas in water. Hence we arrive at the quantity of the oxygen in the air with the greatest accuracy.

To determine the composition of the air by *weight*, it is necessary to weigh the copper, in the first process given for the preparation of nitrogen, before and after the experiment, being careful to ascertain the quantity of air passed through the heated porcelain tube.

Thus the composition of air is—

	By volume.	By weight.
Oxygen	20·93	23·141
Nitrogen	79·07	76·859
	100·00	100·000

Next to these two gases, the most important ingredients in the atmosphere are *vapour of water* and *carbonic acid gas*. To determine their respective quantities, a system of U tubes (Fig. 33) is connected with an "aspirator," which is simply a vessel which has an opening at the top, and another at the bottom; it is filled with water, and when the lower tap is turned, it is evident that as the water flows out air is drawn in through the opening at the top, and by connecting it with the tubes, a current of air is made to pass through them.

The first two, *a* and *b*, are packed with pieces of pumice stone, soaked with sulphuric acid. This retains all the *moisture* the air which passes through contains.

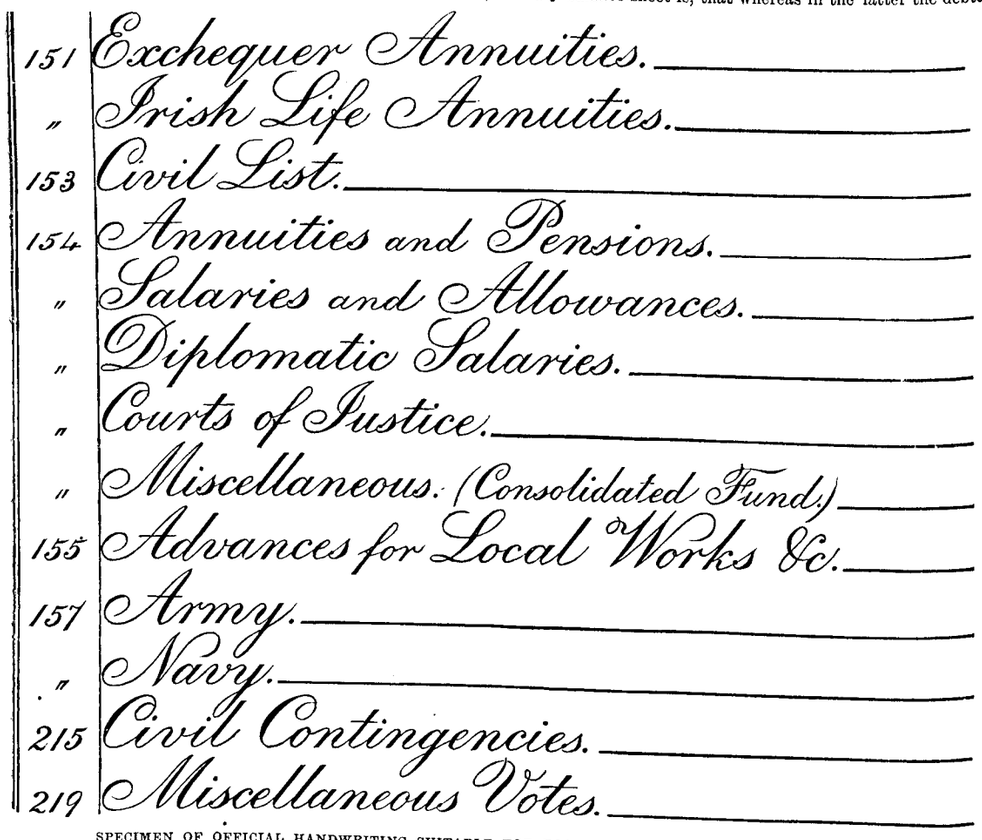
It next traverses a system of bulbs, suggested by Liebig, which are partially filled with a strong solution of caustic potash. Here all the *carbonic acid* gas is absorbed, forming, with the potash, potassium carbonate. The air, however, in passing through the liquid, will take up some moisture, and thus destroy the accuracy of the experiment; therefore, this moisture is again absorbed by the sulphuric acid in the tube *d*. A fourth tube, *e*, similar to *d*, intercepts any moisture which may attempt to penetrate the tubes from the aspirator S. The tubes *a*, *b*, *d*, and the bulbs *c* are accurately weighed. The lower tap is slightly opened, and the air slowly drawn through the tube.

LESSONS IN PENMANSHIP.—XXX.

OFFICIAL HANDWRITING.—III.

THE accompanying model of official handwriting has been copied, by permission, from a specimen sheet of Treasury Journal Entries, annexed to one of the annual reports issued by Her Majesty's Civil Service Commissioners. It is inserted here to furnish our readers with a trustworthy example of the style of handwriting adopted for entries in the various accounts of the public income and expenditure kept in the different Government offices. It should be said, that the sheet of entries from which our model has been copied was sent from the Treasury at the request of the Commissioners, and inserted, with other specimens of Government correspondence, in the report, of which it forms a part, for the purpose of showing candidates for the Civil Service the style of writing that they should endeavour to acquire for what we may call Government bookkeeping. "They may, we think," say the Commissioners, in giving their reason for inserting in their report the specimens to which we have referred, "be useful to those who are preparing for examination." Of this there can be no doubt whatever; but as the majority of those who may be intending to offer themselves as candidates for appointments in the Civil Service may neither have an opportunity of seeing the reports of the Commissioners on the one hand, nor care, on the other, to go to the expense of procuring them, we have endeavoured to supplement what has already been done in these reports for the guidance and instruction of candidates, by setting before our readers the specimens of official correspondence that have been given in previous lessons (see Lessons in Penmanship, XXVII., XXVIII., pages 33, 64), and the present model of official bookkeeping.

Our readers will readily understand that the specimen of handwriting which we have now brought under their notice forms merely a portion of the sheet of entries from which it is taken. It is a part of the central column. The narrow column on the left contains reference numbers—numbers, most probably, of folios in other books in which are entered the items which make up the gross totals inserted either on the debtor or creditor side, opposite the entries in the central column. On either side of this column are, firstly, the entries for reference numbers, one of which is shown in our model; and then, to the right and left of these reference columns, are columns for pounds, shillings, and pence, the whole forming a compendious balance-sheet. It may be as well to note that the difference between this and an ordinary balance-sheet is, that whereas in the latter the debtor and creditor sides of the accounts are written on opposite folios, or divided by a double line when on the same folio, as is often the case in printed statements of accounts, each series of pounds, shillings, and pence columns being on the right-hand side of the folio; while in the former, the entries, whether they belong to the debtor or creditor side of the account, are entered consecutively in the central column of the sheet, the figures belonging to the entries on the debtor side being inserted in the pounds, shillings, and pence columns on the left, while the figures belonging to the entries on the creditor side are placed in the pounds, shillings, and pence columns on the right.



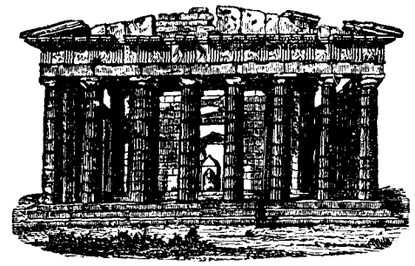
SPECIMEN OF OFFICIAL HANDWRITING SUITABLE FOR BOOKKEEPING IN GOVERNMENT OFFICES.

There is no occasion for us to speak at length of the peculiarities of the style of the handwriting shown in our model. It differs but little from the ordinary style adopted for copies in round-hand and small-hand, the chief point of difference being that the capitals are rather smaller in proportion to the size of the small letters.

LESSONS IN ARCHITECTURE.—V.

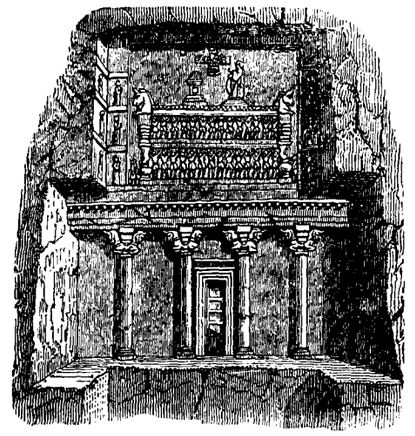
ANCIENT ARCHITECTURE OF PERSIA—GREEK ARCHITECTURE—THE PARTHENON—DORIC ORDER OF ARCHITECTURE.

SIMILAR to the excavated temples of India, are the excavated tombs of Persepolis and Nakshi-Roustam. At the foot of the rock of Istakhr, thirty miles south of Shiraz, stand the ruins of Persepolis, once the capital of the ancient and powerful Persian empire. The platform, which first strikes the eye of the traveller, appears to have been surrounded by a triple wall: of the first two, as described by ancient historians, no trace now remains; but the third, which still exists, is a square cut in the mountain, and is 60 cubits high. It is defended by palisades of copper, with doors of the same, 20 cubits high. The first wall was to inspire awe, the second was for strength, and the third for the defence of the palace. To the east of this, at the distance of 400 feet, is the royal mountain containing the tombs of the kings. Here the rock is hollowed out into several chambers, to gain the entrance to which the coffins are hoisted up by machinery; no other way of ascending them exists. This sacred enclosure, connected with the platform below, comes within the bounds of what may be called the castellated palace. The illustration below is a sketch of one of the tombs in the Shah Kuh or Royal Mountain.



REMAINS OF THE PARTHENON AT ATHENS.

On the ground above appear several mounds and rocky heaps, presenting the appearance of three distinct lines of walls and towns. The steep faces of this rocky palace are formed of dark-grey marble, cut into gigantic square blocks, exquisitely polished, and, without the aid of mortar, fitted to each other with such closeness and precision, that the whole platform must have appeared as part of the rock itself. On the interior faces of the walls of the platform within the portal are sculptured two colossal bulls, symbolical of power, and suitably placed at the gate of the palace of the great king. South of the portal appears the magnificent terrace which supports the Hall of Columns. This series of columns is called Chel Minar, or palace of forty columns, and is approached by a flight of steps remarkable for their grandeur and the beauty of their decoration. But the columns themselves are the most surprising in these respects; they are each 60 feet high, the circumference of the shaft being 16 feet, and the distance from the capital at the top of the shaft to the bottom 44 feet. The shaft is finely fluted in 32 divisions; at its lower extremity begin a cincture and a torus—the first two inches deep, and the latter one foot—whence devolves the pedestal in the form of the cup and leaves of a lotus or lily. This rests on a plinth of eight inches, and in circumference 24 feet 6 inches, the whole from the cincture to the plinth being 5 feet 10 inches in height. The capitals which remain, though much injured, are sufficient to show that they were surmounted by the demi-bull. The heads of the bulls forming the capitals look to the various fronts of the terrace. But it is impossible in our limited space to indulge in the details of these extraordinary ruins; we can only refer our readers to the works which contain fuller descriptions of them, as those of Le Bruyn, Sir William Ouseley, Sir Robert Ker Porter, and others. A few miles distant from Persepolis stands the excavated hill of Nakshi-Roustam. It is about 1,200 feet high, and presents a precipitous face of whitish marble, nearly the whole of which is covered with sculptured tombs.



TOMB AT PERSEPOLIS.

The four most elevated are executed in a superior style, and apparently co-eval with Persepolis, and belonging to the early kings of Persia. The lower tombs appear to belong to the period of the Sassanian dynasty, and therefore to a considerably later period. The description of these remarkable tombs will remind us of the "new tomb" of Joseph of Arimathea, "which he had hewn out in the rock," and of the "great stone" which was rolled to "the door of the sepulchre, wherein was never man yet laid," till the "King of kings" himself became the tenant of its walls. It explains also the meaning of the passage "she stooped down *and looked* into the sepulchre," which is so inaccurately translated in our version, and which ought to be simply "she peeped into the sepulchre." "To peep" is the exact translation of *parakupto*, and, according to Johnson, signifies "to look closely or curiously, to look through any crevice;" the darkness of the interior of the tomb requiring a close and narrow look, to ascertain if its tenant, the "King of Glory," were there.

After this short digression, we proceed to remark that the latest monuments discovered at Khorsabad, near Nineveh, having exhibited no example of a column or even of isolated pillars, no comparison can be instituted between the column constructed by the Assyrians, if they did erect any, and those of the other people of Asia. The nations we have named in our preceding observations were in the height of civilisation, while the Grecian arts were in their cradle; and it is difficult to admit that the Greeks had not learned their first lessons in architecture by the study of the Asiatic or African orders which we have described. In fact, the most ancient type of the Greek orders, the Doric, particularly at its commencement, is nearly the same as that exhibited in the tombs of the Heptanomis, and which Champollion called Proto-Doric or primitive Doric. The genius of Greece developed this first idea, enriched it with details which the Egyptians had neglected, and formed out of it the first basis of its national architecture. The principal character of the Greek Doric is the nobleness and dignity of the whole order, the severe simplicity of its details, and the moderation of its ornaments. The columns have no base; the shaft is ornamented by wide and shallow flutings; the capital is composed of a large moulding in the form of a cup or flat vase, which rests upon two or three little fillets, and is surmounted by a square tablet. The triglyphs, the fluted ornaments at the extremity of the architraves, which are seen in the frieze and entablature, belong exclusively to this order; the square spaces or metopes between the triglyphs are frequently occupied with sculptures of isolated subjects; but the polished frieze, and consequently the continued subject, are in this order very rare. Still this order does not exclude all decoration; and in buildings of a common character it loses its heaviness, and becomes very elegant; the mouldings then become finer, and some are decorated with various ornaments. An example of the Doric column is given in the next page.

According to Vitruvius, it was in the temple of Juno, at Argos, where the Doric order of architecture first rose to a marked eminence, and became the model for the magnificent edifices afterwards erected throughout Greece. It was next employed in the temple of Jupiter Nemeus, at Nemea, between Argos and Corinth; of Jupiter Olympius, at Olympia, in Elis, in a splendid triple portico in the city of Elis; and in three temples of the same city—namely, those of Juno, Minerva, and

When the aspirator is empty, the tubes are again weighed, and thus from the increase of weight we learn the quantity of moisture and carbonic acid gas which were in the volume of air in the aspirator.

The moisture in the air varies immensely.

The proportion of carbonic acid is generally about $\frac{4}{10000}$ of the whole volume of the atmosphere.

Traces of ammonia and sulphuretted hydrogen are found near towns especially; and nitric acid is frequently present after a thunder-storm.

The average composition of the atmosphere is—

	Oxygen	20·61
	Nitrogen	77·95
	Carbonic acid	·04
	Aqueous vapour	1·40
	Nitric acid	traces
	Ammonia	
	Carburetted hydrogen	
In towns	Sulphuretted hydrogen	traces
	Sulphurous acid	

The physical properties of the atmosphere not coming within the actual domain of chemistry, we pass on to

THE CHEMICAL COMPOUNDS OF NITROGEN.

With oxygen, this gas produces five well-defined compounds:—

N_2O_4	Nitric anhydride.
N_2O_4	Nitric peroxide.
N_2O_3	Nitrous anhydride.
N_2O_2	Nitric oxide.
N_2O	Nitrous oxide, or Laughing Gas.

The regularity of their formation offers the best of examples of the law of "multiple combination." It will be seen that the compounds are formed by the addition of an atom of oxygen, the quantity of nitrogen remaining the same. Hence the increase of the atomic weights will be by the addition of 16; and as atoms are indivisible, therefore there can be no addition to the weight, save in a multiple of 16. The law of which this is an example, is an evident deduction from Dalton's atomic theory, which has been already explained. It is known by the name of "*the law of chemical combination in multiple proportion.*" Nitrogen only combines with oxygen under peculiar circumstances. Whenever an electric spark passes through the atmosphere, their combination is effected. Thus, after a flash of lightning, nitric acid is always found in the air. We also find this compound is frequently formed during the putrefaction of animal matter, and it occasionally happens that some of the lower oxides of nitrogen are also produced at the same time.

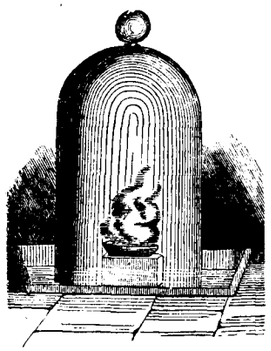


Fig. 31.

NITRIC ACID, OR HYDRIC NITRATE (HNO_3).

As all the other compounds of oxygen and nitrogen are derived from this acid, we shall speak of it first.

In the symbol given above for nitric acid, N_2O_5, it will be seen that there is no hydrogen; and therefore N_2O_5 is, strictly speaking, not an acid; it only becomes one when joined with water. Thus the symbol will be $H_2ON_2O_5 = H_2N_2O_6$. This is usually written HNO_3.

To prepare nitric acid, it is necessary to act on one of the plentiful nitrates, potassium or sodium nitrate (KNO_3, or $NaNO_3$), with sulphuric acid. In the laboratory it is usual to place in a retort equal weights of potassium nitrate (saltpetre) and sulphuric acid, and then distilling in the ordinary way with Liebig's condenser, the action is—

$$2KNO_3 + H_2SO_4 = K_2SO_4 + 2HNO_3.$$

For commercial purposes sodium nitrate is used, being cheaper and yielding 9 per cent. more of the acid; but as a greater heat is required, the nitric acid, which distils over, always contains sulphuric acid.

The liquid thus obtained fumes in the air, and ought to be colourless, but is usually tinted yellow by the presence of the next lower oxide—the yellow gas—nitrous acid.

It easily parts with some of its oxygen, and is therefore a good "oxidising agent." If, for instance, a piece of copper be thrown into a little nitric acid, violent action shortly commences, especially if the liquid be warmed; dense red fumes are given off, and the copper becomes cupric nitrate, blue vitriol ($Cu2NO_3$); by diluting the solution and slowly evaporating, the blue crystals of the salt may be obtained. Its readiness to part with its oxygen is also shown by dropping the acid into hot, finely-divided charcoal, which begins to burn vividly. If the nitric acid be required in a very powerful form, some sulphuric acid is added, which deprives the nitric acid of its water. Oil of turpentine bursts into flame when such a mixture is poured into it. All the metals, except gold and platinum, are attacked by this acid. Thus we have a means of deciding between real gold and a mere electrolytic gilding. On the former a drop of the acid remains unchanged, whilst in the latter case it becomes green.

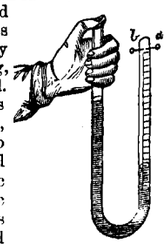


Fig. 32.

To test for the presence of Nitric Acid.—If any body be supposed to contain this acid, whether in a free or in a combined state, get the substance into solution, add an equal quantity of sulphuric acid, which will set the nitric acid free, and carefully add a concentrated solution of iron sulphate (green vitriol). If any nitric acid be present, a black ring will be formed at the place where the two liquids meet.

The anhydrous acid (N_2O_5) may be obtained by a method proposed by Natterer. Dry chlorine gas is passed over crystals of silver nitrate, the action being—

$$2AgNO_3 + 2Cl = N_2O_5 + O + 2AgCl.$$

The silver chloride remains in the bulb, the oxygen escapes, and the anhydrous nitric oxide condenses in a U tube, which is placed in ice, and which is joined to the bulb containing the silver salt. The substance collects as a white crystalline solid. It must be kept in a sealed tube, or it abstracts water from the air, and becomes liquid nitric acid. Hence it is only a chemical curiosity, and of no practical use.

In concluding this lesson we add tests for ascertaining the purity of commercial nitric acid, for every care ought to be taken that laboratory chemicals are pure. Since the process for obtaining nitric acid in large quantities is carried on in a cast-iron retort, and at a high temperature, the acid generally contains sulphuric and hydrochloric acids.

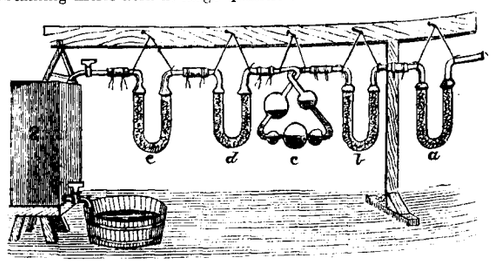


Fig. 33.

To discover the presence of the first substance, take some of the suspected acid, dilute it with four times its volume of water, and add a little barium chloride. The insoluble barium sulphate will be formed if the slightest trace of sulphuric acid be present, and it will exhibit itself in a white precipitate.

In testing for hydrochloric acid, it is not necessary to dilute the nitric acid, but add a few drops of a solution of silver nitrate, and if any hydrochloric acid be present, then there will be a white curdy precipitate of silver chloride. The two reactions are thus expressed:—

$$H_2SO_4 + BaCl_2 = BaSO_4 + 2HCl,$$
$$\text{and } HCl + AgNO_3 = AgCl + HNO_3.$$

LESSONS IN BOTANY.—XXII.

SECTION XLII.—RUBIACEÆ, OR GALIACEÆ.

Characteristics:—Calyx superior, adherent to the ovary; corolla monopetalous, epigynous; stamens inserted upon the corolla; ovary inferior, two or more celled, containing one or many seeds; seed dicotyledonous, albuminous; leaves stipulate.

This family, one of the most important in the whole vegetable kingdom, derives its name from the *Rubia*, or madder, one of its principal genera. The name *Galiaceæ*, which is also applied to this family, is derived from the *Galium*, or ladies' bedstraw. The *Rubiaceæ* are either trees or shrubs, sometimes herbs, especially those indigenous to Europe. The leaves are opposite, or verticillate, and furnished with stipules. Their stipules are subject to variations. Usually they are what is called *interpetiolar*, the adjacent stipules of different opposite leaves becoming fused into one organ, but sometimes they constitute bodies altogether resembling ordinary leaves, and verticillate, then to be distinguished from real leaves thus arranged by the absence of axillary buds. The flowers are complete, or very rarely incomplete by abortion; ordinarily regular; their disposition is various, either in the form of cyme, or panicle, or capitulum. The calyx is adherent by its tube to the ovary; its limb is tubular or truncate. The corolla inserted on the tube of the calyx is infundibuliform, campanulate, or in few cases rotate; its limb is four to six partite, the parts being ordinarily equal to each other; valvular or sometimes gyrate in æstivation. Stamens inserted on the tube of the corolla, their number almost invariably equal to that of the divisions with which they are alternate; anthers introrse; the ovary crowned by a fleshy disc, more or less prominent, generally formed of two carpels, constituting two cells, one, two, or many ovulate. The ovules, reflected or curved, are ascending or erect; style simple; stigmata bifid usually, but varying according to the number of the carpels. The fruit of plants of the madder family may be a capsule, a berry, or a drupe.



182. BRANCH OF COFFEE TREE.

The *Rubiaceæ* may be distinguished from all other natural orders by their inferior ovary, their monopetalous corolla, and their opposite simple leaves, with interpetiolar stipules. They are allied by many strong points of resemblance to the *Caprifoliaceæ*; but they also present many analogies to other natural orders, a circumstance not to be marvelled at, considering how numerous is this family.

Madder (*Rubia tinctorum*) is a perennial vegetable, having a long straggling root, and square knotty stems, upon the angles of which grow coarse bristly hairs; the leaves are verticillate; the flower is small, and of a greenish-yellow colour; the berry is black. Madder is indigenous in the eastern and central states of Europe, but its cultivation is now successfully prosecuted in many districts of the western countries, being of great utility in dyeing. Chemists have succeeded in extracting the colouring matter in the condition of purity, and have denominated it *alizarine*, the name being derived from the term *izari* or *alizari*, by which madder is known in the Levant. Alizarine is volatile, hence it may be obtained by sublimation. The dyeing properties of madder have been known from times of very great antiquity. Strabo relates that he saw this plant cultivated by the Gauls of Aquitania, who called it *varancia*, whence is derived the French word *garance* for madder. During the Middle Ages the Normans cultivated it largely in the country about Caen, and exported large quantities.

It is a curious circumstance in reference to the colouring matter of madder, that it penetrates the whole organism of animals which eat it, and dyes their bones. Many other species of the genus *Rubia* furnish a red colouring matter; amongst these we have the *Rubia peregrina*, *Rubia lucida*, *Rubia angustifolia*, *Rubia longifolia*. Many foreign species are also tinctorial. India possesses the *Rubia Munjista*, Chili the *Rubia Relboun*, the West Indies the *Rubia Guadalupensis* and *Rubia hypocarpa*.

SECTION XLIII.—CINCHONACEÆ.

This important natural order contains a great number of valuable medicinal plants, of the principal of which—namely, those which supply us with the Cinchona bark—we shall speak in a future lesson. The order by many botanists is considered as forming a sub-order of the order *Rubiaceæ*.

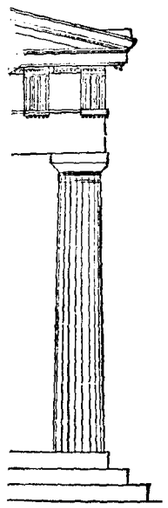
Characteristics:—Leaves simple, entire, opposite, with stipules between the foot-stalks; calyx superior, adherent to ovary; corolla monopetalous, tubular and regular, with segments equal in number to the segments of the calyx when there are divisions in the calyx; stamens rising from the corolla in alternation with its segments; ovary inferior and commonly two-celled; style simple; fruit pulpy in some, dry in others, sometimes splitting into two halves.

Ipecacuanha (*Cephælis ipecacuanha*) is an exceedingly valuable member of the natural order *Cinchonaceæ*. It is a little shrub which inhabits the forests of Brazil. Its root is about the size of a goose-quill, yellow in colour, and furnished with a grey bark disposed in the form of rings very close together. The stem is one or two feet high; the leaves disposed in pairs. The active properties of ipecacuanha reside in the bark of the root, which furnishes a valuable medicine which acts as a purgative and emetic when administered in large doses, and as an expectorant in small doses.

Perhaps the most important individual of the *Cinchona* tribe is the coffee plant. Coffee is the produce of an evergreen shrub, a native of Abyssinia and Arabia. The fruit is a berry about the size of a cherry, covered with a pulp sweet in taste and not very thick. Inside this pulp are two seeds, separated from each other by a parchment-like membrane. These seeds are the well-known coffee. The coffee-seed has been frequently analysed; chemists have found in it several oily gums and albuminous matters, but the valuable principle is crystalline, and denominated *caffeine*. Every person knows that coffee is rendered fit for culinary purposes by the process of roasting, but the precise agency of this roasting process is not understood.

It is supposed that it was only in the fifteenth century that coffee was transported from Abyssinia to Arabia Felix. But if Arabia be not the native land of coffee, it is at least its most prosperous adopted home. Nowhere does the plant flourish better, nowhere is the resulting coffee so delicious in flavour, especially that grown in the country of Yemen, in the environs of Mocha. The Orientals, it is well known, first introduced the use of coffee into Europe; but when they, the Orientals, first became acquainted with the beverage is still uncertain. An Arabian author of the fifteenth century, named Shehabeddin, states that the Mufti of Aden, in the ninth century, was the first who used coffee as a beverage; but it is certain that at this period

Dindymene or Cybele; at Eleusis, in the great temple to Ceres, in the temple of Minerva at Sunium; and in the temple of the same goduess at Athens, called the Parthenon; in the entrance to the Acropolis, and in other public buildings of great magnitude and splendour at Athens. In many of the islands of Greece and Magna Græcia, there were also temples of the Doric style of architecture, as that of Apollo, in Delos; of Juno, in Samos; of Jupiter Panhellenius, of Ægina, and of Silenus, in Sicily; and many others in places of inferior note. Many of these temples were of great magnitude. They were universally of an oblong form. In some the porticoes were only at the end, in others they were extended *right* round the interior of the building, *some* in single, and others in double *ranges*. Some were covered with roofs, others were left partly uncovered, and some were divided by ranges of pillars along the middle of the interior. The superstructure was placed upon a platform composed of three steps, which surrounded the whole building, and upon which the columns were all placed without bases. The number of columns were either six along the ends, and thirteen along the sides, or eight along the ends, and seventeen along the sides. When built upon so large a scale, with the ranges of columns so distinctly isolated, the essential parts of the Doric order produced effects not surpassed for simplicity and majesty; and even the imperfect remains which have escaped the ravages of time and barbarity appear to have far exceeded the expectations of connoisseurs. In the earlier examples of this order the diameters of the Doric columns were very considerable in proportion to their height. For instance, the column of the temple of Silenus, in Sicily, was only five diameters in height, but in the course of time these relative dimensions were changed, and a proportion more adapted to the production of delicate effect was introduced. The Doric style of architecture was, with very few exceptions, the only one employed in Greece or its European colonies in Sicily and Italy, and in Asia Minor, until after the period of the Macedonian conquest. In Asia Minor, and particularly in Ionia, there speedily arose, subsequent to that period, an order of architecture more elegant than the Doric. But our notice of this order must form the subject of our next lesson.



DORIC COLUMN.

LESSONS IN GREEK.—V.

NOUNS OF THE FIRST DECLENSION (*continued*).

THAT the learner may have sufficient practice in declining feminine nouns of the first declension, he should write out the nouns and adjectives in the following vocabulary according to the models given in the last lesson (pages 98, 99).

VOCABULARY.

Αστραπη, -ης, ἡ, lightning.	Διαιτα, -ης, ἡ, manner of life (Eng. diet).	Λαμπρα, shining, splendid.
Ατιμια, -ας, ἡ, dishonour.	Δοξα, -ης, ἡ, glory.	Μεταβολη, -ης, ἡ, change.
Βασιλειᾶ, -ας, ἡ, a queen.	Ευνομια, -ας, ἡ, regard to law.	Πιπτω, I fall.
Βασιλειᾶ, -ας, ἡ, a kingdom.	Εσθλη, good, honest.	Ῥαδιως, easily.
Βλαβη, -ης, ἡ, injury.	Ευθυνω, I make straight, make right.	Σκολια, crooked, wrong.
Βροντη, -ης, ἡ, thunder	Καλη, beautiful.	Στολη, -ης, ἡ, a robe.
Γλωττα, -ης, ἡ, a tongue, speech.	Κατεχω, I hold back.	Τυχη, -ης, ἡ, fortune, fate.
		Φερω (Lat. fero), I bear.

EXERCISE 5.—GREEK-ENGLISH.

1. Τῃ κακιᾳ ατιμια επεται. 2. Ῥαδιως φερε την πενιαν. 3. Βροντη εκ λαμπρας αστραπης γιγνεται. 4. Ἡ αρετη εσθλην δοξαν εχει. 5. Ευνομια ευθυνει δικας σκολιας. 6. Δικη δικην τικτει και βλαβη βλαβην. 7. Αγαθην διαιταν αγε. 8. Κατεχε την γλωτταν. 9. Ἡ τυχη πολλακις μεταβολας εχει. 10. Την πενιαν φερετε. 11. Αι λαμπραι τυχαι ῥαδιως πιπτουσιν. 12. Φερε τας τυχας. 13. Ἡ αρετη ουκ εικει ταις τυχαις. 14. Απεχεσθε των χαλεπων μεριμνων. 15. Ἡ βασιλεια λαμπραν βασιλειαν εχει. 16. Ἡ στολη εστι καλη. 17. Καλας στολας εχομεν.

EXERCISE 6.—ENGLISH-GREEK.

1. Flee cares. 2. Baseness begets dishonour. 3. Virtue follows fame. 4. They bear poverty easily. 5. Poverty is borne easily. 6. You bear poverty easily. 7. Thou hast changes. 8. Abstain from baseness. 9. They have a beautiful robe. 10. Do not yield to fortune. 11. They yield to fortune readily. 12. Do ye restrain (*hold back*) *the* tongue (that is, in English, *your tongue*). 13. Wrong judgments are made right.

Having in the previous lesson treated of feminine nouns of the first declension, I now pass on to

MASCULINE NOUNS OF THE FIRST DECLENSION.

EXAMPLES.

		A citizen.	*Mercury.*	*A youth.*
Sing.	Nom.	πολιτης.	Ἑρμῆς (εας).	νεᾶνιᾶς.
	Gen.	πολιτου.	Ἑρμοῦ.	νεᾱνιου.
	Dat.	πολιτῃ.	Ἑρμῇ.	νεᾱνιᾳ.
	Acc.	πολιτην.	Ἑρμῆν.	νεᾱνιᾶν.
	Voc.	πολιτα.	Ἑρμῆ.	νεᾶνιε.
Plur.	Nom.	πολιται.	Ἑρμαῖ.	νεᾱνιαι.
	Gen.	πολιτων.	Ἑρμῶν.	νεᾱνιων.
	Dat.	πολιταις.	Ἑρμαῖς.	νεᾱνιαις.
	Acc.	πολιτᾶς.	Ἑρμᾶς.	νεᾱνιᾶς.
	Voc.	πολιται.	Ἑρμαῖ.	νεᾱνιαι.
Dual.	N.A.V.	πολιτᾶ.	Ἑρμᾶ.	νεᾱνιᾶ.
	G.D.	πολιταιν.	Ἑρμαῖν.	νεᾱνιαιν.

The vocative of such nouns as have ης in the nominative singular ends in α in the following cases, namely—

1. In all nouns in της, as τοξοτης, *an archer*, vocative τοξοτα; προφητης, *a foreteller, a prophet*, vocative προφητα.
2. In all substantives in ης compounded of a substantive and a verb, as γεωμετρης, *a land-measurer, a geometrician*, vocative γεωμετρα; μυροπωλης, *a perfumer*, μυροπωλα.
3. In names of nations in ης, as Περσης, *a Persian*, Περσα.

Several nouns in ας have the genitive that is customary in the Doric dialect,* ending in ᾶ, *e.g.*, πατραλοιας, -ᾶ, *the slayer of a father*; μητραλοιας, -ᾶ, *the slayer of a mother*; ορνιθοθηρας, -ᾶ (also ου), *a bird-catcher*; also several proper names, as Συλλας, -ᾶ, *Sylla*; finally, contracted nouns in ᾶς, as Βορρᾶς (from Βορεας), genitive Βορρᾶ, *the north wind*.

According to these models decline adjectives of one termination, in ης and ας—*e.g.*, εθελοντης πολιτης, *a willing citizen*; μονιας νεανιας, *a lonely youth*.

A masculine noun and adjective of the first declension are inflected thus:—

εθελοντης αροτης, *a willing ploughman.*

Sing.	Nom.	εθελοντης αροτης, a willing ploughman.
	Gen.	εθελοντου αροτου, of a willing ploughman.
	Dat.	εθελοντῃ αροτῃ, to *or* by a willing ploughman.
	Acc.	εθελοντην αροτην, a willing ploughman.
	Voc.	εθελοντα αροτα, O willing ploughman.
Plur.	Nom.	εθελονται αροται, willing ploughmen.
	Gen.	εθελοντων αροτων, of willing ploughmen.
	Dat.	εθελονταις αροταις, to *or* by willing ploughmen.
	Acc.	εθελοντας αροτας, willing ploughmen.
	Voc.	εθελονται αροται, O willing ploughmen.
Dual.	N.A.V.	εθελοντα αροτα, two willing ploughmen.
	G.D.	εθελονταιν αροταιν, of two willing ploughmen.

In addition to the exercises given above, in declining adjectives of one termination in ης and ας, the learner should write out at length the nouns given in the following vocabularies.

* The "Doric dialect" was a form of the Greek tongue employed by the Dorians. As Greece was divided into several *small* states, so there were several dialects, such as the Doric, the Ionic, the Attic. These dialects must be distinguished from our provincialisms, for they were in their own locality severally classical. The Attic, however, is the generally recognised form of the Greek tongue in its highest perfection; and the writings of Xenophon (Attic) are accounted *the* model for prose in Greek, as Cicero's writings are held to be *the* model for Latin prose.

VOCABULARY.

Αδολεσχης, -ου, ὁ, a chatterer.	Θαλαττα, -ης, ἡ, the sea.	Ορεγομαι, I reach towards, strive after (with Gen.).
Ακουω (with Gen. or Acc.), I hear.	Θεᾶτης, -ου, ὁ, a spectator (Eng. theatre).	Πρεπει, it becomes, it is proper.
Ακροᾶτης, -ου, ὁ, a hearer.	Μανθανω, I learn.	Προσηκει, it is suitable.
Βλαπτω, I injure.	Μελει (with Gen. of the thing, and Dat. of the person), it concerns; μελει μοι, I have to do with.	Σοφια, -ας, ἡ, wisdom.
Δεσποτης, -ου, ὁ, a master (Eng. despot).	Ναυτης, -ου, ὁ, a sailor.	Σπαρτιᾶτης, -ου, ὁ, a Spartan.
Ευκοσμια, -ας, ἡ, decorum, politeness.		Συβαρῖτης, -ου, ὁ, a Sybarite.
Ἡσυχία, -ας, ἡ, tranquillity; ἡσυχιαν αγειν, to be quiet.		Τεχνη, -ης, ἡ, art.
		Τρυφητης, -ου, ὁ, a voluptuary.

EXERCISE 7.—GREEK-ENGLISH.

1. Μανθανε, ω νεανια, την σοφιαν. 2. Πολιτῃ πρεπει ευκοσμια. 3. Την νεανιου αδολεσχιαν ψεγομεν. 4. Φευγε, ω πολιτα, την αδικιαν. 5. Την ορνιθοθηρα τεχνην θαυμαζομεν. 6. Ακροαταις και θεαταις προσηκει ἡσυχιαν αγειν. 7. Φευγετε, ω ναυται, βορβαν. 8. Βορρας ναυτας πολλακις βλαπτει. 9. Ορεγεσθε, ω πολιται, της αρετης. 10. Συβαριται τρυφηται ησαν. 11. Ναυταις μελει της θαλαττης. 12. Φευγε, ω Περσα. 13. Σπαρτιαται καλην δοξαν εχουσιν. 14. Φευγω νεανιαν τρυφητην. 15. Των αδολεσχων απεχου. 16. Ακουε, ω δεσποτα.

EXERCISE 8.—ENGLISH-GREEK.

1. Flee, O Persians. 2. Bravery becomes citizens. 3. It concerns a citizen to be quiet. 4. O youths, learn wisdom. 5. They learn wisdom. 6. You learn wisdom. 7. I learn wisdom. 8. Wisdom is learned. 9. Decorum becomes a youth. 10. O north wind, injure not the sailor. 11. O sailor, avoid (φευγω) the north wind. 12. The north wind is avoided. 13. O Spartan, strive after glory. 14. Chatterers, be quiet. 15. Abstain from a chatterer.

VOCABULARY.

Δικαιοσυνη, -ης, ἡ, justice.	Κλεπτης, -ου, ὁ, a thief.	Οικετης, -ου, ὁ, a servant.
Επιμελομαι (with Gen.), I care for.	Κριτης, -ου, ὁ, a judge.	Στρατιωτης, -ου, ὁ, a soldier.
Εραστης, -ου, ὁ, a lover, a friend.	Μαχομαι, I fight.	Τεχνῖτης, -ου, ὁ, an artist.
Εστι (with Gen.), it is the duty of.	Ναυαγια, -ας, ἡ, shipwreck (literally ship-break).	Τρεφω, I nourish, bring up.
Θαυμαστη, admirable		Ψευστης, -ου, ὁ, a liar.

EXERCISE 9.—GREEK-ENGLISH.

1. Ἡ Σπαρτιατων αρετη θαυμαστη ην. 2. Φευγε, ω νεανια. 3. Φευγετε, ω εραστα. 4. Οι κλεπται φευγονται. 5. Κριταις πρεπει δικαιοσυνη. 6. Εστι των στρατιωτων περι των πολιτων μαχεσθαι. 7. Φευγε ψευστας. 8. Εστι δεσποτου επιμελεσθαι των οικετων. 9. Μη πιστευε ψευστῃ. 10. Τεχνῖτην τρεφει ἡ τεχνη. 11. Εκ ψευστων γιγνονται κλεπται. 12. Σπαρτιαται δοξης και τιμης εραστα ησαν. 13. Εκ βορρᾶ πολλακις γιγνεται ναυαγια. 14. Θαυμαζομεν την Ἑρμου τεχνην.

EXERCISE 10.—ENGLISH-GREEK.

1. The lovers of glory flee not. 2. Liars are not lovers of virtue. 3. The virtue of the Spartan was admirable. 4. O Spartans, believe not liars. 5. The art of (Mercury) Hermes was admirable. 6. We admire the virtue of the Spartans. 7. O Spartan, avoid a liar. 8. It is the duty of a master to care for his servant. 9. It is the duty of servants to care for masters. 10. The arts nourish the artists. 11. It becomes the soldiers to fight for the citizens. 12. Be quiet, O north wind. 13. I admire Mercury.

KEY TO EXERCISES IN LESSONS IN GREEK.—IV.

EXERCISE 3.—GREEK-ENGLISH.

1. Yield not to force. 2. The lyre dissipates cares. 3. Friendship promises refuge and aid. 4. Care corrodes the heart. 5. Worship (cultivate) the Muses. 6. Do not believe false accusations. 7. Justice often yields to injustice. 8. We are often worn down by hard (severe) poverty. 9. Flee from (avoid) talkativeness. 10. Wickedness brings grief. 11. Luxury begets injustice and avarice. 12. Avoid luxury as a shame (or a bane). 13. True friendship arises through (from) virtue and intercourse.

EXERCISE 4.—ENGLISH-GREEK.

1. Απεχου της βιας. 2. Απεχεται της βιας. 3. Ουκ απεχεται της βιας. 4. Απεχονται της βιας. 5. Φευγε την αδικιαν. 6. Φευγετε την αδικιαν. 7. Φευγω την αδικιαν ὡς μανιαν. 8. Ἡ βια λυπην επαγει. 9. Δια δικης γιγνεται ἡδονη. 10. Αληθειαι φιλιαι δια αρετης γιγνονται. 11. Ἡ καρδια πενιᾳ τειρεται. 12. Αἱ μεριμναι λυουσι τῃ λυρᾳ.

GREAT BOOKS.

VI.—DON QUIXOTE.

ROMANTIC fiction, as it is understood in the modern world, is generally believed to have originated with the "Æthiopica" of Heliodorus, a Thessalian bishop at the close of the fourth century. The plant was of quick growth, and romances were soon written by many besides ecclesiastical dignitaries. Chivalry developed a peculiar form of these compositions, and the old legends of Britain, Gaul, and Spain, reinforced by those of other lands, were elaborately treated in a number of fabulous histories, abounding in strange adventures and wild enchantments, and purporting to reflect the ideal of knightly heroism. Many of these works were distinguished by a great deal of poetic fancy, varied at times by a kind of epic grandeur and loftiness of thought; but the style at length grew into a mannerism, and degenerated into the merest extravagance and absurdity. When the reality of chivalrous institutions had departed, all that was vivid and true in such productions vanished likewise. The stories of King Arthur and his Knights of the Round Table, of Charlemagne and his Paladins, of Orlando and Oliver, of Rinaldo and Morgante, of the Cid and others, have added a rich territory to literature, and several of the Italian poets have drawn largely on such sources, as our own Spenser has also done. But when, in the early part of the seventeenth century, Michael Cervantes began writing his satirical romance of "Don Quixote," the epoch of mechanical repetition had set in, and with it the epoch of worthless conceits and insincere exaggerations.

The career of Cervantes was in itself a romance. The scion of an ancient house, he was yet poor, and had to seek his fortunes. As a soldier, he was on board the Christian fleet at the famous battle of Lepanto, which, in 1571, crippled the Turkish naval power. On that occasion he was severely wounded while fighting gallantly. Some years afterwards he was taken by an Algerine corsair, and passed a considerable period in captivity, from which he made unsuccessful efforts to escape. Being at last ransomed, he served again in the army, and then settled down to the practice of literature, to which he had shown an early inclination. Novels, dramas, satires, poems, and other works flowed from his pen; but by far the most celebrated of these productions is the immortal "Don Quixote," the popularity of which, throughout the whole civilised world, has never been surpassed, and which has furnished to the general mind two figures—the Don himself, and Sancho Panza—which are a thousand times more real than many of the fleeting experiences of our lives. Cervantes, who was not merely a great but a good man, died on the 23rd of April, 1616, in his sixty-ninth year. It was the very same day on which Shakespeare died.

In the composition of "Don Quixote," Cervantes had, besides the general intention of producing an amusing work, the special design of casting ridicule on the follies of those books of knight-errantry to which the hidalgo of La Mancha is so passionately devoted. With a hyperbolical race like the Spaniards, it is easy to believe that such stories may have done actual harm, by fostering a habit of boastfulness and aggression, and discouraging the sober and reasonable pursuits of civil life. Quixote is represented as a gentleman of La Mancha, who sits in his library the greater part of the year, reading romances of chivalry until his brain is literally disordered. "His fancy," says Cervantes, "was filled with the things he read of—enchantments, quarrels, battles, challenges, wounds, wooings, loves, tempests, and impossible follies. And these toys did so firmly possess his imagination with an infallible opinion that all the machinery of dreamed inventions which he read was true, that he accounted no history in the world to be so certain and sincere as they were." After much brooding over these fancies, Don Quixote resolves to go forth in the true fashion of knight-errantry, and reform the abuses of the world.

*

the use of the infusion was known in Persia. According to vulgar tradition, the discovery of coffee is due to the mollah Chadelly, whose memory is held in reverence by all true Mussulmans. This pious man, afflicted with sorrow at the thought that he could not keep awake for the performance of his nocturnal devotions, besought Mahomet to indicate some means by which sleep might be chased away. Mahomet, touched with pity, as well he might, seeing that his own honour was concerned, so brought matters about that a herdsman came to acquaint mollah Chadelly of the curious fact that his (the herdsman's) goats could not go to sleep after they had partaken of coffee berries, but kept frisking about all night long. The mollah, taking the hint, at once prepared a good strong dose of coffee. He drank it, and was delighted beyond measure at the result. Not a wink of sleep did he get; delicious sensations crowded on his brain; and his midnight devotions were so fervent that he at once communicated the precious secret to some dervises, who, imitating his example, beleaguered the prophet, now in the seventh heaven of bliss, with unceasing prayers.

According to another tale, the discovery was made by the prior of a convent of Maronites, who, on receiving the report of a camel-driver to the effect that his beasts could get no sleep after having browsed on the coffee plant, at once bethought himself what a good thing coffee would be for his monks, who, like the mollah Chadelly, appear to have been torpid, sleepy fellows, and had acquired the disreputable habit—not quite obsolete now—of going to sleep in church. The practice, we are told, was quite successful.

But coffee, like many other good things, had its enemies, and strange to say, the very Mohammedan priests who were amongst the first to patronise it became its most rancorous foes. The fact was this. So generally was coffee approved of by the Arabian populace, that people, instead of going to the mosque, spent their days in coffee-shops; and as there does not appear to have been any act of parliament to enforce the closing of coffee-houses during church—or rather mosque—hours, the priests had an audience of empty benches. Forthwith the mollahs anathematised the seductive berry and those who used it. Coffee, they said, was as bad as wine and spirituous liquors, if not worse. Its employment was interdicted throughout every part of the Turkish empire. Religious anathemas, however, being insufficient to check the growing evil, at length an appeal was made to physical force. "In the year of the Hegira 945" (A.D. 1538), says an Arabian historian, "whilst large numbers were assembled in the month of Rhamadan, employed in drinking coffee, the captain of the guard surprised them, hunted them ignominiously from the shops, locked them up all night in the pasha's house, and the next morning administered to each individual, by way of salutary admonition, seventeen stripes."

Persecution, as usual, accomplished a result the very opposite to that intended. Coffee speedily became universally popular. In the first half of the seventeenth century there numbered in Cairo no less than 2,000 coffee-shops. At the present time coffee is amongst Eastern Mussulmans one of the first necessaries of life. When a Turk adds a new wife to his associated beauties, he formally contracts with her friends that she is always to have plenty of coffee. If certain modern accounts, however, are to be trusted, Turkish ladies have got into the habit of drinking brandy. According to Mahomet, they have no souls to lose; hence they may drink spirituous liquors with impunity.

Before the seventeenth century coffee was scarcely known in France, even by name. At length certain travellers returning from the East brought a little coffee with them for their own private use. In the year 1647, Thevenot invited some friends to a party, and gave them coffee to drink; but he had been preceded by a Levantine, who, three years before, established at Paris a coffee-shop; his speculation, however, did not succeed. It was in the *beau monde* that coffee first became popularised. The Turkish ambassador at the French Court, Soliman Aga, was in the habit of offering coffee, after the manner of his country, to those who attended his levees. The ladies of the French Court no sooner heard of this custom than they expressed their desire of tasting the seductive liquor; whereupon the Turk, being a polite man, as all Turks are, invited the ladies to his house, and gave them coffee to their hearts' content. Madame de Sevigné was opposed to this fashion; she did not approve of coffee; said it was only a short-lived taste; that it would pass away and be forgotten, like Racine. Well, the lady was right, after all, though not after the fashion she intended; coffee has passed away and been forgotten, "*like Racine!*" About the same time it was that coffee first came into favour at Vienna. The Turks, driven from before the walls of that city by Sobieski, left their camp in the hands of the conqueror. In this camp there was abundance of coffee, and a retinue of slaves whose office was to prepare it. Coffee had already been introduced amongst the Londoners in the following manner. An English merchant named Edwards, returning from Smyrna, brought with him a Greek servant, Pasquot by name, who opened a coffee-shop in Newman's Court, Cornhill, in 1652. Other coffee-shops speedily arose, but Cromwell, then in power, set himself against them and closed them, fearing lest they might injure the taverns. Another account says that the first coffee-shop in England was opened by a Jew named Jacobs, at Oxford, in 1650.

All the supplies of coffee imported for a long time into Europe were obtained from Arabia. It was brought by way of Alexandria and the Levant; but the pashas of Egypt and Syria imposed enormous taxes upon it. Europeans then began to obtain it by the channel of the Red Sea. Holland took the lead in this commerce; next followed France, and, lastly, England. In 1699, the Dutch, under the direction of Van Horne, first president of the Dutch East Indian colonies, having procured certain coffee plants, sent them to Batavia, where they flourished well. The French next introduced coffee into Martinique; and we, following their example, planted the coffee shrub in many of our tropical colonies.

LESSONS IN LATIN.—XXII.

THE LATIN VERB (*continued*).

We have previously seen that *a* long (ā) characterises the first conjugation, to which *amo* belongs; also that *e* long (ē) characterises the second conjugation; and *i* long (ī) the fourth. Hence only one class of verbs is characterised by a short vowel, and that is the class which bears the name of the third conjugation. This *e* short (ĕ), however, does not strictly belong to the verb, but is only a connecting vowel between two consonants in this conjugation, the essence of which is that its stem is consonantal, or ends in a consonant. Thus, in the infinitive mood *ĕre* is introduced, for the sake of sound, between the stem and the ending of the infinitive; e.g., *leg(e)re*, for *legre;* in the same way *leg(e)bam* instead of *legbam*. But the other conjugations have vowel stems, as *ama, doce, audi*. The verbs of the third conjugation are called strong, and appear to be the most ancient. The verbs with vowel stems bear the name of weak, and are of later origin.

Frequently, in order to understand a formation, you will require to know how letters are related one to another. For instance, the supine of *lego* is *lectum*. Here the *g* seems to have disappeared. It is, however, represented by the *c*. Thus, instead of the hard *legtum*, we have *lectum*. In *rexi*, the perfect of *rego*, the *g* seems to have disappeared. But it has its representative in the *c* or *k* in *xi;* thus *rexi*, if written according to the sound (phonetically), would be *regsi* or *recsi* (*reksi*). The sibilant (s) is also introduced for the sake of euphony. To pursue this subject in detail would require more space than we have to give. It must suffice to have put you in the right direction. When your ear, by constant practice, is accustomed to the combinations of letters which the Latins were fond of, you will have received a great assistance towards correctly forming the several parts for yourself.

Let us now take up the chief parts separately, and the present stems, *am(a), doce, leg*, and *audi*. From these are formed—

1. Present subjunctive active with the pres. ind. and subj. passive.
2. Imperf. ind. act. and pass.
3. Future ind. act. and pass.
4. Participle pres. act.; fut. pass. and the gerund.

Accordingly we have—

Am-	1. Am-*em*.	Am-*or*.	Am-*er*.
	2. Am-*abam*.	Am-*abar*.	
	3. Am-*abo*.	Am-*abor*.	
	4. Am-*ans*.	Am-*andus*.	Am-*andum*.

The future of the third conjugation has the termination *am*, and that of the fourth *ar*, instead of *bo*. The subjunctive passive of the third and fourth conjugations ends in *ar* instead of *er*.

From the stem of the infinitive in ā, ē, ī, and in the third conjugation from the consonantal stem with the connecting vowel, ĕ—that is, from *ama, doce, lege*, and *audi*—are formed—

1. The imperfect subjunctive, active and passive.
2. The imperative, active and passive.
3. The infinitive passive.

Accordingly, we have—

Ama-	1. Ama-*rem*.	Ama-*rer*.
	2. Ama.	Ama-*re*.
	3. Ama-*ri*.	

Again, from the stem of the perfect active—that is, from *amav, docu, leg*, and *audiv*—are formed—

1. The perfect subjunctive active.
2. The pluperfect indicative and subjunctive active.
3. The second future.
4. The infinitive perfect active.

Accordingly, we have—

Amav-	1. Amav-*erim*.	
	2. Amav-*eram*.	Amav-*issem*.
	3. Amav-*ero*.	
	4. Amav-*isse*.	

4. Finally, from the stem of the supine in *um*—that is, from *amat, doct, lect, audit*—are formed—

1. The supine in *u*.
2. The passive past participle.
3. The participle future active.

Accordingly, we have—

Amat-	1. Amat-*u*.	
	2. Amat-*us*.	
	3. Amat-*urus*.	

I have here confined myself to *amo* and its parts for the sake of simplicity. It will be a good exercise for you to draw out the forms of the three other conjugations according to these examples.

The forms of the verb not mentioned above are made by combination with the participles and parts of the verb esse, *to be*. Thus the perfect, pluperfect, and second future passive are formed by joining to the perfect passive participle *sum, sim, eram, essem, ero*, or *fuero;* for example, *amatus sum, amatus essem, amatus ero*, etc. The infinitive future active is formed by adding *esse* to the participle future active, as *amaturum esse*. The infinitive future passive is formed by joining *iri* with the participle perfect passive, as *amatum iri*.

GENERAL VIEW OF THE TENSE-ENDINGS, INDICATIVE AND SUBJUNCTIVE, OF THE FOUR CONJUGATIONS.

	ACTIVE.		PASSIVE.	
Tenses.	*Indicative.*	*Subjunctive.*	*Indicative.*	*Subjunctive.*
Pres.	-o.	1, -em; 2, 3, 4, -am.	-or.	1, -er; 2, 3, 4, -ar.
Imperf.	-bam.	-rem.	-bar.	-rer.
Future.	1, 2, -bo; 3, 4, -am.		1, 2, -bor; 3, 4, -ar.	
Perfect.	-i.	-erim.	-us sum.	-us sim.
Pluperf.	-eram.	-issem.	-us eram.	-us essem.
2nd Fut.	-ero.		-us ero *or* fuero.	

I next lay before you a tabular view of the

PERSON-ENDINGS, INDICATIVE AND SUBJUNCTIVE, OF ALL THE TENSES.

Persons.	ACTIVE.	PASSIVE.
Sing. 1.	-o, *or* -m (-em, -am). Perf. Ind. -i.	-r (*or* -er, -ar).
2.	-s. -sti.	-ris, -re.
3.	-t. -t,	-tur.
Plu. 1.	-mus. -mus,	-mur.
2.	-tis. -stis.	-mini.
3.	-nt. -ērunt *or* -ēre.	-ntur.

If you take from the first person of any tense the terminations *o, i, r*, and where *or* appears the syllable *or*, then you get the tense-stem, which appears in all the other persons of the tense. This you may see exemplified in the ensuing

TENSE-STEMS.

Amo-amao Amor-amaor	ama, *Present.*
Amabam Amabar	amaba, *Imperfect.*
Amabo Amabor	amab, *Future.*
Amavi, amav, *Perfect Indicative.*	
Amaveram, amavera, *Pluperfect Indicative.*	
Amaverim, amaveri, *Perfect Subjunctive.*	
Amavissem, amavisse, *Pluperfect Subjunctive.*	
Amavero, amaver, *Second Future.*	

So it is with the three other conjugations. To these stems are added the consonantal person-endings just given. If the tense-stem ends in a vowel (except *u*), the person-endings are made without any connecting vowel; for example—

ACTIVE.		PASSIVE.	
Stems.	*Person-endings.*	*Stems.*	*Person-endings.*
Ama-		Ama-	-ris, 2nd singular.
Amaba-	-s, 2nd singular.	Amaba-	-tur, 3rd singular.
Amavera-	-t, 3rd singular.		
Ame-	-mus, 1st plural.	Ame-	-mur, 1st plural.
Amare-	-tis, 2nd ,,		
Amaveri-	-nt, 3rd ,,	Amare-	-mini, 2nd ,,
Amavisse-			-ntur, 3rd ,,

In the third person plural indicative active and passive the connecting vowel *u* is found after *i* and *u*, as *audi(u)nt, audi-(u)ntur*, so *acu(u)nt*.

In the future active and passive of the third and fourth conjugations the tense-stem, as in the subjunctive present, ends in *am, ar;* as—

Legam, *Active.*	Audiam, *Active.*
Legar, *Passive.*	Audiar, *Passive.*

But the *a* of the first person is changed into *e* in the rest; as—

		Active.	*Passive.*	*Active.*	*Passive.*
Sing.	1.	Legam.	Legar.	Audiam.	Audiar.
	2.	Leges.	Legeris.	Audies.	Audieris.
	3.	Leges.	Legetur.	Audiet.	Audietur.
Plu.	1.	Legemus.	Legemur.	Audiemus.	Audiemur.
	2.	Legetis.	Legemini.	Audietis.	Audiemini.
	3.	Legent.	Legentur.	Audient.	Audientur.

But if the tense-stem ends in a consonant or in *u*, you must employ a connecting vowel; as shown thus:—

m, s, t	require i, *e.g.*	Amab(i)mus.	Leg(i)mus.	Docu(i)mus.
		Amab(i)s.	Leg(i)s.	Docu(i)sti.
		Amab(i)t.	Leg(i)t.	Docu(i)t.
r	require e.	Amab(e)ris.	Leg(ĕ)ris, *Present,*	
n	,, u.	Amab(u)nt.	Leg(u)nt.	Acu(u)nt.

The course of instruction through which you have now gone will require constant repetition. When you have made yourself master of the forms which ensue, by imprinting them on your memory, you will do well to go over and over again these instructions. With diligence combined with observation, you will then make yourself familiar with the Latin verb, not as a mere matter of rote, but understandingly; knowing well how the parts are formed one from the other, and how they are all connected with the common stem. I advise you, however, to question yourself very narrowly, and again and again, before you attempt to pass to the conjugation-forms which I am about to supply you with, though you will do well to refer to these forms for aid in understanding my remarks, and seeing their application.

GENERAL VIEW OF THE TENSE AND PERSON-ENDINGS OF ALL FOUR CONJUGATIONS OF THE ACTIVE VOICE.

Indicative Mood.

PRESENT TENSE.

	1.	2.	3.	4.
Sing.	Am-o	Doc-eo	Leg-o	Aud-io
	-ās	-ēs	-is	-īs
	-at	-et	-it	-it
Plu.	Am-āmus	Doc-ēmus	Leg-imus	Aud-imus
	-ātis	-ētis	-itis	-itis
	-ant	-ent	-unt	-iunt

IMPERFECT TENSE.

Sing.	Am-ābam	Doc-ēbam	Leg-ēbam	Aud-iēbam
	-abas	-ebas	-ebas	-iebas
	-abat	-ebat	-ebat	-iebat
Plu.	Am-ābāmus	Doc-ebāmus	Leg-ebāmus	Aud-iebāmus
	-abātis	-ebātis	-ebātis	-iebātis
	-abant	-ebant	-ebant	-iebant

FUTURE TENSE.

Sing.	Am-ābo	Doc-ēbo	Leg-ām	Aud-iām
	-abis	-ebis	-es	-ies
	-abit	-ebit	-et	-iet
Plu.	Am-abimus	Doc-ebimus	Leg-emus	Aud-iemus
	-abitis	-ebitis	-etis	-ietis
	-abunt	-ebunt	-ent	-ient

It appears to him that the old habit of self-devotion to high purposes is dying out, and that it is his task to re-awaken it. He will ride in quest of adventures. He will deliver distressed ladies, chastise and humble tyrants, break up wicked enchantments, slay dragons, and griffins, and other terrors of the earth. He will be the champion of Christendom against the Moslem and the infidel. Let it be observed that there is a noble as well as a ludicrous side to this conception of the mad knight—for crazed he assuredly is. The thoughtful reader will even find a touch of pathos in the strange, distraught, fantastic figure—the pathos of an unfulfilled ideal, of illusions shattered. The aims of Quixote are high and magnanimous, but his mind is out of joint with facts.

Sancho Panza is a character admirably contrasted with that of the Don, whom he serves as a squire. His gross, sensual, prosaic nature is the exact opposite of the dreamy, imaginative, self-sacrificing disposition of his master. Faithful he is, with touches of homely affection; yet his great idea is to benefit himself, and to get something substantial for his pains. In the matter of the governorship of Barataria, he is as much befooled as Quixote himself; but the motive is sordid. Usually, however, he sees through the delusions of the knight, and corrects them with shrewdness and native sense. He has at his command an exhaustless stock of proverbs, embodying in the briefest compass the mother-wit of Spanish peasants; and altogether he is one of the most amusing fellows in fiction. The other characters in the book are less strongly marked, but show the hand of the master. The first portion of this wonderful work was published in 1605; the second in 1615. It has been said that the earlier part was written when the author was in prison for debt; but the tradition is very doubtful. The life of Cervantes, however, was chequered; his fame alone stands high above the accidents of the world.

LESSONS IN CHEMISTRY.—V.

OXYGEN.

SYMBOL . . O — ATOMIC WEIGHT . . 16 — DENSITY . . 16.

THIS, the most widely-spread, and the most important of all the elements, was discovered independently by Priestley and the Swedish chemist Scheele, in 1774.

It constitutes $\frac{1}{2}$ of the atmosphere, $\frac{8}{9}$ of the weight of water, and at least $\frac{1}{3}$ of the materials composing the solid crust of the earth. It is a tasteless, colourless, inodorous gas.

TO PREPARE OXYGEN.

It cannot be got from the air very readily; for we are not acquainted with any re-agent which will absorb the nitrogen with which it is associated; yet there are substances which will combine with oxygen at certain temperatures, and again give it off at other temperatures. If, for example, humid air be passed through a porcelain tube containing baryta (BaO), this oxide, when heated to a low red-heat, will become the *peroxide* (BaO_2)—that is, the highest oxide not exhibiting acid qualities; when strongly heated it gives off the oxygen again, and returns to its former state (BaO).



Fig. 14.

Melted silver has also the property of absorbing oxygen from the air, which it gives off as it returns to the solid state. It need not be said that these methods of obtaining oxygen from the atmosphere are neither easy nor inexpensive.

1. The most simple of all methods of obtaining this gas would appear to be by heating the oxides of the *noble metals*. Such metals are "those which can be reduced from their oxides by heat." If we heat to any temperature, or for any length of time, some iron-rust, which is the oxide of that metal, we shall never be able to drive off the oxygen and leave the pure iron behind; but if we heat the oxides of *gold, silver, platinum*, or *mercury*, the heat will be sufficient to overcome the affinity which unites the gas and the metal—the former will escape and the latter remain. We do not advise the student to attempt to collect oxygen by this means, for more heat is required than is given by a spirit-lamp; but the experiment may be successfully

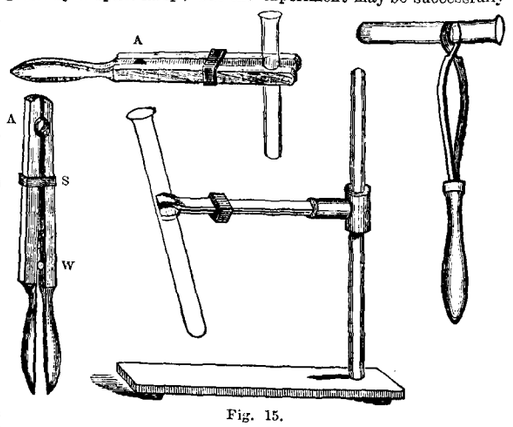


Fig. 15.

shown, as in Fig. 14. With the red oxide of mercury (HgO) in the test-tube put a piece of charcoal; the oxide will give off the oxygen, the charcoal will burn brightly, and globules of mercury will be found at the bottom of the tube. Fig. 15 shows convenient forms of clips for holding test-tubes; A can be made by the student; S is an india-rubber strap; W, a piece of wood which serves the purpose of a hinge.

2. The more general way is by heating in a Florence flask potassium chlorate ($KClO_3$). By adding one-third its weight of the black oxide of manganese (MnO_2), the gas will come off at a lower temperature; the manganese itself undergoes no change, but acts by its presence: this phenomenon is called *catalysis*. The red oxide of iron (Fe_2O_3), the black oxide of copper (CuO), or even sand, has the same effect, though not in so eminent a degree.

The apparatus is arranged as in Fig. 16. The stand is convenient, but superfluous, as the flask may be held by a clipper, or a piece of paper, as the test-tube in Fig. 14. Instead of making

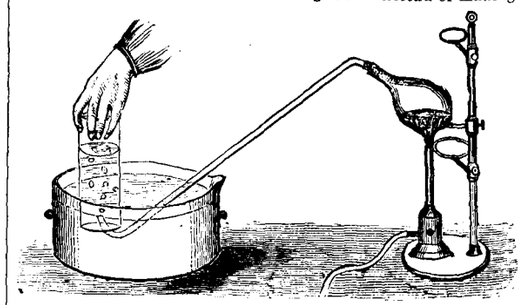


Fig. 16.

bends in the glass tubing, it is as well to have a short piece of small india-rubber tubing to join the tube from the cork and the delivery-tube, thus forming a *flexible* bend. A bowl is filled with water, and the jar into which the gas is to be received is laid down in it; when in this position it must be covered completely by the water, and there must be left in it no air-bubbles. Now raise it up, mouth downwards, but not *out* of the water, so that the jar will be full of water so long as its mouth is below the surface.

Should there not be a bowl at hand deep enough to allow the jar to be completely covered when lying down, a shallow dish may be used. In this case the jar must be filled with water until it runs over the brim; then place over the mouth a piece of glass

cut circular—a flat piece of tin or sheet-brass will do as well; place one hand upon this to prevent it falling off, and with the other hand lift the jar and invert it into the dish. In Fig. 17 it will be seen that the jar stands on two pieces of slate, parted with about half an inch between them, thus allowing room for the delivery tube to pass beneath. When a jar is full of the gas, pass a small plate beneath its mouth, and lift it out of the water; it will stand in the plate as long as required, if the hollow of the plate be left full of water. Another jar should be standing in the dish ready to be filled; and as with one hand the full one is removed, with the other the second one should be placed to receive the gas. The chemical action is expressed and explained in this equation—

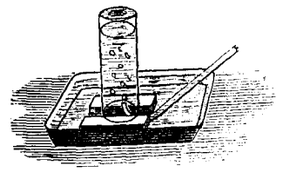


Fig. 17.

$$KClO_3 = KCl + O_3;$$

that is, potassium chlorate, when heated, becomes potassium chloride and oxygen.

Do not place the flask on a cold substance while it is hot, but when cold fill it with water; after a few shakes pour it into a tall jar, and add more water. The potassium chloride is very soluble, and the unaltered MnO_2 goes to the bottom; let it stand all night, then pour off the "supernatant liquid;" fill the jar again with water, and again let the MnO_2 subside; pour off the clear water, which contains the last traces of the KCl, and throw the MnO_2 upon a filter, and afterwards dry it; it is then fit again for use. This will give the student some practice in manipulation, but practically it is not worth the trouble, since the MnO_2 is so cheap.

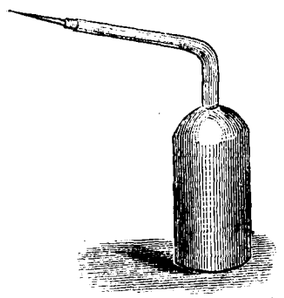


Fig. 18.

3. Oxygen may be got, when large quantities are required, with more economy from the black oxide of manganese itself; but since great heat is required, an iron bottle must be used, as in Fig. 18. In this bottle the delivery tube is passed through a cork in the end of the pipe. The retort is filled with manganese broken into lumps about the size of a pea; then the pipe is screwed in, and, to ensure perfect tightness, the screw is luted with white lead.

The action is—

$$3MnO_2 = Mn_3O_4 + O_2;$$

that is, the peroxide has been by the heat reduced to a lower oxide.

4. A process which answers well, and which is more economical than that in the second, is the following:—Take 3 parts by weight of pulverised potassium bichromate ($K_2O,2CrO_3$—1 atom of potash and 2 of chromic acid), and 4 of sulphuric acid (H_2SO_4); heat it in the Florence flask, and the chromic acid parts with half its oxygen.

$$K_2O,2CrO_3 + 4(H_2SO_4) = \overline{K_2SO_4 + Cr_2,3SO_4} + 4H_2O + 3O.$$

The compound under the line is chrome alum.

Combustion is simply chemical combination, and when this combination is violent, sufficient heat is developed to produce *fire*.

The affinities of oxygen are remarkably strong, and it is capable of entering into combination with every body in nature except *Fluorine*; therefore fire is *generally* oxygen entering into combination with the body burning; though we shall find instances of this phenomenon in which oxygen takes no part.

In the fires of our houses the oxygen of the air is combining with the coal, which is carbon, to form an invisible gas, carbonic acid gas (CO_2), which passes up the chimney. Hence we say that oxygen is the great supporter of combustion. Of course combustion will be more violent in the pure gas than in the air, where it is diluted with nitrogen. This the following experiments will show:—

1. Twist a wire round a piece of charcoal (Fig. 19). Take one of the jars of gas standing on the plate, and replace it in the dish of water; remove the plate, and in its place put the circular piece of glass; lift it from the water and stand it on the table, mouth upwards; hold the charcoal in the flame of the lamp until some parts of it are red; with one hand *slide* the glass off the mouth of the jar sufficiently to admit of the entrance of the charcoal, and the charcoal will burn brilliantly in forming with the oxygen carbonic acid gas (CO_2).

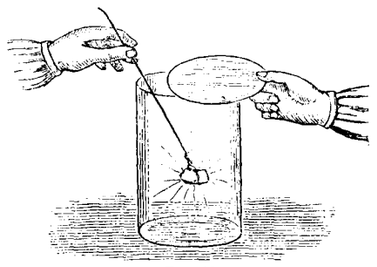


Fig. 19.

2. Place in the "deflagrating spoon"—which is a small metal cup soldered to a piece of wire (Fig. 20)—some sulphur; light it—it burns with a pale blue flame; introduce it into a jar of oxygen—it burns brightly into SO_2 (sulphurous acid), which causes the well-known suffocating smell.

3. Repeat this experiment with phosphorus. The student is advised to use the red amorphous phosphorus, which is not so inflammable as the stick phosphorus. An intensely brilliant light is emitted during the formation of the white fumes, which are phosphoric acid (P_2O_5).



Fig. 20.

4. The following experiment is very illustrative of the fact that burning is chemical combination. Take a piece of fine iron wire—such as that of which "ribbon-wire" is made; coil it into a spiral, round a pencil; stick the end of it into as small a piece of cork as you can; dip this into any inflammable liquid, such as naphtha; pass the other end through a hole in a disc of tin; light the cork, place it in a jar of oxygen, as in Fig. 21, and the wire will *burn* with beautiful scintillations into Fe_3O_4, which is the same oxide of iron as the lodestone.

It is better to fit a piece of cardboard in the bottom of the jar, and leave about an inch of water in it: for the fused oxide is so hot that if it touch the glass the jar will crack.

From the above modes of preparing oxygen we may take examples of one method of finding what weight of the substance is required to give a certain quantity of another.

Take the equation

$$KClO_3 = KCl + O_3;$$

the atomic weights of these elements are

$$39{\cdot}1 + 35{\cdot}5 + 48 = 39{\cdot}1 + 35{\cdot}5 + 48$$
$$122{\cdot}6 = 74{\cdot}6 + 48.$$

That is, from every 122·6 parts by weight of potassium chlorate, 48 parts by weight of oxygen come off; or, from 100, 39·2 come off; that is, 1 kilogramme of the salt gives off ·392 of the gas, or nearly $\frac{2}{5}$ kilogramme.

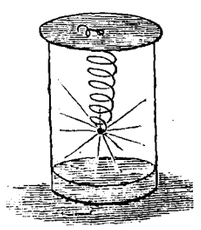


Fig. 21.

Again—

$$3MnO_2 = Mn_3O_4 + 2O.$$
$$3\times55+3\times2\times16 = 3\times55+4\times16+2\times16$$
$$261 = 229 + 32;$$

that is, from 261 parts of manganese by weight we get 32 of oxygen, or about $\frac{1}{8}$ of the weight of the MnO_2. But the commercial black oxide of manganese is seldom very pure, and usually yields about half this weight of gas—a pound giving off about 1,400 cubic inches. The relation between volumes and weights will be given in due time.

Ozone is the allotropic form of oxygen; that is, it seems to be oxygen in "another form," probably condensed, and therefore more active. It is produced by the slow oxidation of phosphorus. If a piece of this substance be placed at the bottom of a jar in

	PERFECT TENSE.		
Sing. Amāv-i	Docū-i	Lēg-i	Audīv-i
-isti	-isti	-isti	-isti
-it	-it	-it	-it
Plu. Amav-imus*	Docu-imus	Leg-imus	Audiv-imus
-istis	-istis	-istis	-istis
-ērunt or -ēre	-erunt or -ere	-erunt or -ere	-erunt or -ere
	PLUPERFECT TENSE.		
Sing. Amav-ĕram	Docu-eram	Leg-eram	Audiv-eram
-ĕras	-eras	-eras	-eras
-erat	-erat	-erat	-erat
Plu. Amav-ĕrāmus	Docu-eramus	Leg-eramus	Audiv-eramus
-ĕrātis	-eratis	-eratis	-eratis
-ĕrant	-erant	-erant	-erant
	SECOND FUTURE TENSE.		
Sing. Amav-ĕro	Docu-ero	Leg-ero	Audiv-ero
-ĕris	-eris	-eris	-eris
-ĕrit	-erit	-erit	-erit
Plu. Amav-ĕrimus	Docu-erimus	Leg-erimus	Audiv-erimus
-ĕritis	-eritis	-eritis	-eritis
-erint	-erint	-erint	-erint

Subjunctive Mood.

	PRESENT TENSE.		
Sing. Am-em	Doc-eam	Leg-am	Aud-iam
-ēs	-eas	-as	-ias
-et	-eat	-at	-iat
Plu. Am-ēmus	Doc-eāmus	Leg-āmus	Aud-iāmus
-ētis	-eatis	-atis	-iatis
-ent	-eant	-ant	-iant
	IMPERFECT TENSE.		
Sing. Am-ārem	Doc-ērem	Leg-ērem	Aud-īrem
-ares	-eres	-eres	-ires
-aret	-eret	-eret	-iret
Plu. Am-arēmus	Doc-erēmus	Leg-erēmus	Aud-irēmus
-arētis	-erētis	-erētis	-irētis
-arent	-erent	-erent	-irent
	PERFECT TENSE.		
Sing. Amav-ĕrim	Docu-erim	Leg-erim	Audiv-erim
-eris	-eris	-eris	-eris
-erit	-erit	-erit	-erit
Plu. Amav-ĕrimus	Docu-erimus	Leg-erimus	Audiv-erimus
-ĕritis	-eritis	-eritis	-eritis
-erint	-erint	-erint	-erint
	PLUPERFECT TENSE.		
Sing. Amav-issem	Docu-issem	Leg-issem	Audiv-issem
-isses	-isses	-isses	-isses
-isset	-isset	-isset	-isset
Plu. Amav-issēmus	Docu-issemus	Leg-issemus	Audiv-issemus
-issētis	-issetis	-issetis	-issetis
-issent	-issent	-issent	-issent

Imperative Mood.

Sing. 2. Am-ā or -āto	Doc-ē or -ēto	Leg-ĕ or -ito	Aud-ī or -ito
3. -āto	-ēto	-ito	-ito
Plu. 2. Am-āte or -ātōte	Doc-ēte or -ētote	Leg-ite or -itōte	Aud-ite or -itōte
3. -anto	-ento	-unto	-iunto

GENERAL VIEW OF THE TENSE AND PERSON-ENDINGS OF THE PASSIVE VOICE.

Indicative Mood.

	PRESENT TENSE.		
Sing. Am-or	Doc-eŏr	Leg-ŏr	Aud-ior
-āris	-ēris	-ĕris	-iris
-ātur	-ētur	-itur	-itur
Plu. Am-āmur	Doc-ēmur	Leg-imur	Aud-imur
-āmini	-ēmini	-imini	-imini
-antur	-entur	-untur	-iuntur
	IMPERFECT TENSE.		
Sing. Am-ābar	Doc-ēbar	Leg-ēbar	Aud-iēbar
-ābāris	-ebāris	-ebāris	-iebāris
-ābātur	-ebātur	-ebātur	-iebātur
Plu. Am-ābāmur	Doc-ebāmur	Leg-ebāmur	Aud-iebāmur
-ābāmini	-ebāmini	-ebāmini	-iebāmini
-abantur	-ebantur	-ebantur	-iebantur

	FUTURE TENSE.		
Sing. Am-ābor	Doc-ēbor	Leg-ar	Aud-iar
-abĕris	-eberis	-ēris	-iēris
-abĭtur	-ebĭtur	-etur	-iētur
Plu. Am-abĭmur	Doc-ebĭmur	Leg-emur	Aud-iemur
-abĭmini	-ebĭmini	-ēmini	-iemini
-abuntur	-ebuntur	-entur	-ientur
	PERFECT TENSE.		
Sing. Amat-us sum	Doct-us sum	Lect-us sum	Audit-us sum
es	es	es	es
est	est	est	est
Plu. Amat-i sumus	Doct-i sumus	Lect-i sumus	Audit-i sumus
estis	estis	estis	estis
sunt	sunt	sunt	sunt
	PLUPERFECT TENSE.		
Sing. Amat-us eram	Doct-us eram	Lect-us eram	Audit-us eram
eras	eras	eras	eras
erat	erat	erat	erat
Plu. Amat-i eramus	Doct-i eramus	Lect-i eramus	Audit-i eramus
eratis	eratis	eratis	eratis
erant	erant	erant	erant
	SECOND FUTURE TENSE.		
Sing. Amat-us ero	Doct-us ero	Lect-us ero	Audit-us ero
eris	eris	eris	eris
erit	erit	erit	erit
Plu. Amat-i erimus	Doct-i erimus	Lect-i erimus	Audit-i erimus
eritis	eritis	eritis	eritis
erunt	erunt	erunt	erunt

Subjunctive Mood.

	PRESENT TENSE.		
Sing. Am-er	Doc-ear	Leg-ar	Aud-iar
-ēris	-eāris	-āris	-iāris
-ētur	-eatur	-ātur	-iatur
Plu. Am-ēmur	Doc-eamur	Leg-āmur	Aud-iamur
-ēmini	-eamini	-āmini	-iamini
-entur	-eantur	-antur	-iantur
	IMPERFECT TENSE.		
Sing. Am-ārer	Doc-ērer	Leg-ĕrer	Aud-irer
-arĕris	-erĕris	-erĕris	-irĕris
-arĕtur	-erĕtur	-erĕtur	-irĕtur
Plu. Am-arēmur	Doc-erēmur	Leg-erēmur	Aud-irēmur
-arēmini	-erēmini	-erēmini	-irēmini
-arentur	-erentur	-erentur	-irentur
	PERFECT TENSE.		
Sing. Amat-us sim	Doct-us sim	Lect-us sim	Audit-us sim
sis	sis	sis	sis
sit	sit	sit	sit
Plu. Amat-i simus	Doct-i simus	Lec-ti simus	Audit-i simus
sitis	sitis	sitis	sitis
sint	sint	sint	sint

Imperative Mood.

Sing. 2. Am-āre or -ātor	Doc-ēre or -ētor	Leg-ĕre or -itor	Aud-ire or -itor
3. -ātor	-ētor	-itor	-itor
Plu. 2. Am-āmini or -āminor	Doc-ēmini or -ēminor	Leg-imini or -iminor	Aud-imini or -iminor
3. -antor	-entor	-untor	-iuntor

* When the tense-endings are the same for the four conjugations, and have the same quantity, the long and short marks determining the quantity and pronunciation are given with the tense-endings of the first conjugation only.

LESSONS IN FRENCH.—XXXVI.

SECTION LXXX.—GOVERNMENT OF PREPOSITIONS, ETC. (§ 135).

1. Some prepositions govern the nouns which follow them without the aid of other prepositions:—**avant**, *before (at an earlier period)*; **devant**, *before (opposite place)* [§ 138 (1)]; **derrière**, *behind*; **chez**, *at the house of*; **concernant**, *touching*; **excepté**, *except*; **outre**, *besides*; **selon**, *according to*; **voici**, *here is*; **voilà**, *there is*, &c. [§ 135 (1)].

2. Others, being rather prepositional phrases, govern their noun by means of the preposition **de**:—**hors de**, *out of*; **loin de**, *far from*; **à fleur de**, *even with*; **à force de**, *by dint of*; **à l'égard de**, *with regard to*; **à l'insu de**, *without the knowledge of, unknown to*; **à raison de**, *at the rate of*; **en deçà de**, *this way of*; **au delà de**, *that way of* [§ 135, 2].

3. Others take **à**:—**quant à**, *as to*; **jusqu'à**, *as far as, &c.* [§ 135, 3].

*

4. Two or more verbs, adjectives, or prepositions, may in French have one object in common, provided they govern it in the same manner or case:—

Nous aimons et nous louons nos enfants.	*We love and praise our children.*
Ce jardin est utile et agréable à notre père.	*That garden is useful and agreeable to our father.*
Au dedans ou au dehors du royaume.	*Within or without the kingdom.*

5. When, however, two or more verbs, adjectives, or prepositions, coming together in the same sentence, do not govern their object in the same manner, they cannot have one object in common. The object must then be repeated, or replaced by a pronoun, or another turn must be given to the sentence. The following sentences could not, therefore, be translated literally into French:—

That man is useful to and loved by his family—I write to and receive letters from my brother—To be exposed to or sheltered from the rain. We must say:—

Cet homme est utile à sa famille, et il en est aimé.	*That man is useful to his family, and he is loved by them.*
J'écris des lettres à mon frère, et j'en reçois de lui.	*I write letters to my brother, and I receive some from him.*
Être exposé à la pluie, ou en être à l'abri.	*To be exposed to the rain, or to be sheltered from it.*

Utile and **aimé, écrire** and **recevoir, exposé** and **à l'abri**, requiring different prepositions, their object is repeated in the second clause in the form of a pronoun, as seen above.

MISCELLANEOUS EXAMPLES.

Nous sommes arrivés avant la bataille.	*We arrived before the battle.*
Vous vous asseyez toujours devant moi.	*You always sit before me.*
Les avez-vous placés sur la table ?	*Have you placed them upon the table?*
Je les ai placés dessous.	*I have placed them under.*
Je les ai mis sous la chaise ou dessus.	*I have put them under the chair or upon it.*
Ils demeurent derrière notre maison.	*They live behind our house.*
J'ai loué une chambre sur le derrière.	*I have rented a back room.*
Nous occupons le devant de la maison.	*We occupy the front of the house.*
Je les ai rencontrés derrière votre jardin.	*I met them behind your garden.*
Vous avez acheté cette terre à l'insu de votre père.	*You have bought that estate without the knowledge of your father.*
J'ai payé ce jardinier à raison de deux francs par jour.	*I paid the gardener at the rate of two francs per day.*

EXERCISE 155.

Assiette, *f. plate.*	Dessous, *under, under it.*	Plat, m. *dish.*
Coût-er, *1. to cost.*		Pomme de terre, *f. potato.*
Dedans, *inside, within.*	Dessus, *above, upon it.*	
Dehors, *outside, without.*	Devant, m. *front.*	S'enrich-ir, *2. to become rich.*
Derrière, m. *back.*	Hectolitre, m. *100 litres.*	
	Hors, *out.*	Sur, *upon, about.*

1. N'avez-vous pas fermé la porte de devant? 2. Nous l'avons fermée, mais nous n'avons pas fermé la porte de derrière. 3. Qui est arrivé avant moi? 4. Le monsieur qui est assis devant la fenêtre. 5. Qui demeure derrière votre maison? 6. Il n'y a point de maison derrière la nôtre. 7. Ne pensez-vous pas qu'à force de travailler, il s'enrichira? 8. Je ne crois pas qu'il s'enrichisse, s'il vend ses marchandises à si bon marché. 9. Apprend-il la musique à l'insu de ses parents? 10. Il l'apprend à leur insu. 11. Vous êtes-vous marié à l'insu de votre sœur? 12. Je me suis marié à son insu. 13. Notre ami n'est pas dans la maison, il est dehors. 14. Il n'est pas hors de la ville, il est dedans. 15. Avez-vous de l'argent sur vous? 16. Je n'ai pas d'argent sur moi. 17. Demeurez-vous sur le derrière ou sur le devant de la maison? 18. Nous demeurons sur le devant. 19. La cuisinière a-t-elle mis les assiettes sur la table ou dessous? 20. Elle a mis les assiettes, les plats, les cuillers et les fourchettes sur la table. 21. Combien ces pommes de terre vous coûtent-elles? 22. Je les ai achetées à raison de cinq francs l'hectolitre. 23. Avez-vous fait réparer le dedans ou le dehors de la maison? 24. J'ai fait réparer l'intérieur et l'extérieur.

EXERCISE 156.

1. Have you bought that house without your father's knowledge? 2. I have bought it without his knowledge. 3. Have you forgotten to shut the front door? 4. I have shut the front door and the back door. 5. I have brought all my goods except two or three. 6. Does your brother occupy the front of your house? 7. He occupies the back. 8. Whom have you met behind that house? 9. I met nobody behind the house. 10. Does that gentleman live behind your house? 11. Nobody lives behind our house. 12. There is no house behind yours. 13. Have you a knife about you? 14. I have no knife about me. 15. Do you carry a knife about you? 16. I never carry a knife about me. 17. Has not your brother money about him? 18. He has no money about him. 19. Will you put these pencils upon the table, or under it? 20. I will put them in the drawer (*tiroir*). 21. How much have you given for that wheat? 22. I bought it at the rate of twenty-five francs a hectolitre. 23. Is that lady's house out of the city? 24. It is not out of the city; it is within. 25. Has not your sister placed the plates upon the table? 26. She has put the plates upon the table, and the spoons under it. 27. Have you had your house repaired?

KEY TO EXERCISES IN LESSONS IN FRENCH.

EXERCISE 44 (Vol. I., page 175).

1. Est-ce que je porte mon grand chapeau noir? 2. Vous portez un beau chapeau vert. 3. Le banquier va-t-il chez le perruquier ce matin? 4. Il y va ce matin. 5. A-t-il l'intention d'aller à la banque ce matin? 6. Il n'a pas l'intention d'y aller, il n'a pas le temps. 7. Envoyez-vous vos lettres à la poste? 8. Je ne les y envoie pas, elles ne sont pas encore écrites. 9. Est-ce que je vous envoie un billet? 10. Vous m'envoyez un billet, mais je n'ai pas envie d'aller au concert. 11. Monsieur votre frère va-t-il à l'école demain? 12. Il y va aujourd'hui et il reste demain à la maison. 13. Est-ce que j'y vais? 14. Vous n'allez nulle part. 15. Où allez-vous? 16. Je vais chez M. votre frère; est-il à la maison? 17. Il n'est pas à la maison, il est absent depuis hier. 18. Monsieur votre frère demeure-t-il dans ce village? 19. Il n'y demeure pas, il demeure chez mon neveu. 20. Avez-vous tort d'aller à l'école. 21. Non, Monsieur, j'ai raison d'aller à l'église et à l'école. 22. Avez-vous envie de venir chez moi? 23. J'aime à aller chez vous et chez M. votre frère. 24. Quand venez-vous chez nous? 25. Demain, si j'ai le temps. 26. Le banquier aime-t-il à venir ici? 27. Il aime à venir chez vous. 28. Le perruquier vient-il? 29. Il ne vient pas encore. 30. Qu'envoyez-vous à l'écolier? 31. Je lui envoie des livres, du papier et des habits. 32. Où est-il? 33. Il est à l'école. 34. L'école est-elle dans le village? 35. Elle y est.

EXERCISE 45 (Vol. I., page 182).

1. What are you going to do? 2. I am going to learn my lessons. 3. Are you not going to write to your acquaintances? 4. I am going to write to nobody. 5. Who has just spoken to you? 6. The Irishman has just spoken to us. 7. When is the Scotch lady going to teach you music? 8. She is going to teach me next year. 9. Is she going to commence on Tuesday or on Wednesday? 10. She is going to commence neither on Tuesday nor on Wednesday; she intends to commence on Thursday, if she has time. 11. Does your companion go to church every Sunday? 12. She goes every Sunday and every Wednesday. 13. To whom do you go? 14. I do not go to any one. 15. Do you not intend to come to me to-morrow? 16. I intend to go to your dyer. 17. Do you send for the physician? 18. When I am ill I send for him. 19. Does he remain with you the whole day? 20. He remains with me only a few minutes. 21. Do you go to school in the morning? 22. I go in the morning and in the afternoon. 23. Do you go every day? 24. I go every day, except Monday and Sunday. 25. Saturday I remain at home, and Sunday I go to church.

EXERCISE 46 (Vol. I., page 182).

1. L'Irlandais que va-t-il faire? 2. Il va enseigner la musique. 3. Vient-il de commencer son travail? 4. Il vient de le commencer. 5. Qui vient de vous écrire? 6. Le teinturier vient de m'écrire. 7. Votre petit garçon va-t-il à l'église tous les jours? 8. Non, Monsieur. il va à l'église le dimanche, et il va à l'école tous les jours. 9. Allez-vous chercher le médecin? 10. Je l'envoie chercher parce que ma sœur est malade. 11. Allez-vous trouver mon médecin ou le vôtre? 12. Je vais trouver le mien, le vôtre n'est pas à la maison. 13. Où est-il? 14. Il est chez Monsieur votre père ou chez M. votre frère. 15. Avez-vous l'intention d'envoyer chercher le médecin? 16. J'ai l'intention de l'envoyer chercher. 17. Ai-je raison d'envoyer chercher l'Écossais? 18. Vous avez tort de l'envoyer chercher. 19. Allez-vous trouver M. votre père l'après-midi? 20. Je vais le trouver le matin. 21. Votre frère va-t-il chez votre oncle tous les lundis. 22. Il y va tous les dimanches. 23. Allez-vous apprendre la musique? 24. Ma

*

which is a little water, the oxygen of the air in the jar partly becomes ozone.

This body is also formed when electric sparks pass between two points. The sulphurous smell in the neighbourhood of a strong electric machine, or of a flash of lightning, is the peculiar smell of ozone. Ozone is a very powerful oxidising agent. It can even separate the iodine from the compound potassium iodide—forming potash and liberating the iodine. This fact has been used as a test for ozone. Iodine makes a blue compound with starch, so that if a piece of paper be dipped in a mixture of starch paste and potassium iodide, if any ozone be present the paper becomes blue. This test alone, however, is not decisive, for nitric acid, which is sometimes found in the air, will do the same thing. It has been said that the health of a district depends upon the quantity of ozone in the atmosphere—but this fact is not satisfactorily established. Since it is a great oxidiser it is a powerful bleacher, for by oxidising the colouring matter it destroys it. It is hoped to apply it to the bleaching of sugar, which has hitherto been effected by charred blood. A powerful magneto-electric machine has lately been sent out to the West Indies to produce ozone, wherewith to bleach sugar. Ozone was discovered by Professor Schönbein, of Basle, to whose genius we also owe gun-cotton.

LESSONS IN ENGLISH.—XVIII.

SUFFIXES (*continued*).

WORDS have been curiously formed by abbreviation; the word *omnibus* affords an instance: derived from the Latin "omnibus," the dative case of the plural number of the Latin adjective omnis, *all*, and so signifying *for all*—that is, every man's carriage—the word has been shortened into *bus*, and so it is now generally termed in common parlance. *Mob* appears to have been formed in the same way. What is now called the mob used to be called the rabble. But as the rabble are mobile vulgus, *a fickle crew*, so were they called mobile vulgus, and by contraction, *mob*. Still *mob* and *rabble* are not identical. *Rabble* is the general term, the class, and *mob* is a collection of persons belonging to that class. *Palsy* is a contracted form of the now more fashionable *paralysis*. Between *alms* and *eleemosynary* there would seem to be no connection; both, however, come from the same Greek term, and the former is only a shortened form of the root from which the latter is derived. Well do we remember *kickshaws*, a term of our youthful days, used to signify something contemptible. Little did we then suspect that it was only the English way of pronouncing the French *quelque chose*; i.e., *something*, contemptuously travestied to mimic and ridicule French prisoners in England.

Kin, from the Anglo-Saxon cyn, *kin, offspring, son*, signifies the *son of*; as in Wil*kin* (Wilkins); seen in another form—namely, Wil*son*. Kin, from its signification, has also a diminutive force; as in lamb*kin* (a lamb's child), or *little lamb*. What is little is dear, hence diminutives are terms of endearment. But what is little may be despised. Sometimes, therefore, diminutives imply contempt; as in man*ikin*.

"This is a dear *manikin* to you, Sir Toby."—*Shakespeare.*

Le (see *el*), among the suffixes already given.

Les, from the Anglo-Saxon læs (German, los, *destitute of*), has not a comparative but a negative force; as, an læs twentig, *one less twenty*, or, as we should say, twenty *minus one*. Hence it appears that the idea of *less* is privation or negation. Consequently *less*, the comparative of little, is altogether a different word. And thus we are also led to understand the true force of *less* when employed as a suffix; as, motion*less*, or *without motion*; death*less*, *free from death*. Two negatives thus make a positive: death, the privation of life, and *less*, the negation of death, combine to declare the idea of ever-enduring existence, the most positive, the most real, the most permanent of all conceivable things, the very essence of Deity; life itself.

Let, according to Latham, "seems to be double, and to consist of the Gothic diminutive *l*, and the French diminutive *t*." It is found in stream*let*, tart*let*, ham*let* (Anglo-Saxon, ham, *home*; as in hamstede, *homestead*).

Ling, of Saxon origin, denotes *descent*, and hence offspring; also that which is little, and that which is beloved; *e.g.*, dar*ling* (*dear child*), gos*ling* (*little goose*), nest*ling*. Hire*ling* is properly a child of hire, a person whose services are obtained by hire.

"The idea of contempt" ascribed to it by Latham does not necessarily, for it did not originally, belong to the word.

"I will be a swift witness against those that defraud the *hireling* in his wages."—Malachi iii. 5 (compare Job vii. 1, 2; xiv. 6).

Strip*ling* may be connected with the Latin stirpes, stirps, *offshoot*; so that stripling is *a little branch, a youngster.*

"He is but an *yongling*,
A tall, worthy *stripling*."—*Skelton.*

The last line shows that nothing contemptuous belonged to the word in the olden time. Consult the ensuing:—

"Now a *stripling* cherub he appears,
Not of the prime, yet such as in his face
Youth smiled celestial."—*Milton, "Paradise Lost."*

Ly, a termination of Saxon origin, having the force of our *like*, and so forming an adjective or an adverb; as child*like*, *childly*, in German kind*lich*; man*like*, *manly*, man*lich*. When *ly* is added to a noun, it forms an adjective, as love, love*ly*; when it is added to an adjective, it forms an adverb, as wise, wise*ly*. Such a formation as "holi*ly*" (1 Thess. ii. 10) is to be avoided for the sake of euphony.

Ment, from the Latin mentum (as in orna*mentum, an ornament*; adju*mentum, an assistance*), through the French *ment* (as in the French mandement, or Latin mandatum, *a command*), is a suffix which denotes the result of the act indicated in the verb from which the noun is derived: thus, velo means *I veil* or *cover*; and velamen or velamentum is *a veil* or *covering*; so aliment (from the Latin alo, *I nourish*) is *a means of nourishing, nourishment*. Hence, *devotement* properly indicates not the act, but the result; not the doing, but the state of feeling which ensues from the doing, the devotion. In practice, however, the usage seems reversed.

"Her (Iphigenia) *devotement* was the demand of Apollo."—*Hurd.*

"Oh, how loud
It calls *devotion* genuine growth of night!
Devotion! daughter of Astronomy!
An undevout astronomer is mad."
Young, "The Complaint."

Mony, as in ali*mony*, sanctim*ony*, a Latin termination (as in parsimonia, *sparingness*; and matrimonium, *the condition of a mother*, matri*mony*, not in great use) which denotes a consequence, as in testi*mony*, the result of the act of testis, *a witness*.

Ness, as found in littleness, nothingness, is a Saxon suffix, signifying the abstract quality. If we compare littleness with words, as tendresse, tenderness, we are led to conjecture that the *n* is only a connecting consonant, and that *ess* or *esse* in both French and English are the same. Consider also the Anglo-Saxon sarenes, *soreness*, that is *sorrow*; geliceness, *likeness*; heardnes, *hardness*; micelness, *muchness*, that is *greatness*; and you find the same form in the root of our language. If, however, the *n* is not an essential part of the word, then the *ness* or rather *ess* has no connection with *ness* in such words as Dungeness, Sheerness, and other proper names, names of places. In these the ness comes from the German nase, and the Anglo-Saxon nese, and signifies *nose*; that is, *a headland* or *promontory*.

"About six of the clock at night the wind vered to the south-west; and we weighed anker, and bare cleere of the *ness*, and then set our course north-east and by north until midnight, being then clear of the Yarmouth sands."—*Hakluyt.*

Ock, as in hillock, a diminutive; so that hillock is *a little hill*. So bull*ock* originally meant *a young bull* or *calf*; compare Isaiah xi. 6 with Jer. xxxi. 18, where *calf* and *bullock* are the renderings of the same Hebrew term. In the suffix *ock* the *c* sound is the essential element, the *k* being merely an affair of spelling, and the *o* (probably) a connecting vowel. Thus regarded, we find the origin of our diminutive *c* in the Latin diminutive *c*, as seen in recula (res, *a thing*), specula (spes, *hope*), nubecula (nubes, *a cloud*), vulpecula (vulpes, *a fox*), etc. Another form of bullock is bul*chin*, obviously bull's-*kin*, that is, *bull's child*, as in the Hebrew, "steer, the son of a bull," for a bullock or calf (Exod. xxix. 1; Lev. iv. 3).

"And better yet than this, a *bulchin*, two years old.
A curled pate calf it is, and oft could have been sold."
Drayton, "Polyolbion."

Oon, or *on*, an augmentive; as in balloon, or *great ball*. The termination *oon*, or *on*, comes to us from the Italian, but is originally from the Latin; as seen in naso, *a man with a large nose*; sapito, *a man with a large head*. Like ballo*on* is saloon, in the French salon, a place of reception (French, saluer, *to salute, greet*; Latin, salvus, *safe*).

Or, a termination borrowed from the Latin *or*; as seen in auctor, in English, *author*. The correspondent Saxon ending is *er*, which has already been spoken of. *Or* denotes the agent. *Or*, in former times, was written *our*. Author properly signifies originator; the first who does anything.

"The *author* of that which causeth anything to be, is *author* of that thing also which thereby is caused."—*Hooker.*

"From his loins
New *authors* of dissension spring."—*Philips.*

Ory, a Latin suffix, seen in promonto*rium*, a promonto*ry* (pro, *forward*, and mons, *a mountain*); and auditory, from auditorium (audire, *to hear*).

Ose, from the Latin *osus*, as morosus (*ill-tempered*), morose. The *osus* in Latin is sometimes *uosus*; as, monstr*uosus*, monstrous. We have the ending in imperi*ous*, imperi*osus*; religi*ous*, religi*osus*; invidi*ous*, invidi*osus*; suspici*ous*, suspici*osus*. The *osus* is Englishised also by our termination *y*; as, vent*osus*, windy; lapid*osus*, stony.

Ote, of Latin origin, found in verbs formed from the Latin participle in *otus*; as, to promo*te*, from promo*tus* (*moved forward*); to devo*te* (Latin, devotus, *consecrated*—votum, *a vow*—something sacred or set apart for the gods).

"Such on Isis' temple you may find,
On *votive* tablets to the life pourtrayed."—*Dryden.*

Ric, as in bishop*ric*, in Anglo-Saxon denotes *power, dominion, territory*; as, to-become thin *rice*, i.e., *thy kingdom come*. Bishop*ric*, then, is the *jurisdiction of a bishop*.

Ship, as in hard*ship*, has no connection with ship, *a vessel*, but comes from the Anglo-Saxon *scipe*, denoting *a state, an office, a dignity*; as, freond-scipe, *friendship, the state of being a friend*; in German, freund*shaft*; the *shaft* represents the older form of the word, which was *sceajt*. Here is seen the origin of wor*ship*; that is, weorth-*ship*, literally, *worthiness*.

"My train are men of choice and rarest parts,
That all particulars of duty know;
And in the most exact regard support
The *worship* of their names."—*Shakespeare, "King Lear."*

Hence "worship" is a title of honour.

"Dinner is on table; my father desires your *worship*'s company."
Shakespeare, "Merry Wives of Windsor."

Derivatively, "worship" signifies *adoration*.

"Under the name of church, I understand a body or collection of human persons, professing faith in Christ, gathered together in several places of the world for the *worship* of the same God, and united into the same corporation."—*Pearson.*

Sum, from the Anglo-Saxon *sum*, an adjective of the same meaning as our adjective *some*, is employed in both Anglo-Saxon and in English as a suffix; as, winsum, *winsome*, that is, *winning*. We find the termination in our present lonesome, handsome, tiresome, etc. The spelling of *some* in the Anglo-Saxon—namely, sum—shows the origin of our pronunciation of the word. Sound etymology would throw great light on pronunciation.

Ster, str, a suffix of Anglo-Saxon origin, denoting the *feminine gender*, as spinster, a female spinner. We may exhibit the real meaning of nouns ending in *ster*, found in the Anglo-Saxon, thus—

MASCULINE.	FEMININE.
Sangere, *a singer*;	Sangestre, *a songster*.
Bacere, *a baker*;	Bacestre (Baxter), *a female baker*.
Fidelere, *a fiddler*;	Fidelstre, *a female fiddler*.
Vebber, *a weaver*;	Vebbestre (Webster), *a female weaver*.
Rædere, *a reader*;	Rædestre, *a female reader*.
Seamere, *a seamer (sewer)*;	Seamstre, *a seamstress*.

In our present termination of these feminines—namely, *stress*, as seen in song*stress*—the *ess* or *ss* seems derived by attraction from the classical termination *ess* from *ix*. Originally, song*stress* was song*stre*, but by the prevalence of such forms as shepherd*ess*, songestre was gradually drawn into song*stress*; and thus came to have a double suffix, both feminine; that is, *str* of the Saxon, and *ess* of the Latin. Not inappropriately may the English language be called a medley.

"Through the soft silence of the listening night,
The sober-suited *songstress* trills her lay."—*Thomson.*

LESSONS IN DRAWING.—XVIII.

TREATMENT OF REFLECTIONS IN WATER.

IT is not the rule that because we can see the *objects* we must consequently see the *reflections*; and, on the other hand, it is very common to *see the reflection* of an object, or of light, when the eye does *not see the object itself*, something *intervening between the eye and the object, but not between the eye and the reflection*. The leading principle, upon which is founded all other data connected with our subject, is that the *reflections of all objects and their parts are always perpendicularly beneath the objects and the parts themselves respectively*. Fig. 112, a simple subject of posts, etc., will explain this. The top of the post *a* is perpendicularly over the reflection *b*, and so with the rest; but it must be borne in mind that the *proportion to be drawn* of the reflection of an object is regulated by or according to the *position* of the object, and also with regard to the point from which we view it. If we view the posts (Fig. 112) as they are drawn, perpendicularly and parallel with the picture plane—that is, the upper parts neither advancing towards the eye nor receding from it, but exactly over the position of the lower parts—then the reflections will be the same in length, with the slight exception resulting from the perspective of distance. We will endeavour to make this clear by the help of a few problems. In order fully to understand these problems, we recommend the pupil to work them out, and as the principles of construction are the same throughout, we advise him to repeat them with a few of the conditions varied—for instance, greater or less inclinations of the slopes, and greater or less elevations of those objects which are most in advance. Our first subject will be to draw the reflection of a wall (Fig. 113). Let A be the end section of a wall situated on the margin of a river. It is required to show its reflection, B, below the water's edge, C D; S^1 being the *position of the eye* on the horizontal line. Draw a line, $S^1 S^2$, perpendicularly as much below the base C D as it is above it, making S^2 E equal to S^1 E. From the upper part of the wall F draw a line to S^2, and where this line cuts the base C D in H will give the point through which a line is to be drawn from S^1 to meet a perpendicular line from F, which will give the depth of the reflection required. Now in order to apply the above rule in showing the face of the wall and its reflection, we must proceed as follows:—In Fig. 113 draw at pleasure the line *a c d b*, and repeat this line, with its respective divisions, in Fig. 114; through the several points *a c d b* draw horizontal lines at right angles with *a b*; make A B equal to the length of the given wall, and draw the rectangle A G H B; A B F E will represent the wall, E F H G the reflection. The pupil must be reminded that the line *a c d b* in Fig. 113 is the picture plane or medium through which we see the wall, and upon which it is supposed to be traced (see Vol. I., page 72, Def. 3, "Station Point"). We have previously observed that in consequence of the position of the eye being above the reflection, and on a level with some portion of the object, it will repeatedly occur that the *reflections* of *many parts* of the solid cannot be seen, although *the parts themselves are in sight*, and form, perhaps, the most important portions of the object. Let us illustrate this by Fig. 115, which is a mass of masonry, having two slopes, A and B. Having drawn the profile or section G, proceed as in the last case, being careful to draw lines, or visual rays, from every angle to S^1, and also to S^2. Where these rays cut each other respectively in *w, t, g*, lines from S^1 will determine the lengths of the reflection. We must apply this to a front view, as in the former case. Draw the perpendicular line E E^1 (the picture plane), and mark the points where the visual rays cut the picture plane in *a, b, c*, etc. Repeat this line in Fig. 116, and copy from Fig. 115 the distances of the divisions upon it, and proceed with the horizontal lines from these distances as in the last problem. Upon the line marked *g*, which represents the water's edge, make F G equal to the given length of the wall; *d* being the horizontal line, and the observer being supposed to stand opposite the centre of the wall, the point of sight will be at P S. Now the lines F P S and G P S are horizontal lines in perspective—that is, the perspective of the base *g* H (Fig. 115): therefore, where the visual rays from the points in the base cut the picture plane in *f* (three lines close together) will give the points, *k, l, m*, whence the perpendiculars of the wall must be drawn, the lower slope *r n* must be drawn between the lines *e, g* (see Fig. 115), and the perpendicular

nièce va l'apprendre, si elle a le temps. 25. Est-ce que je vais lire ou écrire? 26. Vous allez lire demain. 27. Va-t-il chez vous tous les jours? 28. Il vient vous trouver tous les mercredis. 29. À quelle heure? 30. À neuf heures moins un quart. 31. Vient-il de bonne heure ou tard? 32. Il vient à neuf heures et quart. 33. Qu'envoyez-vous chercher? 34. Nous envoyons chercher du vin, du pain, du beurre, et du fromage. 35. Qu'allez-vous chercher? 36. Nous allons chercher des légumes, de la viande et du sucre. 37. Nous avons besoin de sucre tous les matins.

READING AND ELOCUTION.—XXII.

EXERCISES ON EXPRESSIVE TONE (*continued*).

VI. ETERNITY OF GOD.

[*Marked for Rhetorical Pauses, Emphasis, and Inflections.*]

There is *one* Being || to whom we can look | with a *perfect conviction* | of *finding that security* which | *nothing* about us | can *give*, and which nothing about us | can *take away*. To *this* Being | we can lift up our *sóuls*, and on *Him* | we may *rèst* them, exclaiming | in the language | of the monarch of Israel, "Before the *mountains* | were brought forth, or ever Thou hadst formed the *earth* | and the *wórld*, even from *everlásting* to *everlásting* || Thou art GÓD." "Of *old* || hast Thou laid the foundations of the *earth*, and the *hèavens* | are the work | of Thy hands. *They* | shall *pérish*, but *Thóu* | shalt *endùre*; yea, *all* of them | shall *wax old* | like a *gàrment*, as a vèsture | shalt Thou chànge them, and they shall be *chànged*; but *Thou* | art the *sàme*, and *Thy* years | shall have *no énd*." *

Here | then | is a *support*, which will *néver fáil*; here | is a *foundation* | which can *néver* be *móved*—the *everlasting Creator* | of *countless wórlds*, "the *high* | and *lofty* One | that *inhabiteth eternity*." What a SUBLIME CONCÈPTION! HE INHABITS ETÈRNITY, *occupies* this *inconceivable duration*, PERVADES | and FILLS | THRÒUGHOUT || THIS | BÓUNDLESS DWÈLLING. *Ages* on *ages* || before even the dust of which we are formed || was *crèated*, HE had *existed* | in *infinite májesty*, and *ages* on *ages* | will *roll away* || after we have all *returned* to the dust | whence we were *táken*, and | still | HE will *exist* || in *infinite májesty*, *living* | in the *eternity* of his *ówn náture*, *reigning* | in the *plenitude* of his *ówn omnipotence*, for *ever* sending forth the *word*, which *forms*, *supports*, and *góverns* | *all* things, *commanding new-created light* || to shine on *new-created wórlds*, and raising up *new-created generations* | to *inhábit* them.

The contemplation | of this *glorious attribute* of GÓD, is fitted to excite | in our minds | the most *animating* | and *consóling* | *reflections*. Standing, as we are, amid the *ruins* of *time*, and the *wrecks* of *mortálity*, where *every* thing about us | is *créated* | and *dependent*, *proceeding* from *nóthing*, and *hastening* to *destrúction*, we *rejoice* | that *something* is presented to our view | which has *stood* from *everlásting*, and will *remain* for *ever*. When we have looked on the *pleasures* of *life*, and they have *vanished awáy*; when we have looked on the *works* of *nature*, and perceived that they were *chánging*; on the *monuments of árt*, and seen that they *would* not *stánd*; on our *fr'ends*, and they have *fled* | while we were *gázing*; on *ourselves*, and felt that *wè* were as fleeting as *they*; when we have looked on *every* object | to which we could turn our *anxious éyes*, and they have all told us that they could give us *no hope*, nor *support*, because they were so *feeble themsélves*; we can look to the THRONE of GÓD: *change* | and *decay* | have *never reached* THAT; the *revolution* of *áges* || has never *móved* it; the waves of an *eternity* | have been rushing *pást* it, but it has remained *unsháken*; the waves of *anóther* eternity | are rushing *tóward* it, but it is FIXED, and can NÉVER be DISTÙRBED.—*Greenwood.*

VII. THE UPRIGHT LAWYER.

[*Marked for Rhetorical Pauses, Emphasis, and Inflections.*]

In the walks of *private life*, the character of an *úpright láwyer* || shines | with *mild* | but *gr'nd* | *lustre*. He concerns himself | with the beginnings of *contróversies*, not to *inflàme* | but to *extínguish them*. He is not content | with the doubtful morality | of suffering clients, whose passions are *róused*, to *rush blindly* into *legal cónflict*. His conscience | can find *nó bálm* | in the reflection, that he has but obeyed the orders of an *ángry mán*. He feels that his *first* duties | are to the *community* in which he *lives*, and whose *peace* | he is *bound* to *presérve*.

He is no *stránger* | to the mischiefs which follow in the train of *litigátion*; the *deadly feuds* | and *animósities* | descending from the original combatants | to *successive generátions*; the *périuries* | and *fráuds* | so often committed to *secure success*; and the impoverishment | so commonly resulting | even to the *winning party*; and in view of *these cónsequences*, he advises to *amicable negotiation* and *adjústment*. He is a *péacemaker*—a *compóser* of dissensions—a *blessing* to his *neighbourhood*; his path | is *lúminous* || as the path of the JÚST.

I look | with *pity* | on the man, who regards himself | a *mere machine* of the *láw*;—whose conceptions of moral and social duty || are all absorbed in the sense of *supposed obligation* to his *client*, and this | of so low a nature || as to render him a *very* TOOL | and SLÀVE to serve the *worst passions* of men;—who yields himself | a *passive instrument* | of *legal inflictions*, to be moved at the pleasure of *every hírer*;—and who || beholding the *ruin* and *havoc* | made by a *láwsuit*, which | "*two scruples of honesty*" | in *his counsel* | might have *prevénted*, can *calmly pocket* his *fee* | with the reflection that he has done his *duty* to his *client*, alike regardless of *duty* to his *néighbour* | and his *Gód*.

That such men *dó* exist, to *disgrace* our *profession*, is *lamentably trúe*; mén—

> "that can speak
> To *évery* cause, and things mere *còntraries*,
> Till they are *hóarse* again, yet *áll* | be LÀW."

We would *redeem* its character || by marking a *higher standard* of *mórals*. While our aid should never be withheld | from the *injured* | or the *accúsed*, let it be remémbered, that all our duties | are not concéntrated in conducting an appeal to the *láw*;—that we are not only *láwyers*, but CITIZENS | and MÈN;—that our clients | are not always the best *judges* of their *ówn interests*:—and that | having confided these interests to *óur* hands, it is for us to advise to *thát* course which will best conduce to their *permanent bénefit*, not merely as *solitary individuals*, but as men || connected with *society* | by *enduring ties*.—*Greenleaf.*

VIII. HUMAN CULTURE.

[*To be marked by the reader, for Rhetorical Pauses, Emphasis, and Inflections.*]

When we see a flower—its calyx filled with petals of exquisite form, of the most delicate texture, and diverse colours, so rich and nicely blended that no art can equal them, and withal perpetually diffusing a delicious perfume, we cannot readily believe that all this variety of charms was evolved from a little seed, not bigger, it may be, than the head of a pin.

When we behold a sturdy oak that has for a hundred years defied the blasts of winter, has stretched wide around its sheltering limbs, and has seemed to grow only the more hardy the more it has been pelted by the storms,—we find it difficult to persuade ourselves that the essence, the elements of all this body and strength, were once enclosed in an acorn. Yet such are the facts of the vegetable world. Nor are they half so curious nor wonderful as the changes, which are wrought by time and education, in the human mind and heart.

Here, for example, is a man now master of twenty languages, who can converse in their own tongues with the people of as many different nations, whose only utterance thirty years ago was very much like, and not any more articulate than, the bleating of a lamb. Or it may be that he, who could then send forth only a wailing cry, is now overwhelming the crowded forum, or swaying the councils of the nation, by his eloquence, fraught with surpassing wisdom.

Here is another, who can conceive the structure, and direct the building of the mighty ship, that shall bear an embattled host around the world, carrying a nation's thunder; or the man, who can devise the plan of a magnificent temple, and guide the construction of it, until it shall present to the eye of the beholder a perfect whole, glowing with the unspeakable beauty of symmetrical form.

And here is a third, who has comprehended the structure of the solar system. He has ascertained the relative sizes of the planets, and learned at what precise moments they shall severally complete their circuits. He has even weighed the sun, and measured the distances of the fixed stars; and has foretold the very hour "when the dread comet," after an absence of centuries, "shall to the forehead of our evening sky return."

These men are the same beings who, thirty years ago, were puling infants, scarcely equal in their intelligence to kittens of a week old.

There, too, is a man who is swaying the destiny of nations. His empire embraces half the earth; and throughout his wide domains his will is law. At his command, hundreds of thousands rush to arms, the pliant subjects of his insatiable ambition, ready to pour out their blood like water in his cause. He arranges them, as he pleases, to execute his plans. He directs their movements, as if they were pawns upon a chessboard. He plunges them into deadly conflict, and wades to conquest over their dead and mangled bodies. That man, the despotic power of whose mind now overawes the world, was once a feeble babe, who had neither the disposition nor the strength to harm a fly.

On the other hand, there is one who now evinces unconquerable energy, and the spirit of willing self-sacrifice in works of benevolence. No toil seems to overbear his strength. No discouragement impairs his resolution. No dangers disarm his fortitude. He will penetrate into the most loathsome haunts of poverty or vice, that he may relieve the wretched, or reclaim the abandoned. He will traverse continents, and expose himself hourly to the capricious cruelty of barbarous men, that he may bear to them the glad tidings of salvation; or he will calmly face the scorn and rage of the civilised world, in opposition to the wrong; or march firmly to the stake, in maintenance of the true and the right. This man, a few years ago, might have been seen crying for a sugar-plum, or quarrelling with his little sister for a two-penny toy.

And who are they that are infesting society with their daring crimes, scattering about them "fire-brands, arrows, and death," boldly setting at defiance the laws of man and of God? They are the same

* When the falling inflection recurs, in succession, as above, it falls lower at each repetition.

beings that, a few years ago, were innocent little children, who, could they have conceived of such deeds of darkness, as they now perpetrate without compunction, would have shrunk from them instinctively with horror.

These, surely, are prodigious changes, greater far than any exhibited in the vegetable world. And are they not changes of infinitely greater moment? The growth of a mighty tree, from a small seed, may be matter for wonder, for admiration; but the development of a being, capable of such tremendous agencies for good or for evil, should be with us all a matter of the deepest concern. Strange, passing strange, that it is not so!—*May.*

The next piece is designed as an exercise in "smooth" and "pure quality" of voice. The *suavity* of tone, which belongs to *gentle* and *tender emotion*, should prevail in the reading of this beautiful composition. A full, clear, but softened note should be heard throughout.

IX. MEMORY.

[*Pa.t.*] 'Tis sweet to remember! I would not forego
The charm which the past o'er the present can throw
For all the gay visions that fancy may weave
In her web of illusion, that shines to deceive.
We know not the future—the past we have *felt*—
Its cherished enjoyments the bosom can melt;
Its raptures anew o'er our pulses may roll,
When thoughts of the morrow fall cold on the soul.

'Tis sweet to remember! When storms are abroad,
We see in the rainbow, the promise of God:
The day may be darkened,—but far in the west,
In vermilion and gold, sinks the sun to his rest;
With smiles like the morning he passes away;
Thus the beams of delight on the spirit can play,
When in calm reminiscence we gather the flowers,
Which love scattered round us in happier hours.

'Tis sweet to remember! When friends are unkind,
When their coldness and carelessness shadow the mind.
Then, to draw back the veil which envelops a land,
Where delectable prospects in beauty expand;
To smell the green fields, the fresh waters to hear,
Whose once fairy music enchanted the ear;
To drink in the smiles that delighted us then,—
To list the fond voices of childhood again,
Oh! this the sad heart, like a reed that is bruised,
Binds up, when the banquet of hope is refused.

'Tis sweet to remember! And naught can destroy
The balm-breathing comfort, the glory, the joy,
Which spring from that fountain, to gladden our way,
When the changeful and faithless desert or betray.
I would not forget!—though my thoughts should be dark;
O'er the ocean of life, I look back from my bark,
And see the fair Eden, where once I was blest,
A type and a promise of heavenly rest.—*Clark.*

COMPARATIVE ANATOMY.—VIII.

ANNELIDA: RINGED WORMS.

WE have now arrived at a class in the animal kingdom in which the radial symmetry is almost entirely abandoned, and the two-sided arrangement is perfect. In accordance with this advance we find many of these animals gifted with considerable powers of locomotion, and it is in this class that we first find animals which have adopted a quasi-aërial mode of life. Nature, we are told by the ancients, and told truly, does nothing suddenly, and hence, though the arrangement best adapted to rapid locomotion is found in this class, and some of these animals reside in that thin medium through which the body can be impelled with the greatest velocity, yet the means of locomotion in this class are but feeble. The instruments of locomotion, the limbs, are but rudimentary: and though the earth-worm be capable of breathing in air, it respires on the aquatic type, and, indeed, requires that its skin be kept moist to respire at all. Hence, the earth-worm always inhabits *moist* earth, and makes its peregrinations above the soil after dark, when the sun's rays, which would rapidly dry it up, are directed elsewhere.

This class also introduces us to the articulate type of animals under its simplest form. In the worms the beginnings of all the more complicated organs which we find in the lobster and the bee are present, but present in a very incomplete condition. In accordance with what we have said about the characteristics of an animal of a low grade of structure, we find the *vegetative repetition of parts* here manifested in a high degree. The same parts are repeated over and over again, sometimes to the number of many hundreds. In fact, the bodies of these animals may be said to consist of a long series of exactly similar rings or segments placed one behind the other, and containing all the parts essential to life in each segment. By this statement it is not meant that the animal is an aggregate of individuals, or that it is capable of independent existence if severed from the rest, but merely that the individual is maintained by the interdependence of similar parts. In some species this statement is almost literally correct. Thus the earth-worm has a mouth developed in the under side of the first segment, and an opening in the tail segment for the completion of the alimentary canal; but all the intermediate segments form a series differing from one another only in size. Each segment has its own ring-like outer wall, its own nervous centre, its compartment of the stomach, its transverse circulatory organs, and its so-called peculiar segmental organs. In some of the water-worms the presence of feelers, proboscises, and jaws in the fore part—or of localised gills, etc., in the after parts—of the body, somewhat interfere with this repetition; but something corresponding to these organs generally exists in a rudimentary condition in the other segments, and in all the species the parts are indefinite in number, and many of the segments in each species precisely alike.

We have said that each segment has its own nervous centre, a centre consisting of two nerve knots, situated on the under side or floor of the segment, and sending lateral nervous-threads to its own special ring. It is, however, essential to individual life that the whole of the nervous system should be united, and therefore, to effect this, two cords run from the two nerve-centres of each segment to each of the adjoining segments before and behind it. This arrangement gives rise to a double beaded or knotted cord of nervous matter stretching along the floor of the body-cavity from end to end. Since the mouth always opens on the under side of the body, and the organs of sense, when present, are necessarily placed in the neighbourhood of this and in the front of the animal, it follows that the nervous centre, which supplies these organs with nerves (the necessary carriers of sensation), must be situated above the throat, and must also be joined to the next centre lying under the throat by two cords, one of which runs on each side of the gullet; otherwise symmetry would not be maintained. The form of the nervous system arising from these arrangements is the most distinguishing character of the articulata, and it is retained by all the members of this sub-kingdom, however much they have become modified from the elongated worm-like type. This character has given rise to the term *homogangliata*, which means that the animals so named have a system of repeated, similar, nervous knots. This division includes all the articulate animals, and excludes all other animals; for though the spinal cord of vertebrates may be looked upon by some as the aggregation of a lineal series of nervous centres, yet this tract is not crossed by the alimentary canal in their case, and is probably not homologous with this system at all.

In this symmetry in the arrangement of the nervous system, and in the segmental condition of their bodies, the worms are like the higher classes of the articulata, which are represented by the centipede insects and crustaceans and spiders. They differ from these in having no definitely jointed limbs, in having a system of blood-vessels completely shut off from the body-cavity whose whole circuit is perfect, and in having ciliated membranes at some period of their lives in some part of their bodies. Besides these distinctive characters there is another very generally possessed by worms, and that is that the exterior of their bodies, instead of being stiff and hard, is soft and flexible. The body-wall is composed, not of a horny substance called chitine, as is the case in insects; but of membraneous material, in the internal layers of which muscular fibres are embedded. Since there are no jointed levers for limbs, it follows that the whole movement of the body must depend on the flexibility, contractility, and elasticity of the integument, and hence the soft character of the outer integument is a matter of necessity.

The species which stands as the representative of the whole of this class, both on account of its occurrence everywhere, and of the multitude of individuals which it composes, is the common earth-worm (*Lumbricus terricola*). Nevertheless, this is rather

ko; the same with the upper slope. The reason why neither of these slopes are seen in the reflection is because the point P coincides with *g* (Fig. 115) on the picture plane: therefore the same line, F G, represents both extremities of the slope. If the slope B had had a greater elevation—that is, had it been at a greater angle—then the upper extremity would have admitted a line to s^2, and consequently would have cut the picture plane EE^1 at a higher point than *g*; and that point of intersection would have been shown *below g* in the reflection. And also for reasons given above, we see *parts reflected* which are not visible in the objects themselves. Figs. 117 and 118 will satisfy the mind upon this point.

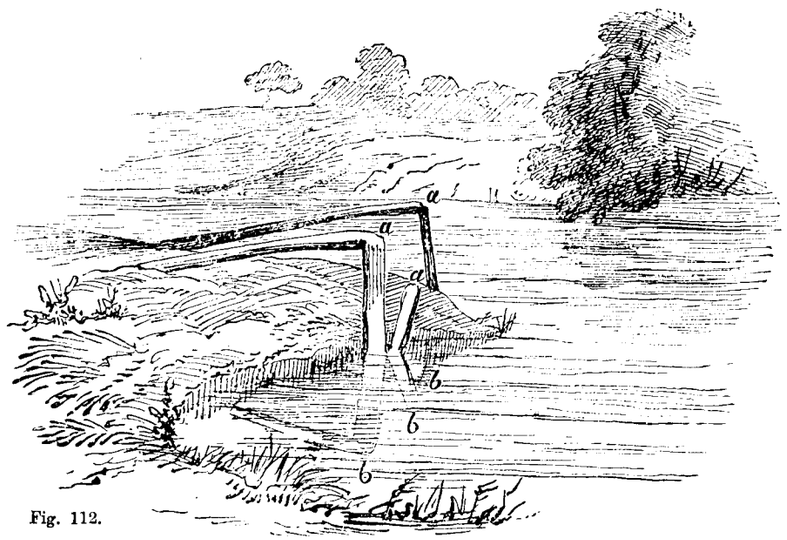


Fig. 112.

The subject is a cottage on a bank with a large notice-board in front of it. The profile view (Fig. 117) will explain the distance of the board from the cottage, and this will account for the great difference between the details of the projection A and the reflection B in Fig. 118. If the pupil fail not to work out this problem also (of which, being constructed by the same rules as the former, we give no detailed explanation, but prefer leaving it as it is, for an exercise), he will more readily understand it, and the method of construction also; remembering that the visual rays drawn from every important point of *the whole* passing through P P (the picture plane) determine the points to be transferred to the corresponding plane on the left in Fig. 118. We remark that the notice board covers part of the roof in the projection A, whilst it is clear of the roof in the reflection B. Also compare the chimneys in both cases with respect to their apparent position with the board. In the reflection B the sills of the windows are on a line with the base of the post, and the thresholds of the doors cannot be seen because they are hidden by the bank. There are other differences. which the pupil will be able to discover for himself. The same may be satisfactorily proved with regard to clouds. It is common, also, in their cases to see brilliant reflections of light clouds on the water, when to the eye there is nothing to account for them. These reflections are invariably caused by light clouds which are hidden from view behind other clouds, the reflections affording us the only evidence of their existence. Why is this? And where is the root of the mistake that is so frequently made, that, without exception, whatever we paint above the water must be necessarily repeated by its reflection? It is simply this, that many treat the whole view, sky and all included, as *one single plane*, never thinking there are parts more remote than others, and consequently many are reflected which are shut out from the eye by intervening objects.

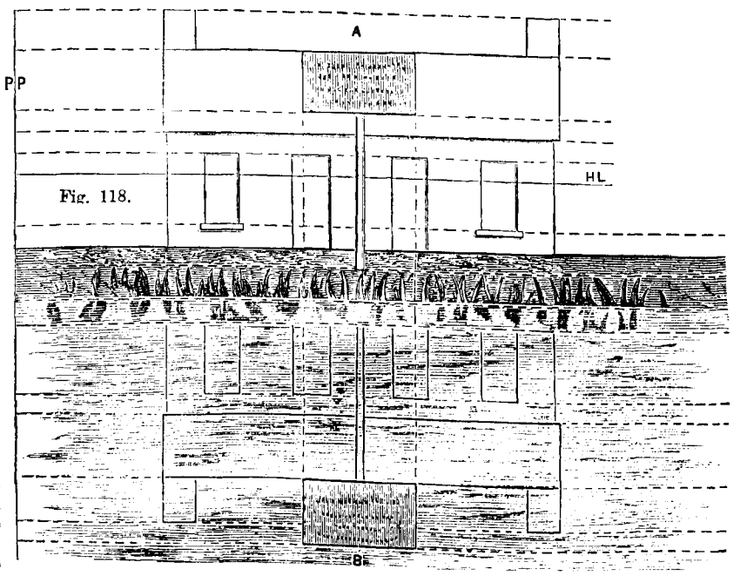


Fig. 118.

Water not only receives reflections, but, *conditionally*, is capable of receiving shadows. If the water is perfectly clear, no shadows occur, and the reflections are more or less vivid in proportion as the water is more or less impregnated with colouring matter, say clay, or as rivers generally appear after heavy rains. Then the strength of the reflections and shadows alternate in proportion to the clearness or opacity of the water. When it is very thick and muddy, the shadows of objects are cast as forcibly upon the surface as they are on a road; and as it becomes clearer, the reflections become more brilliant and the shadows weaker: the *earthy particles* mingled with the water receive the shadow, *not the water* itself. In perfectly clear water the light passes through the water itself, as through a piece of glass, lighting up the bed of the river, so that we are able to distinguish readily the stones, weeds, fish, and whatever else may be at the bottom; then the shadow which falls upon the water sinks as it were, and is seen at the bottom only.

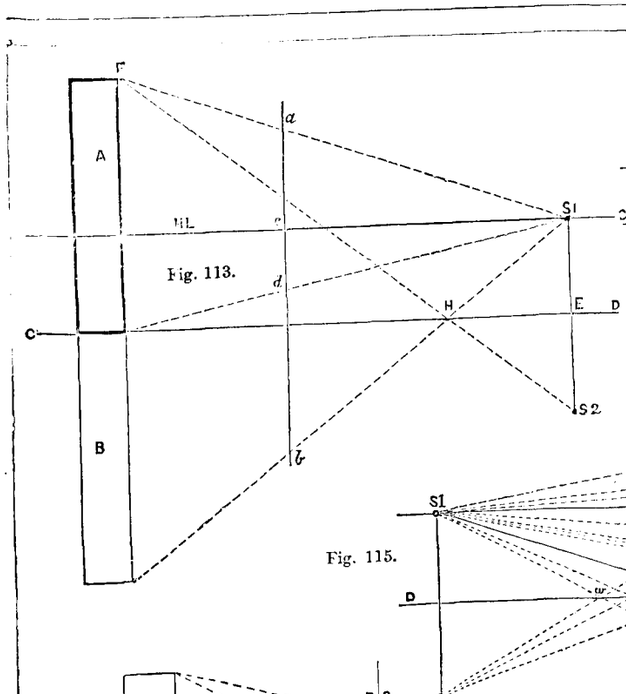


Fig. 113.

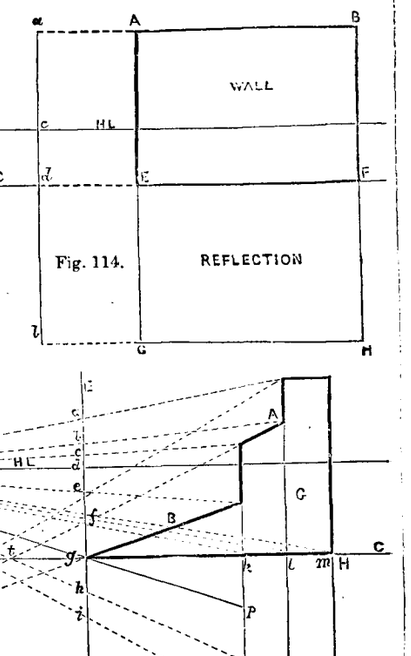


Fig. 114. REFLECTION

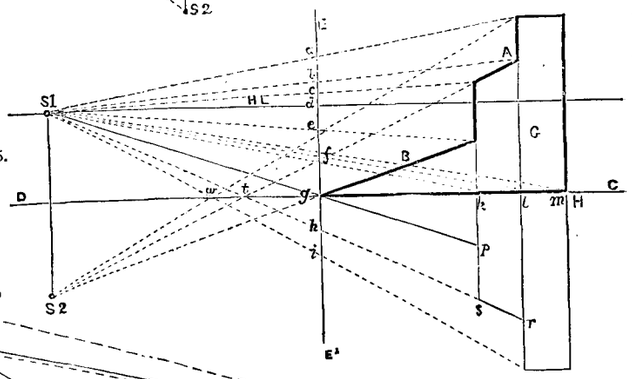


Fig. 115.

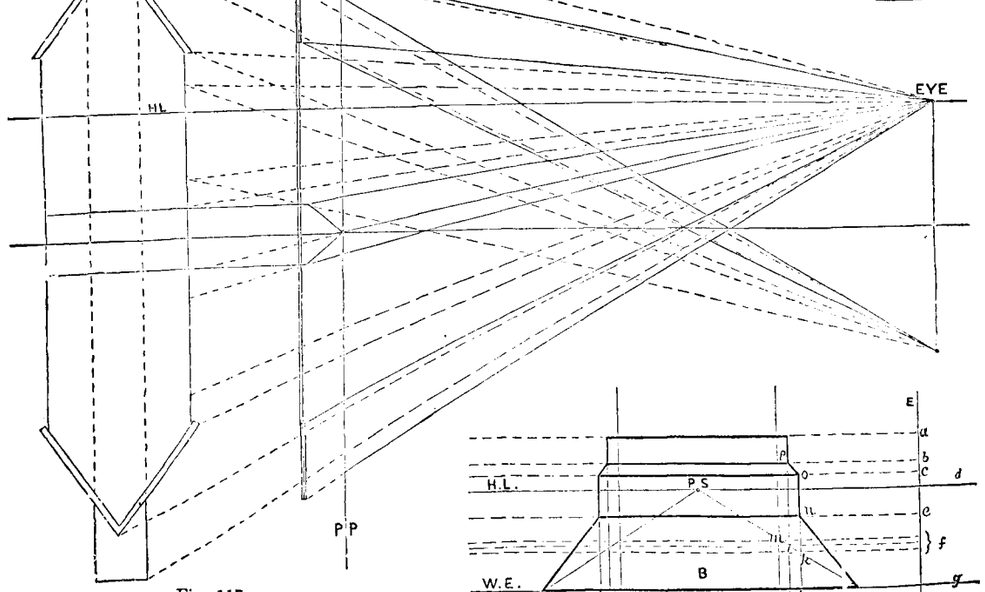


Fig. 117.

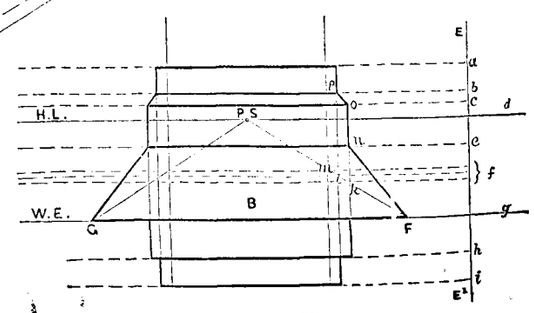


Fig. 116.

an aberrant species of the class than its proper type. Its residence in moist earth has imposed upon it a different means of locomotion, and also of respiration, to the more typical examples of the annelids. The proper type of the class is rather found among those sea-worms which fishermen find in the sand at low-tide and use as baits for fish, and to which the names of lob-worm and lug-worm are applied somewhat indiscriminately. One of these is the Nereis, represented in the engraving. This worm consists of a great many segments; unlike the earth-worm the head is very distinct, and is furnished both with antennæ or feelers, and eyes, though the latter are of very simple structure. The orifice of the mouth opens on the under side of the body. The worm appears in its ordinary condition to be a very innocent, inoffensive, and defenceless animal, like the ordinary earth-worm; but this appearance is deceptive, and only arises from the fact that the powerful jaws are concealed. If the animal be handled while alive, it will suddenly evert and protrude a formidable proboscis armed with a large pair of horny jaws, and with these it will attack the fingers of its captor. The proboscis while at rest is retracted in the same manner as the finger of a glove might be withdrawn by pulling the end in from the inside. These retractible trunks are very general throughout the families of the sea-worms, and though in the Nereis the proboscis is only armed with one pair of jaws, in some it has seven, eight, or nine jaws. Thus, singular as it may appear, we find that the bilateral symmetry, which is so strict in other parts of the body, is here interfered with, for in some species three jaws are found on one side, and four on the other; and in other species there are four jaws on the right-hand side and five jaws on the left. Besides these jaws which play laterally, other instruments are sometimes attached to the trunk. One species has a circlet of cartilaginous beads round its proboscis, and another has a number of horny plates so arranged as to form a file. In others the trunk is quite unarmed, and must act as a flexible lip to suck in substances.

With regard to the remainder of the segments behind the head and proboscis, they are almost exactly alike, the external appendages being locomotive organs, and more or less developed gills.

In the case of the Nereis, the gills are not well developed, consisting of slightly protruded thin membranes where the breathing function is localised; but in nearly allied forms, these gills are developed into branched bundles of vessels, or into plates or leaves, in the substance of which the blood enters, and becomes exposed to the influence of the surrounding water through their very thin walls. There is thus considerable difference in the nature of their organs, which will be best understood after we have described the general circulation in these animals. It is sufficient here to say that the gills or tufts of respiratory vessels are, when present, always protruded from the back or upper side of the animal, and are sometimes not developed in every segment, but confined to certain regions of the elongated body. So in the common lob-worm (*Arenicola*) they are limited to the sixteen middle segments of the body. The locomotive organs which are most effective are bundles of hairs or bristles which stand at the ends of protrusions from the body wall, and which can be more or less retracted into the flexible papillæ which bear them. These bundles of bristles are always paired, and sometimes there are two pairs on each annulus. They are brush-like oars, which the animal plies with such regularity one after the other in succession, that the general effect produced to the eye is as of a series of waves following one another from head to tail. Hence the simile often applied to these animals of a galley with its bank of oars, or of an elongated cutter with a multitude instead of eight oars, is hardly a good one, since the oars of these all play in unison, while the brushes of the sea-worm play successively. Nevertheless, the remarkable order which the simile suggests is well maintained. These organs are, of course, very different from the jointed limbs of the arthropoda, and cannot be applied to points of resistance with the same definiteness and accuracy. Yet they are not ill suited to the wants of the animals, for these are always found among the sand and mud of the bottom of the sea, and their false limbs are equally effective against water, mud, and sand. Besides the bunches of bristles, there are fleshy appendages called cirri, which seem to have also a locomotive function. The relation of these to one another is well seen in the ventral feelers shown in the section of a segment of the body of the Eunice.

The food canal of these animals runs in a straight or slightly flexuous course from head to tail. There is sometimes a muscular gizzard, and generally the tube is more or less sacculated—that is, it consists of alternate enlargements and constrictions, the enlargements usually corresponding to one or more of the outer rings of the body. From the outer wall to the constrictions run partitions which divide the body cavity into a number of chambers. These partitions are not complete, but are perforated so as to allow of the passage of the fluid of the cavity (called the chylaqueous fluid), which flows rapidly from one chamber into another with the movements of the creature. In some the body cavity, or space between the food canal and outer skin, is large; but in some it is but small, and in earthworms it is almost obliterated. In the leech it is absolutely lost, so that the same network of vessels which runs round the stomach, and sucks and absorbs the alimentary liquids into the blood, also supplies the integument with blood, and there exposes it to the influences of the air.

From the foregoing sentences the intelligent reader will have gathered that in the annelids there are two distinct vital fluids which are shut off from one another:—

1. The fluid which occupies all the space between the food-tube and body-wall, which is of watery consistence and pale colour, though containing albumen and little roundish bags called corpuscles.

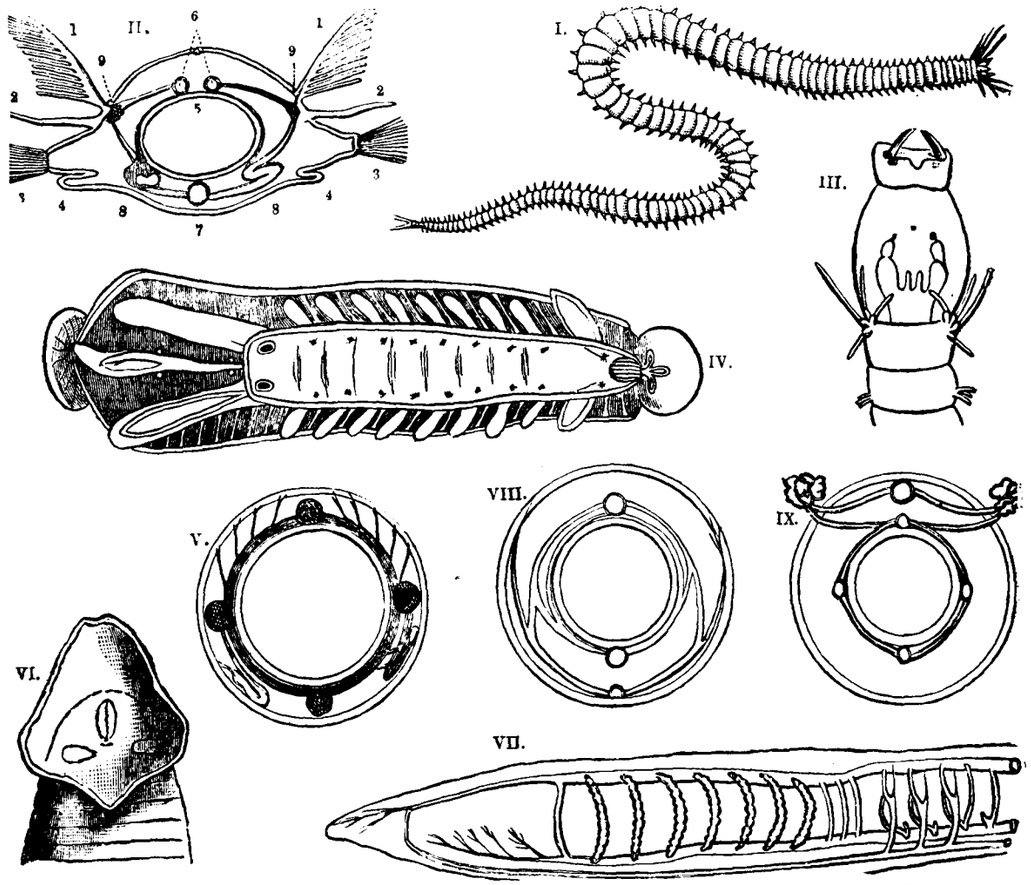
2. The fluid contained in the blood-vessels, which has usually no corpuscles, and is of a dark red or green colour.

Though at first one might have supposed the last-named was the blood proper corresponding to the blood of the higher animals, on account of its being contained in definite veins and arteries, yet the real representative of the blood is the first-named fluid, and the vascular system corresponds to the ambulacral, or water-vascular system, which we have described as found in the annuloida. This system is very probably represented in insects by the tracheal system; a system which we must describe hereafter, and which is applied to an utterly different purpose. Whatever be the homology, or structural affinity, of this vascular system in worms, it attains in them a high degree of perfection and complication.

In the Eunice, which may be taken as a type of the circulation in those worms whose integument is distinct or not adherent to the food canal, the arrangement of the vascular system and the course of its contents are as follow:—Two main vessels run along the upper side of the intestine, and receive the blood and the fluids added from the aliment from the network of vessels which invests that tube. At the point where the dilated throat joins the intestinal tube a large vessel runs round the alimentary tube, while the two vessels before named are united into one large contractile vessel, and thus continued forward towards the head. The large single vessel does not adhere to the throat or pharynx, but acts as a heart to propel the blood received, not only from the intestine, but also from a vessel which runs along the integument of the back. The blood thus derived from the system, both alimentary and intestinal, is forced by branches to the head and also round into a vessel which runs along the floor of the body. This ventral vessel, as it is called, gives off at each segment a lateral branch on each side, which is bent into a muscular loop, which acts as a special heart to drive the blood to the network of vessels lying under each tuft-like gill. After being aërated in the gills the blood is returned to the main dorsal vessel by ducts, which are sustained by the partitions which join the body wall to the intestinal wall. In the case of the lob-worm (*Arenicola*) the gills are supplied from vessels which branch off from the main trunk running along the top of the intestine, and they return the blood to the great dorsal vessel, which is situated in the middle line of the integument. The gills of this creature are beautiful objects under the microscope, although they appear to be but confused tufts of vessels to the naked eye. Although these tufts of vessels are so very delicate that the blood shines through them, and as indeed it is necessary they should be for the function of respiration to be accomplished, yet they have voluntary muscular fibres running round them. This is manifest, not only from the revelation of the microscope; but also from the fact that the animal can empty and retract any or all of its gills at pleasure. In this case the gills are little else than tufts of vessels derived exclusively from the closed vascular circuit; but in those cases before alluded to, where the gills are more like solid plates, not only is the fluid of the vessels conveyed into them; but they are channelled into spaces into which the chylaqueous fluid of the abdominal cavity can find its way, and thus becomes exposed to the influence of the oxygen of the water.

When the gills are almost wholly composed of protrusions of the vascular system through the body wall, since the blood in them is kept in constant and rapid circulation, it is necessary that the outer sea-water should be as rapidly changed; and hence we find such gills are clothed with those minute, constantly-moving hairs which we call cilia. On the other hand, when the gills are in the shape of massive lobes so channelled out as to admit of the chylaqueous fluid to remain in them, and to be only changed slowly by the motion of the body, the necessity of change of the external water is not so pressing, and therefore these lobes are naked and not ciliated.

The representative of one of the families of sea-worms is the common sea-mouse (*Aphrodite*). It is much broader and shorter than most worms, being of an oval form. That which is most attractive about this otherwise inert and uninteresting animal is the splendid play of colours which glances from the thickly-set bristles which clothe its sides. The bristles are from their shape not only locomotive organs, but means of defence; for many of them are found, under the microscope, to be small harpoons, furnished with many barbs. These, like the oar-bristles of other families, are capable of being withdrawn into pits made by the inversion of the papillæ on which they are set. Lest the harpoons should wound the skin when withdrawn, each is furnished with a sheath consisting of two pieces, which are made into a split tube holding the retracted weapon. The common sea-mouse has two stalked eyes and three tentacles on its head. One great peculiarity of its structure is that its back is covered in with a coating of felt composed of tangled and matted hairs. This felt covering is not continuous, but consists of pairs of plates attached to certain segments of the body, the hind edges of the front plates overlapping the front edges of those which come behind. These plates are moved up and down by muscles, which are capable of erecting and



I. Nereis (a sea-worm). II. Transverse section of the Eunice. III. Proboscis of a nearly allied species. IV. Leech, showing the body-wall and alimentary canal laid open along the back. V. Diagram showing the circulation in the Leech. VI. Oral sucker of a Leech. VII. Longitudinal section of an Earth-worm, showing the circulation. VIII. Diagram showing the circulation in a transverse section of a Worm at the tail end of the animal. IX. Diagram showing the transverse circulation in a Lob-worm (Arenicola).

Refs. to Nos. in Fig. II.—1, comb-like gill; 2, dorsal feelers; 3, bundles of bristles; 4, ventral feelers; 5, cavity of alimentary canal; 6, dorso-intestinal vessels; 7, ventral vessel; 8, vascular loop acting as a heart to force the blood to the gills; 9, plexus of vessels beneath the gills.

LESSONS IN FRENCH.—XXXI.

SECTION LXVIII.—DIMENSION, WEIGHT, ETC.

1. The verb **avoir** is used in expressing the size of an object. The preposition **de** precedes the noun of dimension. When there is no verb in the sentence the preposition must be placed before the number, and again before the noun of dimension:—

Cette muraille a dix pieds de hauteur.	*That wall is ten feet high.*
Ce puits a cent pieds de profondeur.	*That well is one hundred feet deep.*
Une table de quatre pieds de longueur.	*A table four feet long.*

The verb **être** is also used, in which case the preposition **de** precedes the number:—

Cette table est longue de quatre pieds.	*This table is four feet long.*

2. In sentences where sizes are compared, and the verb **être** is used, the preposition **de** is placed before the number expressing the *excess*:—

Vous êtes plus grand que moi de deux pouces.	*You are taller than I by two inches.*

3. When the price of an article is mentioned, the definite article is used before the noun expressing the measure, weight, &c. When the remuneration, or rent, &c., for a definite space of time is mentioned the preposition **par** (*per*) is used:—

Le beurre se vend un franc la livre.	*Butter is sold [at] a franc per pound.*
Il gagne six francs **par** jour.	*He earns six francs per day.*

4. The same preposition is used when we speak of the number of times any occurrence takes place in a given space of time:—

Je vais à la poste deux fois **par** jour.	*I go to the post-office twice a day.*

MISCELLANEOUS EXAMPLES.

La canelle se vend deux francs la livre.	*Cinnamon is sold [at] two francs a pound.*
Cette soie vaut six francs le mètre.	*That silk is worth six francs a metre.*
Ce clocher a cinq cents pieds de hauteur.	*That steeple is five hundred feet high.*
Cet étang a huit pieds de profondeur.	*That pond is eight feet deep.*
Une chambre de quinze pieds de longeur, sur dix-huit de largeur, et huit de hauteur.	*A room fifteen feet long by eighteen feet broad and eight feet high.*
De quelle taille est votre frère?	*How tall is your brother?*
Sa taille est de cinq pieds huit pouces.	*His height is five feet eight inches.*
Notre ami est-il grand ou petit?	*Is our friend tall or short.*
Il est de taille moyenne.	*His height is middling.*
Votre maison est plus haute que la mienne de cinq pieds.	*Your house is higher than mine by five feet.*
Je vais à l'école deux fois par jour.	*I go to school twice a day.*
Il nous paie huit francs par semaine.	*He pays us eight francs a week.*

EXERCISE 131.

Bon marché, *cheap.*	**Grandeur**, f. *size.*	**Mètre**, m. *metre* (39$\frac{37}{100}$ *English inches*), *yard.*
Cassonade, f. *brown sugar.*	**Hauteur**, f. *height.*	**Pouce**, m. *inch.*
Écossais, e, *Scotch.*	**Largeur**, f. *breadth.*	**Profondeur**, f. *depth.*
Épaisseur, f. *thickness.*	**Longueur**, f. *length.*	**Semaine**, f. *week.*
Étoffe, f. *stuff.*	**Loyer**, m. *rent.*	**Taille**, f. *height, size.*

1. Votre maison est-elle grande? 2. Elle a cinquante pieds de long et vingt-cinq de large. 3. Combien de longueur votre jardin a-t-il? 4. Il a vingt-cinq mètres de longueur et douze de largeur. 5. De quelle grandeur est ce livre? 6. Il a dix-huit pouces de longueur, treize de largeur et trois d'épaisseur. 7. Votre maison est-elle plus longue que celle-ci? 8. Elle est plus longue de deux pieds. 9. Quelle profondeur a ce puits? 10. De quelle hauteur est ce clocher? 11. Il a trois cent cinquante-trois pieds de hauteur. 12. De quelle taille est cet officier? 13. Il est de haute taille. 14. De combien cet Écossais est-il plus grand que son frère? 15. Il est plus grand de toute la tête. 16. N'êtes-vous pas de beaucoup plus grand que moi? 17. Je suis plus grand que vous de trois pouces. 18. Combien cette étoffe se vend-elle le mètre? 19. Elle se vend trois francs le mètre. 20. La cassonade ne se vend-elle pas cher? 21. Elle se vend à bon marché. 22. Combien de lettres écrivez-vous par semaine? 23. Je n'en écris que six par semaine. 24. Combien payez-vous par semaine pour votre loyer? 25. Je ne paie que dix francs par semaine.

EXERCISE 132.

1. How large is your father's garden? 2. It is twenty-five yards long and ten broad. 3. Is your cousin's house large? 4. It is fifty-six feet long and forty broad. 5. Is your house larger than mine? 6. It is larger than yours by ten feet. 7. Do you know how deep that well is? 8. It is twenty-five feet deep and six feet broad. 9. How much is that cloth sold a metre? 10. It is sold [at] sixteen francs a metre. 11. How much do you receive a week for your work? 12. I receive fifty francs a week for my work. 13. How much does your friend pay a month for his board (*pension*, f.)? 14. He pays seventy francs a month. 15. Are you taller than your cousin? 16. I am taller than he by the whole head. 17. Is not your nephew taller than your son? 18. He is taller than my son by three inches. 19. How large is this room? 20. It is sixty feet long by forty. 21. What size is your brother? 22. He is tall, he is taller than I. 23. How many books do you read a week? 24. I read ten volumes a week. 25. How much is butter sold per pound? 26. Butter is sold [at] two francs per pound. 27. Do you know how much your son earns a day? 28. He earns as much as yours, he earns ten francs a day. 29. How much is that silk worth a metre? 30. It is worth six francs a metre. 31. Our friend's stature is middling. 32. Do you go to church twice a day? 33. I go to church once a day. 34. Does your son go to the post-office every day? 35. He goes thither six times a day.

SECTION LXIX.

1. **Mettre** (4. ir.) forms, in French, many idiomatic expressions. **Mettre à même de**, *to enable*; **mettre pied à terre**, *to alight, to land*; **mettre le pied**, *to set one's foot*; **mettre à la porte**, *to turn out of doors*; **mettre au fait de**, *to acquaint with*; **mettre à l'abri**, *to shelter*; **mettre à l'ombre**, *to put in the shade*; **mettre un habit à l'endroit, à l'envers**, *to put on a coat right side out, wrong side out*, &c.:—

Nous l'avons mis à même de connaître la vérité.	*We enabled him to know the truth.*
Il a mis cet insolent à la porte.	*He turned that insolent person out of doors.*

2. **Mettre** conjugated reflectively, *i.e.*, **se mettre**, means *to place one's self, to dress one's self*; **se mettre à table**, *to sit down to table*; **se mettre en colère**, *to become angry, to put one's self into a passion*:—

Il se met à l'ombre, au soleil.	*He places himself in the shade, in the sun.*

3. **Se mettre**, followed by an infinitive, means *to commence, to begin*:—

Ils se mirent à pleurer.	*They commenced weeping.*

À l'anglaise, à la française, are used elliptically for **à la mode anglaise, à la mode française**, *after the English fashion, after the French fashion.*

MISCELLANEOUS EXAMPLES.

Ce cavalier a mis pied à terre.	*That horseman has alighted from his horse.*
Vous n'osez mettre le pied chez lui.	*You dare not set your foot inside his house.*
Mettez ces enfants à l'abri de la pluie.	*Shelter those children from the rain.*
Vous avez mis votre manteau à l'envers.	*You have put your cloak inside out.*
Ce monsieur se met toujours à l'anglaise.	*That gentleman always dresses after the English fashion.*
Hier nous nous mimes à table à dix heures.	*Yesterday we sat down to table at ten o'clock.*

Bourquoi vous mettez-vous à l'ombre?	*Why do you go into the shade?*
Ces enfants se mirent à rire.	*Those children commenced laughing.*
Pourquoi ne vous mettez-vous pas à l'ouvrage?	*Why do you not set yourself to work.*
Je vais me mettre en pension.	*I will commence boarding.*
Nous allons nous mettre en voyage.	*We are going to commence our journey.*

EXERCISE 133.

À l'italienne, *after the Italian fashion.*	**Défend-re**, 4. *to forbid.*	**Étudi-er**, 1. *to study.*
À merveille, *exceedingly well.*	**Effets**, m.p. *things.*	**Mise**, f. **mettre**, *dressed.*
Couvert, *See* Sect. 32, 1.	**Entr-er**, 1. *to come in.*	**Pluie**, f. *rain.*
	Étourdi, e, *giddy person.*	**Ri-re**, 4. ir. *to laugh.*
		Tablier, *apron.*

1. Avez-vous défendu à cet homme de mettre le pied chez vous? 2. Je le lui ai défendu. 3. Avez-vous mis ces effets à l'abri de la pluie? 4. Je les ai mis à l'abri de la pluie et du vent. 5. Avez-vous mis votre frère au fait de cette affaire? 6. Je ne l'en ai pas mis au fait. 7. Ne l'avez-vous pas mis à même d'étudier? 8. Je l'ai mis à même de s'instruire, s'il le désire. 9. Voulez-vous mettre cela de côté? 10. Je vais le mettre au soleil. 11. Votre ami n'a-t-il pas voulu entrer? 12. Il n'a point voulu mettre pied à terre. 13. Votre teinturier n'a-t-il pas mis son tablier à l'envers? 14. Non, Monsieur, il l'a mis à l'endroit. 15. N'avez-vous pas mis cet étourdi à la porte? 16. Nous lui avons fermé la porte au nez (*in his face*). 17. À quelle heure vous mettrez-vous à table? 18. Aussitôt que le couvert sera mis [Sect. 61, 5]. 19. Cet homme se met-il bien? 20. Il se met toujours à l'anglaise ou à l'italienne. 21. Ces enfants ne se mirent-ils pas à pleurer? 22. Au lieu de se mettre à pleurer, ils se mirent à rire. 23. Pourquoi ne vous mettez-vous pas à écrire? 24. Il est temps de se mettre à table. 25. Ces Siciliennes sont-elles bien mises? 26. Elles sont mises à merveille.

EXERCISE 134.

1. Did the gentleman alight this morning? 2. No, Sir, he would not alight, he had no time. 3. Have you put that insolent person out of doors? 4. No, Sir, but I forbade him to set his foot in my house. 5. Did you shelter those little children from the rain? 6. I sheltered them from the rain and the wind. 7. Have you enabled your son to study medicine (*la médecine*)? 8. I enabled him to study medicine, if he wishes to do so. 9. Have you put on your coat inside out? 10. I have not put it on inside out, but right side out. 11. Did you put yourself in a passion? 12. No, Sir, I did not become angry. 13. Did you sit down to table at four o'clock yesterday? 14. We sat down to table at six o'clock. 15. Do you intend to commence boarding? 16. I intend to board with Mr. L. (*chez M. L.*). 17. When do you commence your journey? 18. We commence our journey to-morrow morning. 19. Did your son commence laughing? 20. No, Sir, he commenced weeping. 21. Why do you not commence working? 22. Because I am going to commence reading. 23. Does that lady dress after the English fashion? 24. She dresses after the Italian fashion. 25. Are those ladies well dressed? 26. They are extremely well dressed. 27. Will you not place yourself in the shade? 28. I will place myself in the sun, I am very cold. 29. Is your coat inside out? 30. No, Sir, it is right side out. 31. Is this the right side of this cloth (*l'endroit*)? 32. It is the wrong side (*l'envers*). 33. Are you not dressed after the English fashion? 34. I am dressed after the Italian fashion. 35. You are well dressed.

KEY TO EXERCISES IN LESSONS IN FRENCH.

EXERCISE 21 (Vol. I., page 86).

1. Are our friend's horses restive? 2. His horses are not restive, but his mules are very restive. 3. Your brother's horses and mules are excellent. 4. Are your sisters very quick? 5. My brothers and my sisters are very quick. 6. Are they often idle? 7. No, Sir, my sisters are never idle. 8. Are you afraid of your brother? 9. No, Sir, I am afraid of nobody. 10. Are we not indulgent? 11. You are indulgent, and you are right. 12. Have I your books? 13. You have them not, you have my eldest brother's. 14. Have you them not? 15. I have them not. 16. Have you a good pair of woollen stockings? 17. I have a handsome pair of silk stockings. 18. Have you the good houses or the bad? 19. I have neither the good nor the bad, I have my cousin's. 20. Is labour agreeable? 21. Labour is useful and agreeable. 22. Have you my handsome morocco shoes? 23. I have not your handsome morocco shoes, I have your handsome velvet slippers. 24. Have you your sister's slippers or mine? 25. I have neither yours nor your sister's, I have the German lady's.

EXERCISE 22 (Vol. I., page 86).

1. Vos frères et vos sœurs sont-ils bien vifs? 2. Mes frères sont vifs, mais mes sœurs ne sont pas vives. 3. N'avez-vous pas deux chevaux rétifs? 4. Non, mais j'ai une mule rétive. 5. N'avez-vous pas deux bonnes paires de gants de soie? 6. J'ai une bonne paire de gants de coton, et deux paires de gants de soie. 7. N'avez-vous pas peur de vos amis? 8. Non, Monsieur, je n'ai jamais peur de mes amis. 9. Je n'ai peur de personne. 10. Avez-vous raison ou tort? 11. J'ai raison. 12. Avez-vous mes belles pantoufles de cuir, ou mes vieilles pantoufles de satin? 13. J'ai vos vieux souliers de cuir, et vos pantoufles de velours. 14. Ces dames sont-elles contentes? 15. Ces dames sont contentes, et elles ont raison. 16. L'Allemande a-t-elle les souliers de votre père ou les miens. 17. Elle n'a ni les siens ni les vôtres, elle a ceux de ma sœur. 18. Votre frère aîné a-t-il de bonnes maisons ou de mauvaises? 19. Ses maisons sont meilleures que les vôtres et que les miennes. 20. Ses maisons sont-elles vieilles? 21. Ses maisons sont vieilles, mais elles sont bonnes. 22. Les avez-vous? 23. Non, Monsieur, je ne les ai pas, je n'ai pas de maisons. 24. Avez-vous celles de mon frère, ou celles de ma sœur? 25. Votre sœur a les siennes et celles de ma mère. 26. Vos écoliers sont-ils attentifs? 27. Mes écoliers sont tres-attentifs et très-studieux. 28. Ces Allemandes sont-elles studieuses? 29. Elles sont tres-studieuses et tres-attentives? 30. Avez-vous souvent tort? 31. Oui, Monsieur, j'ai souvent tort. 32. Le travail est-il agréable? 33. Oui, Monsieur, le travail est agréable et utile. 34. Nous les avons et vous ne les avez pas.

LESSONS IN BOOKKEEPING—VIII.

In the examples of posting into the Ledger given in our last lesson, the form of the entry in the *Journal*, when transferred to the *Ledger*, is considerably different; yet both forms have the same meaning. For whether we say *Sundries Dr. to Cash Account*, as in the *Journal*; or *Cash Account Cr. by Sundries* as in the *Ledger*; both of these forms of expression have precisely the same meaning; the former is peculiar to the *Journal*, the latter is peculiar to the *Ledger*. Of course the student is supposed to know that *Sundries* is used instead of the words *Several Accounts*, and has the same meaning. It is a very convenient business word; but he would be a very stupid learner who should expect to see a *Sundries Account* in the *Ledger*, as there it would have no meaning. Instead of saying in the *Cash Account*, as above, *By Sundries*, the Bookkeeper might say *By Hugh Williams* and *By John Tillotson*; but this would occupy two lines instead of one, and would not be one whit clearer in meaning. Besides, if in one entry in the *Journal* there were *twenty Drs. to Cash*, instead of *two* as in the preceding instance, you will see what a vast saving of writing, and of liability to error, is effected by using the single phrase—*By Sundries*. As a general rule, for *posting*, or transferring entries from the *Journal* to the *Ledger*, you have only to *Debit the Debtors for the sums that they owe; and Credit the Creditors for the sums owing to them*; and remember, that to *Debit a Debtor*, is to enter on the *Dr. side* of his account in the *Ledger*, the *name of his Creditor*, with the word *To* before it, and the *sum that the Debtor owes*; and to *Credit a Creditor*, is to enter on the *Cr. side* of his account in the *Ledger*, the *name of his Debtor*, with the word *By* before it, *and the sum that is owing to him, the Creditor.*

It has been already remarked that by the adoption of *Dr. and Cr. columns* in the *Journal* (which forms the peculiarity of Jones's system of Bookkeeping), a constant check is kept upon the accuracy of the entries, not only in that Book, but also of the corresponding entries in the *Ledger*; inasmuch as the total sums in the *Dr. and Cr. Columns* of both books for any given period ought perfectly to agree; that is, not only ought the sum of the Dr. columns in the *Journal* to agree with the sum of the Cr. columns for any given period; but the sum of the Dr. columns of the *Ledger* ought to agree with the sum of the Dr. columns of the Journal, and the sum of the Cr. columns of the *Ledger* ought to agree with the sum of the Cr. columns of the *Journal*, and that for the same given period. In addition to this (which constitutes part of our improve-

depressing them. Since these plates are not attached to all the segments, but are only appendages to some of them, while the intermediate ones are furnished with gills, which lie under the felt, the reader will observe that there will be a chamber between the felt-like roof and the proper dorsal wall of the animal. In this chamber the delicate gills of the animal are protected from being bruised, and fresh filtered water is supplied to them in the following manner. When the plates are slowly erected, or removed from the back, water flows through their porous substance, and when they are drawn rapidly down, the water is forced backward along the whole length of the back, laving the gill fringes, and passing out behind.

The animals we have hitherto described are grouped together under the title Errantia, or wandering animals, because they are capable of locomotion; but other families occupy protective tubes, made of particles of sand glued together, or of compact carbonate of lime. In accordance with this mode of life, all the feelers and all the respiratory organs have to be crowded together around the head, which alone projects from the tube. These tube-inhabiting worms furnish a striking instance of the method in which Nature exhibits the plan of structure of animals, even when circumstances necessitate a fundamental modification of that plan, for the *rudiments* of feet and gills are found all along the body, even when that body is so enclosed that they can be of no use. In such cases the rudiments are reduced to the smallest possible dimensions, yet there they remain to indicate the affinities of the animal.

The common earth-worm has no external gills, and instead of close-set bundles of setæ or bristles which act as oars, it has only eight thorn-like locomotive organs on the under side of each segment. These can be protruded or retracted, and the animal makes use of them as holders to prevent one part of the body being dragged back while the other is drawn up to it by muscular contraction.

The leech is the type of another large family. Its skin is perfectly smooth; and, being deprived of the means of progression enjoyed by its neighbours, it is compensated by having at each end of its body a sucking disk, with which it walks. In it the abdominal cavity is obliterated, for though the main tube of the stomach is small as compared to the tube of the body, and septa unite them as in other annelids, yet, as will be seen in the engraving, this tube sends forth lateral pockets, which swell outward till they come in opposition to the skin to which they are united.

The use of the leech is so widely recognised that the demand for these animals is enormous, many millions of them being imported into this country annually. It is difficult to conceive of an animal better suited to the surgeon's purpose. It makes a puncture with its three compound teeth shaped like the letter Y; and this is of such a nature that while it admits of the free flow of the blood while suction is going on, yet but little drains away afterwards. Again, the creature always fills itself to repletion, though its stomach is, of course, of limited capacity, so that a certain number of leeches applied always indicates a definite amount of blood abstracted. These conveniences, united with the fact that leeches often die after gorging themselves, have led some to suppose that Providence created the leech on purpose for blood-letting. It may be so; but if so, it is the only instance in which a species is known to sacrifice its own welfare for the benefit of another species.

The class Annelida may be divided into orders thus:—

1. *Suctoria*, of which the leech is a type.
2. *Scolecina*, of which the earth-worm is a type.
3. *Tubicolæ*, of which the serpula is a type.
4. *Errantia*, of which the lob-worm and sea-worms are types.

LESSONS IN GERMAN.—XXXII.

SECTION LXII.—IDIOMS OF VARIOUS KINDS.

auch (also) often corresponds to our word "ever" in compounds; s:—So groß er auch ist, *ich will es doch mit ihm aufnehmen, however* ig he is, I will enter into the contest with him (literally, take up with him). Wer er auch sein mag, *whoever* he may be. Was auch sagen mag, *whatever* he may say.

Sometimes it is best translated by "even," as:—Wenn er auch auf ist, *so will ich ihm doch nicht helfen*, even if he is sick, nevertheless *I* will not help him.

1. Selbst, when it *precedes* the subject or the object, is likewise generally rendered by "even," as:—Selbst der Tod trennte sie nicht, even death did not separate them. Selbst das Wiedersehen seiner Freunde vermochte nicht, ihn zu erheitern, even the meeting again of his friends was not able to cheer him.

Vocabulary.

Ab'halten, to hinder.
Armuth, *f.* poverty.
Auf'nehmen, to take up, to contest.
Au'ßenseite, *f.* exterior.
Aus'wählen, to select, choose out.
Bedin'gung, *f.* condition, proviso, terms.
Beglei'tung, *f.* attendants, escort.
Behar'ren, to persevere.
Dringen, to penetrate.
Gefühl'voll, sensitive, feeling.
Gesang', *m.* song, singing.
Gewinn', *m.* gain, profit.
Hart, hard.
Hell, bright.
Jedermann, every one.
Krachen, *n.* roar.
Listig, cunning.
Muthlos, disheartened.
Ohr, *n.* ear.
Preisen, to praise.
Redlich, honestly.
Säen, to sow.
Sieger, *m.* victor.
Sogar', even.
Tapf'erkeit, *f.* valour.
Ton, *m.* strain, melody.
Treu, faithful.
Unkraut, *n.* weed, tare.
Unterstütz'ung, *f.* support, assistance.
Wachsen, to grow.

Résumé of Examples.

An'haltend fall'ende Wass'ertropfen höhlen mit der Zeit sogar einen Stein aus.
Perpetually falling water-drops in time hollow out even a stone.

So schwer auch die Prüfung für ihn war, so hat er sie doch bestan'den.
Severe as the trial was for him, he nevertheless stood it.

Wenn auch die Welt unʼtergehen sollte, so will ich dennoch auf den Herrn trauen.
Even if the world should be wrecked, I will still trust on (in) the Lord.

Wer er auch sein mag, und was er auch sein mag, ich fürchte mich nicht vor ihm.
Whoever he may be, and whatever he may be, I do not fear him.

So viel auch die Leute über ihn sprachen, so mußten sie doch alle seine Hand'lungen bill'igen.
However much people spoke of (about) him, they were yet obliged to approve his actions.

Exercise 118.

1. Sogar die Sieger priesen die Tapferkeit der Besiegten. 2. Der Gesang rührte sogar die härtesten Gemüther. 3. Die Töne der Musik drangen sogar bis an unsere Ohren. 4. Man kann sogar hier das fröhliche Lachen der Kinder hören. 5. Wie kann man von Andern verlangen, was man selbst nicht thun mag? 6. Man muß sich selbst achten. 7. Das Unkraut wächst von selbst, ohne daß man es säet und pflegt. 8. Die Armuth selbst soll mich nicht abhalten, redlich zu handeln. 9. Wenn auch sie mich verlassen, dann habe ich keinen Freund mehr. 10. O, wenn auch diese Zeit schon da wäre! 11. Wenn er auch eine rauhe Außenseite hat, so hat er doch ein gefühlvolles Herz. 12. Wenn Ihr auch dieses thut, dann will ich Euch gut belohnen. 13. So viel auch Eurer sind, ich nehme es mit jedem auf. 14. So viel auch Heinrich arbeitet, so bringt er doch nichts fertig. 15. So viel er auch sprach, sie hörten ihn doch nicht. 16. Was auch geschehen mag, ich werde ihm treu bleiben. 17. Was auch für Nachrichten kommen, sie werden nicht muthlos. 18. Was auch mein Freund beginnt, er hat kein Glück. 19. Was es auch sein mag, Niemand soll es erfahren. 20. Er hat sogar nicht Geld genug, um Brod zu kaufen. 21. Wir müssen Jedermann lieben, selbst unsere Feinde. 22. Ich kann selbst unter diesen Bedingungen Ihren Vorschlag nicht annehmen. 23. Er konnte sogar unter allen Büchern das schönste auswählen.

Exercise 119.

1. Whatever he may say, I shall persevere. 2. Even with that profit they were not contented. 3. The mishap of this family was so great, that they even asked assistance of strangers. 4. I shall not depart with attendants even. 5. The moon does not give us so much light as the sun, even when she shines the brightest. 6. Whatever your friend may be, you will not obtain it. 7. Whoever this young lady be, she is very rude. 8. However cunning they may be, they are sometimes mistaken. 9. Great as my poverty may be, I shall not become disheartened. 10. Whatever the news may be, impart it to me. 11. Whatever advantages may be offered to him, he will not accept of them. 12. Whatever faults he may have committed, I will forgive him. 13. Even in the heat of the battle, and amidst the roar of cannons, the commander rode quietly to and fro. 14. However great my misfortune may be, nobody shall perceive it. 15. Even the king must obey the law. 16. Even my adversary praised my valour.

SECTION LXIII.—IDIOMS OF VARIOUS KINDS (*continued*).

Pflegen, besides its primary meaning "to nurse" or "take care of," has in both the present and imperfect the signification "to be accustomed," "to be wont;" as:—Er pflegte zu sagen, he *used* to say. Er pflegt zu reiten, he is *accustomed* to ride (on horseback).

1. Achten or Acht haben, followed by auf, is used thus:—Ich achte auf das, was (Sect. LXIX. 2) ich höre. I give attention to that which I hear. Ich werde Acht auf ihn haben, I will attend to him (have attention on him). Er nimmt sich in Acht, he takes care of himself. Wir müssen uns vor dem Bösen in Acht nehmen, we must guard ourselves against that which is bad (take ourselves in attention before, etc.).

Vocabulary.

Allein', alone, but.
Ameise, *f.* ant, emmet.
Appetit', *m.* appetite.
Christus, *m.* Christ.
Dachs, *m.* badger.
Damit', therewith.
Eichenhain, *m.* grove of oaks.
Geburt', *f.* birth.
Gesundheit, *f.* health.
Glatt, smooth.
Gut, *n.* good, gift, blessing.
Hamster, *m.* German marmot.
Kleinod, *n.* jewel, treasure.
Lebensunterhalt, *m.* subsistence.
Müssiggang, *m.* idleness, sloth.
Opfern, to offer, sacrifice.
Pflegen, to foster.
Regierungsantritt, *m.* accession to the government.
Schmeichler, *m.* flatterer.
Selbsterkenntniß, *f.* self-knowledge.
Sommer, *m.* summer.
Sorgen, to care, to take care.
Tugend, *f.* virtue.
Vortragen, to propound, tell.
Winter, *m.* winter.
Wiederherstellen, to restore.

Résumé of Examples.

Ein guter Vater sorgt mehr für den geistigen Schmuck seiner Kinder, als für den leiblichen.
A good father cares more for the intellectual, than for the corporeal adorning of his children.

Ein jeder Mensch trägt wegen der Zukunft Sorge.
Every man has a concern for the future.

Vor einem falschen Menschen soll man sich mehr in Acht nehmen, als vor einer giftigen Schlange.
One should guard himself more against a treacherous person than against a poisonous serpent.

Er hat mehr Acht auf seine Umgebung, als auf sich selbst.
He gives more attention to those who surround him than to himself.

Gebet Acht auf lehrreiche Gespräche, und behaltet das Beste.
Give attention to instructive conversation, and retain the best.

Sokrates pflegte zu sagen, er wisse weiter nichts, außer daß er nichts wisse, und so pflegt noch heutigen Tages jeder Bescheidene, und selbst der Gescheitteste zu sagen.
Socrates was accustomed to say he knew nothing farther, than that he knew nothing; and so, at the present day, every modest person, yea, even the most learned, is accustomed to say.

Exercise 120.

1. Derjenige, welcher in der Jugend sorgt, braucht nicht im Alter zu sorgen. 2. Habe Acht auf Dich, nicht nur in Gesellschaft fremder Leute, sondern auch wenn Du allein bist, damit (Sect. LXXVI.) Du Dich selbst kennen lernst. 3. Derjenige, welcher nicht immer auf sich Acht giebt, kommt nie zur Selbsterkenntniß. 4. Die alten Deutschen pflegten gewöhnlich in alten Eichenhainen ihren Göttern zu opfern. 5. Gute Kinder pflegen (Sect. XLVI.) ihre Eltern in ihrem Alter. 6. Meine Freunde pflegen des Morgens Wasser zu trinken. 7. Des Morgens und des Abends pflegt er der Ruhe. 8. Wir pflegen, anstatt des Thees, Kaffee zu trinken. 9. Seiner Gesundheit zu pflegen ist seine erste Sorge. 10. Er pflegt des Morgens zu arbeiten, und des Nachmittags zu lesen. 11. Derjenige, welcher des Müßigganges pflegt, pflegt auch der Sünde. 12. Pfleget der Tugend, und nicht des Lasters. 13. Er pflegt nicht vor acht Uhr aufzustehen. 14. Man pflegt nicht in Amerika, wie in Deutschland, zu sagen: „Ich wünsche Ihnen einen guten Appetit." 15. Der Mensch sorgt oft mehr als nöthig ist um seinen Lebensunterhalt. 16. Die Ameise sorgt schon im Sommer für ihre Nahrung im Winter. 17. Der deutsche Kaiser Maximilian I. trug gleich bei seinem Regierungsantritt Sorge, die innere Ruhe Deutschlands wiederherzustellen.

Exercise 121.

1. Guard yourself against those who have smooth words, bad thoughts, and a treacherous heart. 2. He cares more for his soul than for his body. 3. We are accustomed to drink tea instead of coffee. 4. The Greeks fostered art and science long before the birth of Christ. 5. He is accustomed to rise at six o'clock. 6. I will take care of this book till you return. 7. He takes care of his health. 8. Give attention to thyself, not only when you are in society, but also when you are alone. 9. Good children give attention to that which their parents tell them. 10. We must guard ourselves against our enemies. 11. A German marmot takes care in the summer of his food for the winter.

KEY TO EXERCISES IN LESSONS IN GERMAN.

Exercise 38 (Vol. I., page 211).

1. Sie mögen in den Garten gehen, aber Sie dürfen nicht lange dort bleiben. 2. Diese aufmerksamen Schüler durften mit ihrem Lehrer nach Mannheim gehen. 3. Wir können unsere Zeit besser anwenden. 4. Können Sie Deutsch sprechen? 5. Wir konnten unsere Aufgaben diese Woche nicht lernen. 6. Sie müssen die Aufgaben dieser Woche aufmerksam lernen. 7. Sie mögen morgen zu Ihren Eltern gehen. 8. Er mag ein guter Mann sein. 9. Die Hausfrau muß morgen auf den Markt gehen. 10. Haben Sie Ihren Eltern geschrieben? 11. Ja, ich mußte schreiben. 12. Es ist zwei Uhr. 13. Ich werde bei Ihnen (an Ihrem Hause), ein Viertel auf vier Uhr ankommen. 14. Wollen Sie zwanzig Minuten vor acht Uhr kommen? 15. Ich mag diesen Abend zu Ihnen kommen, aber warten Sie nicht auf mich. 16. So lange als es regnet, kann ich nicht ausgehen. 17. Fische können nur im Wasser leben, und Vögel in der Luft. 18. Sie hätten das nicht thun sollen, es wird keine Empfehlung für Sie sein. 19. Ich will heute Abend nach dem (*or* ins) Theater gehen. 20. Wir mögen ein anderesmal diese Gelegenheit nicht haben.

Exercise 39 (Vol. I., page 238).

1. I must go to the meadow to fetch hay. 2. What is your brother to do at school? 3. He is to go to school, to learn the Latin language. 4. Man must be honest or wretched. 5. What am I to do? 6. You may do what you like, and should do what you can. 7. Why did you not come to our house yesterday? 8. I would, but I could not; I was obliged to stay at home and read. 9. Will the tailor be willing to make me a coat? 10. He will be willing to make you one, but he may not be able to do it. 11. Why will he not be able to do it? 12. He will be obliged to go in the country to see his sick brother. 13. What does the boy want with the knife? 14. He wishes to cut bread and cheese. 15. Have you time to go into the stable? 16. I have time, but I will not go; I will remain at home. 17. What have you to do at home? 18. I have letters to read and to write. 19. Are you obliged to write them to-day? 20. I must write them to-day, because I am going to Heidelberg to-morrow. 21. One must be cautious in the choice of one's friends. 22. This boy has learnt nothing at all to-day. 23. Have you also learnt nothing? 24. I have learnt something, but not much.

Exercise 40 (Vol. I., page 238).

1. To whom are you going? 2. I am going to my brother. 3. With whom is this boy going? 4. He is going with his father to the town. 5. From whom did you hear this news? 6. I heard it from my old friend. 7. With whom are you going to the village? 8. I am not going to the village, I am going with my father to the great town. 9. When are you going out of the town to our friends? 10. We are not going to your friends, we are coming home again to-morrow. 11. I am going neither to my friend to-day, nor to the village, nor out of the house. 12. The count has a great castle with little windows. 13. The river comes from the mountains. 14. Has your father heard anything from his brother? 15. Yes, this man is (come) from Hungary, and has brought my father a box from my uncle. 16. Is he going to Vienna? 17. No, he is going to Warsaw, and from Warsaw to Cracow. 18. The Bavarian, the Bohemian, and the Hessian come from Germany. 19. The huntsman with his gun comes from the forest. 20. The servant is going to the town. 21. I heard from my brothers you were going to their friend. 22. The servant-girl comes from the well, and the man-servant goes to the butcher.

Exercise 41 (Vol. I., page 239).

1. Wenn wir glücklich sein wollen, dürfen wir nicht vom Pfade der Tugend abweichen. 2. Ich weiß, daß er Ihr Freund nicht ist, aber ich weiß gleichfalls, daß er ein Mann von Redlichkeit ist. 3. Laßt sie wissen, daß diese Neuigkeiten nur Gerüchte sind. 4. Man muß nicht alles sagen, was man weiß. 5. Sie müssen in der Wahl Ihrer Freunde sehr vorsichtig sein. 6. Wir sollten wissen, an wen wir uns wenden. 7. Wollen Sie dem Schneider sagen, wenn er Ihren Rock fertig habe, bei mir vorzusprechen? 8. Haben Sie Zeit, mit mir nach der Stadt zu gehen? 9. Wenn er die Arbeit nicht hätte zu Stande bringen können, würde er sie nicht unternommen haben. 10. Haben Sie Zeit, diesen Brief zu lesen? 11. Er geht in die Schule, um die lateinische Sprache zu lernen.

ment of the said system), the plan of check on the accuracy of all the books will be rendered complete, *if*, to the amount of the *net sums* of the *Day Book* entries for any given period, be added the amount of the sums entered in the *Bills Receivable Book*, in the *Bills Payable Book*, in both sides of the *Cash Book*, and in any other book from which entries are taken into the *Journal*; for then the *sum* of the whole amounts or totals of the sums entered in *these books* ought exactly to agree with the sum of the *Dr. or Cr.* columns of the *Journal* or of the *Ledger*, for the period in question. Such a mode of check will at all events furnish a clear and satisfactory proof that no error with regard to the entering of sums has been committed, either in Journalising the *subsidiary Books*, or in *posting* the entries into the *Ledger*.

HOME TRADE.

In the system of Bookkeeping by Double Entry which we are about to explain, it is necessary to begin with a series of transactions in business, arranged in the exact order of their occurrence. These are the materials to be employed in forming a system which shall constitute a model for guidance in keeping the books of any mercantile house. We have selected the supposed transactions of a particular branch of home trade—namely, that of a cotton merchant, as one well adapted, from its simplicity and generality, to exemplify the principles which we have explained in former lessons. We have arranged these transactions in order from January, when we suppose the business to be commenced, till June, when we suppose a balance to be struck, and the merchant's *real worth* ascertained. These six months' transactions in the cotton trade are interspersed with various *banking*, *bill*, and *cash* transactions, such as might be supposed to occur in the business of a cotton merchant resident in the metropolis; and the whole is afterwards entered in the *various subsidiary books* which belong to such a business; then into the *Journal*; and, lastly, into the *Ledger*. The *General Balance* is then taken, and the difference between the *Assets* and *Liabilities*, or the *real worth* of the merchant, is ascertained from the Ledger alone. The remarks which it will be necessary to make concerning the method of *Balancing the Books*—a process equivalent to the *taking of stock* among tradesmen and others, who only use *Single Entry*—we must postpone until we have shown how to make up the *Subsidiary Books* of our system.

MEMORANDA OF TRANSACTIONS.

1881.—January 1st.
Began business with a Capital of £1200 0 0

3rd.
Deposited my Capital in the London and Westminster Bank £1200 0 0

5th.
Drew out of the London and Westminster Bank . . £10 0 0

5th.
Took from Cash for Petty Cash £5 0 0

7th.
Bought of Osmond and Co., London,
22 bags of Berbice Cotton (on credit),
Net 7280 lbs. at 9½d. per lb. £288 3 4

10th.
Took from Cash for Petty Cash £5 0 0

12th.
Bought of Andrews and Co., London,
30 bags of Grenada Cotton (on credit),
Net 9240 lbs. at 8½d. per lb. £327 5 0

17th.
Drew out of the London and Westminster Bank . . £985 0 0

17th.
Bought £1000 of Stock in the Three per Cents. Consols, at 98½ per cent. £985 0 0

21st.
Accepted a Bill drawn by Osmond and Co., London,
No. 1, Payable to their Order, due at 3 months . . £288 3 4

22nd.
Drew out of the London and Westminster Bank . . £10 0 0

January 22nd.
Took out of Cash for my Private Account £10 0 0

26th.
Bought of Andrews and Co., London,
14 bags of Maranham Cotton (on credit),
Net 4350 lbs. at 7½d. per lb. £135 15 9

31st.
Accepted Two Bills drawn by Andrews and Co., London,
No 2, Payable to their Order, due at 3 months . . £327 5 0
„ 3, „ Smith and Co. „ 4 months . . 135 18 9

February 1st.
Sold to Brown and Smith, London,
22 bags of Berbice Cotton (at 1 mo. credit),
Net 7280 lbs. at 10½d. per lb. £318 10 0
Discount at 1½ per cent. 4 15 7
£313 14 5

5th.
Drew out of the London and Westminster Bank . . £100 0 0

5th.
Lent to Thomas Watson, London £100 0 0

10th.
Bought of White and Co., London,
24 bags of West India Cotton (at 1 mo. credit),
Net 7460 lbs. at 6½d. per lb. £202 0 10
Discount at 1½ per cent. 3 0 7
£199 0 3

14th.
Sold to Williams and Co., London,
14 bags of Grenada Cotton (at 1 mo. credit),
Net 4312 lbs. at 9½d. per lb. £170 13 8
Discount at 1½ per cent. 2 11 2
£168 2 6

17th.
Bought of White and Co., London,
24 bags of West India Cotton (at 1 mo. credit),
Net 8476 lbs. at 6½d. per lb. £229 11 2
Discount at 1½ per cent. 3 8 10
£226 2 4

21st.
Sold to Williams and Co., London,
16 bags of Grenada Cottou (at 1 mo. credit),
Net 4928 lbs. at 9½d. per lb. £195 1 4
Discount at 1½ per cent. 2 18 6
£192 2 10

22nd.
Received of Thomas Watson, London,
My Loan of the 5th instant £100 0 0

22nd.
Deposited in the London and Westminster Bank . . £100 0 0

25th.
Bought of the East India Company,
10 Lots of Madras Cotton (prompt April 25th), viz.,

No. 1.	containing	12	bales, net	4320 lbs. at 4d. per lb.	£72 0 0
2.	„	12	„	4260 „	71 0 0
3.	„	12	„	4132 „	68 17 4
4.	„	12	„	4084 „	68 1 4
5.	„	12	„	3976 „	66 5 4
6.	„	12	„	4092 „	68 4 0
7.	„	12	„	4390 „	80 12 6
8.	„	12	„	4184 „	78 9 0
9.	„	12	„	3896 „	73 1 0
10.	„	12	„	4004 „	75 1 6

£721 12 0

25th.
Due to James Manning, London,
For his Brokerage on £721 12s. at ½ per cent. . . £3 12 2

26th.
Drew out of the London and Westminster Bank . . £120 0 0

26th.
Lent to Darling and Co., of London £50 0 0

28th.
Paid the East India Company their Deposit on 10 Lots of Cotton at £6 per Lot £60 0 0

February 28th.
Took out of Cash for Petty Cash £10 0 0

March 1st.
Received of Brown and Smith, London,
For Cotton sold to them February 1st. . . . £313 14 5

1st.
Deposited in the London and Westminster Bank . . £300 0 0

2nd.
Paid James Manning, London,
For his Brokerage on the Purchase of Cotton . . £3 12 2

3rd.
Sold £1,000 of Stock in the Three per Cents. Consols, at 99⅜ per cent £997 10 0

3rd.
Deposited in the London and Westminster Bank . £1,000 0 0

5th.
Received of Darling and Co., of London,
My Loan of the 26th ult. £50 0 0

5th.
Deposited in the London and Westminster Bank . . £50 0 0

10th.
Drew out of the London and Westminster Bank . . £200 0 0

10th.
Paid White and Co., London,
For Cotton bought of them February 10th . . £199 0 3

13th.
Sold to Spencer and Co., London,
14 bags of Maranham Cotton (at 1 mo. credit),
Net 4350 lbs., at 9d. per lb. £163 2 6
Discount 1½ per cent. 2 8 11
£160 13 7

14th.
Received of Williams and Co., London,
For Cotton sold to them 14th February . . . £168 2 6

14th.
Deposited in the London and Westminster Bank . . £170 0 0

16th.
Sold to Thompson and Co., London,
24 bags of West India Cotton, for Cash,
Net 7460 lbs., at 8½d. per lb. £264 4 2
Discount 2½ per cent. 6 12 1
£257 12 1

16th.
Received of Thompson and Co., London,
For Cotton sold to them this day £257 12 1

17th.
Paid to White and Co., London,
For Cotton bought of them 17th February . . £226 2 4

18th.
Took from Cash for my Private Account . . . £20 0 0

21st.
Received of Williams and Co., London,
For Cotton sold to them 21st February . . . £192 2 10

21st.
Deposited in the London and Westminster Bank . . £200 0 0

22nd.
Sold to Althorpe and Co., London,
12 bags of West India Cotton (for cash in a week),
Net 4240 lbs., at 8d. per lb. £141 6 8

24th.
Bought of Baring, Smith, and Co., London,
30 bags of Demerara Cotton (on credit),
Net 9218 lbs., at 7½d. per lb. £288 1 3

26th.
Drew out of the London and Westminster Bank . . £600 0 0

26th.
Lent White and Co., London £600 0 0

29th.
Received of Althorpe and Co., London,
For Cotton sold to them on the 22nd inst. . . £141 6 8

30th.
Received of White and Co., London,
My Loan of the 26th inst. £600 0 0

March 31st.
Deposited in the London and Westminster Bank . . £740 0 0

31st.
Accepted a Bill drawn by Baring, Smith, and Co., London,
No. 4, Payable to their Order, due at 3 months . . £288 1 3

April 4th.
Bought of Osmond and Co , London,
16 bags of Berbice Cotton (at a fortnight's credit),
Net 4960 lbs., at 9d. per lb. £186 0 0
Discount 1½ per cent. 2 15 9
£183 4 3

7th.
Bought of Andrews and Co., London,
22 bags of Maranham Cottou (on credit),
Net 7166 lbs., at 8d. per lb. £238 17 4

11th.
Accepted a Bill drawn by Andrews and Co., London,
No. 5, payable to Ford and Co., due at 3 months . £238 17 4

12th.
Sold to Allison and Co., of London,
12 bags of West India Cotton (on credit),
Net 4236 lbs., at 8½d. per lb. £150 0 6

13th.
Drew a Bill on Allison and Co., London,
No. 1, payable to my Order, due at 2 months . . £150 0 6

13th.
Received of Spencer and Co., London,
For Cotton sold to them on the 13th March . . £160 13 7

14th.
Drew out of the London and Westminster Bank . . £180 0 0

14th.
Paid the East India Company a moiety of the amount due for Cotton bought on the 25th February . . £330 16 0

15th.
Took out of Cash for Petty Cash £20 0 0

18th.
Sold at Liverpool, per Thomas Jones,
24 bales of Madras Cotton,
Net 8580 lbs., at 6½d. per lb. £232 7 6
His Commission and other expenses . . 5 16 2
£226 11 4

18th.
Drew out of the London and Westminster Bank . . £190 0 0

18th.
Paid Osmond and Co., of London,
For Cotton bought of them on the 4th inst. . £183 4 3

20th.
Sold Lloyd and Co., of Manchester,
24 bales of Madras Cotton (on credit),
Net 8216 lbs., at 6½d. per lb. £222 10 4
Incidental expenses 0 19 6
£223 9 10

22nd.
Bought of Ovington and Co., London,
24 bags of Demerara Cottou,
Net 7362 lbs., at 8d. per lb. £245 8 0

24th.
Drew out of the London and Westminster Bank . . £290 0 0

24th.
Paid Bill No. 1, drawn by Osmond and Co. . . £288 3 4

25th.
Received of Lloyd and Co., of Manchester,
The following Remittances in Bills:
No. 2, drawn on Warwick and Co., due May 15th . £120 10 0
No. 3, drawn on Thiselton and Co., due „ 25th . £102 19 10

25th.
Drew out of the London and Westminster Bank . . £330 0 0

25th.
Paid the East India Company
The remaining moiety of the amount due for Cotton bought on the 25th February £330 16 0

LESSONS IN GEOMETRY.—XXII.

THE OVAL—THE PARABOLA.

THE next two problems will be found useful by the practical draughtsman, as the first enables him to draw an oval, a figure approaching very nearly to the form of the ellipse, by a few turns of his compasses; while the second shows how an ovoid or egg-shaped figure, of which one end is more pointed than the other, may be formed. The oval is as elegant in form as the ellipse, and quite as useful for all practical purposes. It may be drawn far more readily than the ellipse when it is necessary to trace the curve by hand and determine points through which it must pass, as in the last problem.

PROBLEM LX.—*To describe an oval on any given straight line as its greater diameter.*

Let A B (Fig. 87) be the given straight line about which, as its greater diameter, it is required to describe an oval. Trisect the straight line A B in the points C and D. From the centre C at the distance C D or C A describe the circle A E F, and from the centre D at the distance D C or D B describe the circle B E F, and let the circles A E F, B E F intersect each other in the points E and F. From the point E, through D, draw the straight line E G, meeting the circumference of the circle B E F in G, and from the point F, through C, draw the straight line F H, meeting the circumference of the circle A E F in H. From the point E as centre, with E G as radius, describe the arc G K meeting the circumference of the circle A E F in K; and from F as centre, with the radius F H, describe the arc H L, meeting the circumference of the circle B E F in L. The figure A H L B G K is an oval, and it is described on or about the given straight line A B as its greater diameter. The straight line N O drawn through the points of intersection E and F of the circles A E F, B E F, is the lesser diameter of the oval, and M, the point in which its diameters intersect each other, is its centre.

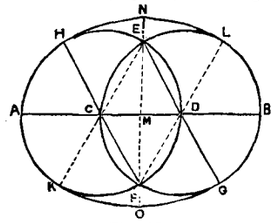


Fig. 87.

There is another method of constructing an oval, the principles of which may be readily applied to the mode of construction just described, inasmuch as in both cases the oval is described by arcs of circles drawn from four centres, which are the angular points of a rhombus, a figure formed by placing together two equal equilateral triangles, base to base.

In X Y (Fig. 88), a straight line of indefinite length, take any two points A and B, and on the straight line A B describe the equal and opposite equilateral triangles A C B, A D B. Produce the sides C A, C B of the triangle A C B indefinitely towards E and F, and the sides D A, D B of the triangle A D B also indefinitely towards G and H; and through C and D, the opposite vertices of the equilateral triangles A C D, A D B, draw the straight line K L of indefinite length, intersecting the straight line X Y in the point Z. In C Z take any point M, and from Z set off Z N along Z D, equal to Z M. From D as centre at the distance D M, describe the arc O M P, meeting the straight lines D G, D H in O and P; and from C as centre, at the distance C N, describe the arc Q N R, meeting the straight lines C E, C F in Q and R. Then from the point A as centre at the distance A O or A Q, and from the point B as centre at the distance B P or B R, describe the arcs O Q, P R. The figure O M P R N Q, composed of the four arcs O P, P R, R Q, Q O, described from the four angular points of the rhombus D B C A as centres, is an oval. By taking points beyond M and N at equal distances from Z, a series of similar ovals may be drawn, as shown by the dotted line surrounding the oval O M P R N Q. This shows us an easy and practical method of forming an oval grass-plot or flower-bed, surrounded by a gravel walk of uniform width.

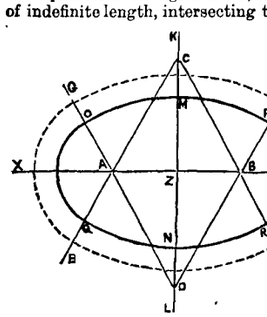


Fig. 88.

PROBLEM LXI.—*To describe an ovoid or egg-shaped oval or any given straight line taken as its lesser diameter.*

Let A B (Fig. 89) be the straight line that is given on or about which to describe an ovoid or egg-shaped oval. Bisect A B in C, and from C as centre, at the distance C A or C B, describe the circle A D B E, and through C draw the straight line D Z of indefinite length towards Z, at right angles to A B. Through the point E, from the points A and B, draw the straight lines A Y, B X of unlimited length. Then from A as centre, with A B as radius, describe the arc B G meeting A Y in G; and from B as centre, with B A as radius, describe the arc A F, meeting B X in F. From the point E, at the distance E F or E G, describe the arc F L G. The figure D A L B is an ovoid, and it is described about A B as its lesser diameter as required. If it be required to make the ovoid longer or shorter than the ovoid D A L B, it is manifest that the points from which the arcs forming the sides of the figure are described must be without the points A and B in the straight line A B, produced both ways in the first case, and within the points A and B in the straight line A B itself in the second. Supposing that it be required to make it longer than the ovoid D A L B, produce A B both ways to Q and R; in A Q take any point H, and make C K equal to C H. Take any point L in D Z, and through L from the points H and K draw the straight lines H P, K O of unlimited length towards P and O. Then from H and K as centres, at the distances H B, K A respectively, describe the arcs B N, A M, meeting H P K O in M and N, and complete the ovoid D A M N B as before, by drawing the arc M N from L as centre with the radius L M or L N. The student may work out the remaining case for himself, bearing in mind that the radius with which the arcs forming the sides of the ovoid are described must be necessarily greater than the radius of the circle described about the given lesser diameter, or, in other words, greater than one-half of the straight line given as the lesser diameter, as, when the centres of the side arcs approach so closely together as to coincide with each other and the centre of the circle, there can be no elongation of the lower part of the ovoid, which, in fact, then becomes identical with the circle.

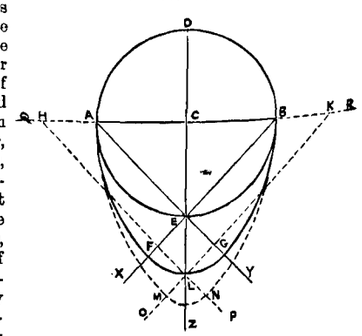


Fig. 89.

PROBLEM LXII.—*To describe a parabola by mechanical means.*

Fix a long flat ruler by means of two brass pins on the piece of wood or paper on which it is required to describe a parabola, and from a point A (Fig. 90), taken as nearly as possible in the middle of the ruler, draw a straight line A B at right angles to the ruler, or the direction in which the ruler is fixed. The straight line A B is called the axis of the parabola, while the line C D which represents one side of the fixed ruler is called the directrix of the parabola. Take a ruler made in the form of a right-angled triangle (see Vol. I., page 96), and at the extremity G of the longer of the two sides that contain the right angle G F E, fasten a piece of thread or string, and let the thread have a knot tied in it so that the length of the thread from G to the knot may be exactly equal to the side G F of the triangular ruler. Thrust a pin through the knot, and fix the pin through any point H, in the straight line A B, which has been selected as the *focus* of the parabola to be described. Place the edge F G of the triangular ruler along the straight line A B, keeping the string tight with a pencil-point, which, when the edge F G of the ruler is lying along the straight line A B, will manifestly be at a point K, the point of bisection of A H, the distance between the fixed ruler and the focus of the required parabola. Slide the edge F E of the triangular ruler slowly along the edge C D of the fixed ruler in the direction of C, keeping the pencil-point against the edge F G

of the triangular ruler, and the thread at its utmost tension from the focus H to the pencil-point, and from the pencil-point to G. When the edge of the ruler has moved from A B to the position L M, the pencil-point will have traced out the curve K N, while the string will be in the position indicated by the dotted lines H N, N M. When the ruler's edge occupies the position F G, the pencil-point will have traced out the curve K N O, and the string will be in the position indicated by the thick lines H O, O G. Similarly, when the ruler's edge occupies the position E P, the pencil-point will have traced out the curve K N O Q, and the string will be in the position indicated by the dotted lines H Q, Q P. By turning the ruler E F G, and reversing the operation, the lower part of the curve K S Z V may be traced; the change of position of the ruler's edge, and the string, being shown by dotted lines, which are lettered R T, U W, H S, S T, H V, V W in the diagram.

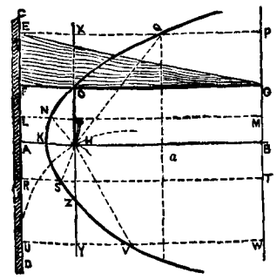


Fig. 90.

It will be seen as well from the construction of the mechanical means for producing the parabola as from examination of the diagram, that the leading principle of the parabola is that the distance of every point on it from the focus is exactly equal to a line let fall from the point in question perpendicularly to the directrix. Thus in Fig. 90, H N, the distance from the focus in a straight line to the point N, is equal to N L, the perpendicular let fall from N on the directrix C D. Similarly H O is equal to O F, and H V to V U. A straight line drawn H Q to Q E, H S to S R, and H V to V U. A straight line drawn through any point in the curve at right angles to the axis is called the ordinate of that point. Thus, if we draw an indefinite straight line X Y, at right angles to the axis A B, passing through the point O and the focus H, H O is the ordinate of the point O, and H Z the ordinate of the point Z. The part K H of the straight line A B, intercepted between K, the vertex of the parabola, and the focus H, in which the double ordinate O Z cuts the axis A B at right angles, is called the abscissa of the points O Z. In like manner Q *a* is the ordinate of the point Q, and K *a* its abscissa.

To find the focus of any given parabola, as Q K V in Fig. 90, draw the axis A B and the directrix C D, and at the point K in the straight line B K make an angle, B K O, equal to 60°. From the point O in which K O meets the curve draw O H perpendicular to A B; the point H is the focus of the curve. Make K A equal to K H, and through A draw C D at right angles to A B: C D is the directrix of the parabola.

HISTORIC SKETCHES.—XXII.

ADMIRAL BYNG ON THE 14TH OF MARCH, 1757.

"EVERY person in the fleet who, through cowardice, negligence, or disaffection, shall in time of action withdraw or keep back, or not come into the fight or engagement, *or shall not do his utmost to take or destroy every ship which it shall be his duty to engage* . . . every such person so offending, and being convicted thereof by the sentence of a court-martial, shall suffer death." This was the article of war upon which the life and honour of Admiral John Byng were given in charge to a naval court-martial on the 28th of December, 1756. The trial took place on board the *St. George*, in Portsmouth harbour, under circumstances of unusual excitement. All England was smarting under a sense of the disgrace which the conduct of the prisoner had appeared to bring upon it, and there was a universal cry for thorough investigation into the whole affair. The populace were deeply imbued with the spirit which actuated all ranks, from the king downwards, and as Admiral Byng was brought to Portsmouth from Greenwich, under the escort of a strong guard, he was insulted in every town and village he passed through.

It is, happily, an event of most rare occurrence when a British officer's courage is called in question; and it is a matter of satisfaction that in this case of Admiral Byng the personal courage of the accused was admitted to be unsullied. But the way in which he had conducted himself in the Mediterranean, when not his own honour only, but that of the kingdom also, was entrusted to his keeping, was said to have been such as greatly to tarnish the national glory. What that conduct was, and the result of it to the man most concerned, will be shown in this sketch.

In 1755 war, which had for a long time threatened, broke out between England and France and Spain. Various indecisive actions had been fought between the ships of the several countries, and a few collisions took place between detached bodies of troops; but there were not any operations on a large scale till in the early part of 1756 the French determined on reducing the island of Minorca, which was held by General Blakeney for the British. All the previous winter they had been secretly preparing for the enterprise, though they had skilfully concealed the aim and objects of it. Indeed, until February, 1756, the British Ministers were not aware that the expedition was meant for any place in the Mediterranean, but fancied that the British possessions in North America were the destination. Convinced, however, at this time, of the actual designs of the French, the Government took steps, albeit tardily, to frustrate them.

A squadron of ten ships of the line was fitted out, and the command was given, on the 1st of April, to Admiral Byng, with instructions to proceed forthwith to Gibraltar, and to inquire there whether the French fleet from Toulon had passed the strait. If they had, he was to detach Admiral West, his second in command, with a portion of the fleet, to North America, where it was still supposed a blow would be struck. If they had not, he was "to go on without a moment's loss of time to Minorca." Failing to meet the enemy's fleet there, he was to go to Toulon, and blockade it in that port. Imperative orders were given him to use his utmost diligence to protect the island of Minorca and Gibraltar.

As soon as he found what work was marked out for him, Admiral Byng complained to the Admiralty of the inadequacy of the force assigned to him. He had not a single frigate for reconnoitring or signalling purposes; the ships he had were foul, the crews weak both in number and health; and there were not any marines on board of them, that valuable arm of service having been withdrawn in order to make room for a regiment of soldiers he was to take to Minorca, and for another he was to pick up at Gibraltar. But his protests produced no effect; the only answer he received from the Admiralty was an order to proceed as already instructed, and on the 7th of April he put to sea.

Owing to the foulness of his ships, on the sides and bottoms of which weed had so collected as to impair most materially their sailing qualities, the admiral did not reach Gibraltar till the 2nd of May, and there he found there were not enough stores to replenish his squadron, and that the governor would not part with the regiment which Byng had been instructed to take from him to Minorca. While lying in Gibraltar Bay, the news reached him that a fortnight before the French admiral, with a strong fleet, had appeared off Fort Mahon, Minorca, and had landed the Duc de Richelieu, with an army of 16,000 men, to besiege the place. The governor of Minorca was away (General Blakeney, eighty-two years of age, was deputy-governor), and there were many of the officers of the garrison on leave of absence; the fortress of St. Philip, though very strong, was very ill supplied; and there was not any assistance from Nature, in the shape of rugged cliffs or difficult beaches, to defend the place. General Blakeney did his best to prepare for the siege, with his 3,000 men against 16,000 of the enemy. Under these circumstances Admiral Byng's instructions "to go on without a moment's loss of time to Minorca" should unquestionably have been acted on to the very letter, yet the admiral waited in Gibraltar Bay till the 8th of May, and did not sight Minorca till the 19th.

Though the British flag was still flying from the citadel of Port Mahon, the place was closely invested. The Duc de Richelieu was pressing the siege with all his power, and M. de la Galissonière, the French admiral, was cruising off the island with a fleet about equal in strength to the British admiral's. General Blakeney had sunk some vessels at the month of the harbour to prevent the French fleet getting in, and so succeeded in relieving himself from the fire of the ships' guns; but by

April 26th.

Received of Thomas Jones, of Liverpool,
The following Remittances in Bills :

No. 4, drawn on Parker and Co., due May 11th .	£190	10	6
No. 5, ,, ,, Baring and Co., ,, June 3rd . .	66	0	10

27th.

Sold at Liverpool, per Thomas Jones,
24 bales Madras Cotton (on credit),

Net 8068 lbs., at 6½d. per lb.	£218	10	2
His Commission and other expenses	5	9	2
	£213	1	0

LESSONS IN ARITHMETIC.—XXVIII.

FRACTIONS IN CONNECTION WITH COMPOUND QUANTITIES.

1. *To find the Value of any Fraction of a Compound Quantity.*

It is evident that we have only to divide the given compound quantity by the denominator, and then multiply by the numerator. The first part of the process determines the magnitude of the equal parts into which the denominator indicates that the quantity is to be divided, and the latter takes as many of those parts as are indicated by the numerator.

Thus, $\frac{3}{4}$ of £1 = 3 × $\frac{1}{4}$s. = 15s.

Again, $\frac{4}{3}$ of £2 = $\frac{4}{3}$ of 40s. = 4 × $\frac{1}{3}$2s. = $\frac{4 \times 8}{3}$s. = $\frac{32}{3}$s. ; $\frac{32}{3}$s. = 10$\frac{2}{3}$s.

Again, $\frac{2}{3}$ of a shilling is $\frac{2}{3}$ of 12 pence, or 2 × $\frac{1}{3}$2d. = 8d.
Therefore, $\frac{4}{3}$ of £2 = 10s. 8d.

2. Find $\frac{2}{5}$ of 3 days 4 hours 25 minutes.

days.	hrs.	min.
3	4	25
24		
72 + 4 = 76	hrs.	
60		
4560 + 25 = 4585 minutes.		

Therefore, $\frac{2}{5}$ of 3 days 4 hours 25 min. = $\frac{2}{5}$ of 4585 minutes = 2 × 917 = 1834 minutes.

Reducing 1834 minutes to higher denominations,

6,0) 183,4

24) 30 . . . 34 minutes.

1 . . . 6 hours.

Therefore, $\frac{2}{5}$ of 3 days 4 hrs. 25 min. is 1 day 6 hrs. 34 min.

3. *To reduce one Compound Quantity to a Fraction of any other.*

Finding what fractional part of one compound quantity another given compound quantity is, is called reducing the latter quantity to the fraction of the first.

Thus, finding what fraction of one pound 6s. is, is reducing 6s. to the fraction of a pound.

This is, in fact, only another name for performing the operation of dividing one compound quantity by another, or of finding the *ratio* of two compound quantities (see Art. 11, Lesson XXVII., page 101).

4. Example.—What fraction of £1 7s. 6d. is 3s. 6d.?

£1 7s. 6d. = 330 pence.
3s. 6d. = 42 pence.

Hence, if £1 7s. 6d. be divided into 330 equal parts, 3s. 6d. contains 42 of them;

Therefore, 3s. 6d. is $\frac{42}{330}$ of £1 7s. 6d.; and $\frac{42}{330} = \frac{7}{55}$ when reduced to its lowest terms.

This might have been more shortly performed as follows :—

£1 7s. 6d. = 55 sixpences.
3s. 6d. = 7 sixpences.

Therefore, 3s. 6d. is $\frac{7}{55}$ of £1 7s. 6d.

5. Hence the following

Rule for reducing one Compound Quantity to the Fraction of another.

Having reduced them both to any the *same* denomination, take the first quantity for a numerator, and the latter for a denominator.

The denomination to which the quantities are to be reduced is a question of choice. Sometimes we can much simplify our calculation by choosing one rather than another.

6. Example.—Reduce £2 6s. 8d. to the fraction of £3 5s.

£2 6s. 8d. = 2$\frac{1}{3}$ pounds.
£3 5s. 0d. = 3$\frac{1}{4}$ pounds.

Therefore the required fraction is $\frac{2\frac{1}{3}}{3\frac{1}{4}}$, which is $\frac{7}{3} \times \frac{4}{13}$, i.e., $\frac{28}{39}$.

7. The question of Art. 2 might also have been solved as follows by the aid of the present method :—

25 minutes = $\frac{25}{60}$ of an hour = $\frac{25}{60 \times 24}$ of a day.

4 hours = $\frac{4}{24}$ of a day = $\frac{1}{6}$ of a day.

Therefore, 3 days 4 hours 25 minutes are 3 + $\frac{1}{6}$ + $\frac{25}{60 \times 24}$ days, or 3$\frac{917}{2440}$ of a day, or $\frac{917}{240}$ of a day.

Therefore, $\frac{2}{5}$ of 3 days 4 hours 25 minutes = $\frac{2}{5} \times \frac{917}{240}$ of a day.
= $\frac{917}{600}$ = 1$\frac{317}{600}$ of a day.

$\frac{317}{600}$ of a day = $\frac{317}{600} \times 24$ hours = $\frac{317}{25}$ hours = 6$\frac{17}{25}$ hours.
$\frac{17}{25}$ of an hour = $\frac{17}{25} \times 60$ minutes = 34 minutes.

Hence the required answer is 1 day 6 hours 34 minutes.

Exercise 47.

Examples in finding a Fractional Part of a Compound Quantity, and in reducing One Quantity to the Fraction of another of the same kind.

Find the value, expressed in successive denominations, of—

1. $\frac{1}{4}$ of £1; $\frac{7}{8}$ of £1; $\frac{3}{5}$ of 1s.
2. $\frac{4}{15}$ of £1; $\frac{2}{3}$ of 1s.; $\frac{7}{12}$ of 3s. 2d.
3. $\frac{5}{6}$ of 1 lb. avoir.; $\frac{6}{7}$ of 1 oz. Troy; $\frac{4}{7}$ of 1 cwt.
4. $\frac{5}{6}$ of 1 ton; $\frac{4}{5}$ of 1 yard; $\frac{3}{8}$ of 1 rod.
5. $\frac{5}{8}$ of 1 mile; $\frac{3}{5}$ of 1 gallon; $\frac{5}{6}$ of 1 peck.
6. $\frac{7}{8}$ of 1 hour; $\frac{5}{8}$ of 1 minute; $\frac{2}{7}$ of 1 degree.
7. $3\frac{5}{6}$ of $\frac{2}{3}$ of a mile; $\frac{5}{7}$ of $\frac{1}{21}$ of a week.
8. $\frac{2\frac{1}{2}}{4\frac{1}{2}}$ of a guinea; $\frac{3\frac{4}{5}}{9\frac{3}{16}}$ of a crown.
9. If $1\frac{2}{3}$ of a sum of money = $\frac{5}{6}$ of 5s. 10d., find it.
10. Find the value of $\frac{2\frac{3}{5} + 1\frac{2}{5}}{\frac{1}{20} + \frac{3}{5}}$ of £20.
11. Find the sum of $\frac{1}{2}$ of 2s. 6$\frac{3}{4}$d. + $\frac{1}{3}$ of £3 2s. 6$\frac{1}{4}$d. + $\frac{1}{6}$ of £5 7s. 3$\frac{1}{2}$d.
12. And of $\frac{1}{2}$ of 16s. 6$\frac{1}{4}$d. + $\frac{1}{3}$ of 12s. 10$\frac{1}{2}$d. + $\frac{1}{4}$ of £2 4s. 8$\frac{3}{4}$d.
13. Find the value of $\frac{5}{13}$ of £7 4s. 1d. — $\frac{2}{11}$ of £4 0s. 1d.
14. Find the value of $\frac{3}{11}$ of £4 0s. 1d. — $\frac{2}{11}$ of £3 10s. 1d.
15. Find the value of $\frac{\frac{1}{3}\text{ of }\frac{4}{5} - \frac{2}{3}\text{ of }\frac{1}{5}}{\frac{2}{7}\text{ of }\frac{5}{6} + \frac{1}{6}\text{ of }\frac{2}{7}}$ of £1.

Reduce to the fraction of a pound—

16. 4$\frac{2}{5}$s.; 4s. 7d.; 9s. 2$\frac{1}{2}$d.
17. 13s. 0$\frac{1}{4}$d.; 3$\frac{1}{2}$d.; £3 15s. 9$\frac{1}{2}$d.
18. What part of £1 is $\frac{7}{8}$ of a penny?
19. What part of 1 lb Troy is 7 oz.?
20. Reduce $\frac{3}{4}$ of a quart to the fraction of a gallon.
21. Reduce $\frac{3}{4}$ of 1 secon to the fraction of a week.
22. Reduce £3 17s. 11$\frac{1}{2}$d. to the fraction of £7 3s.
23. Reduce 3 pecks 2 gallons to the fraction of 2 bushels.
24. Reduce 15 cwt. 65 lbs. to the fraction of 2 tons 3 cwt.
25. Reduce 1° 15′ 10″ to the fraction of a right angle.
26. Reduce 1$\frac{1}{2}$ acre to the fraction of 5 acres 2 r. 40 p.
27. Reduce $\frac{1}{17}$ of £1 to the fraction of a penny.
28. Reduce $\frac{1}{7}$ of a week to the fraction of a minute.
29. Reduce $\frac{3}{4}$ of $\frac{7}{9}$ of £2 8s. 9d. to the fraction of £1 1s. 8d.
30. Express as a fraction of £10 the difference between £8$\frac{4}{5}$ and $\frac{3}{5}$ of £8.
31. Find the value of $\frac{1 \text{ lb. } 7 \text{ oz. } 4 \text{ dwts.}}{2 \text{ lb. } 7 \text{ oz. } 10 \text{ dwts.}}$ of 15 guineas.
32. Find the value of $\frac{77 \text{ dys. } 4 \text{ hrs. } 30 \text{ min.}}{6 \text{ dys. } 12 \text{ hrs.}}$ of $\frac{1° 17′}{17′ 15″}$ of $\frac{136 \text{ gals. } 2 \text{ qts.}}{178 \text{ gals. } 3 \text{ qts.}}$ of 517 square feet 72 inches.
33. Find the value of $\frac{£3 \text{ 18s. } 8\text{d.}}{£6 \text{ 12s. } 9\text{d.}}$ of 104 yards 9 inches.

KEY TO EXERCISES 44, 45, 46, LESSONS XXVI., XXVII.

(Vol. II. pages 78, 102.)

Exercise 44.

1. £9 2s. 8$\frac{3}{4}$d.
2. £3 5s. 10$\frac{1}{4}$d.
3. 8 cwt. 1 qr. 6 lbs. 10 oz.
4. 24 tons 1 cwt. 83 lbs.
5. 19 miles 289 rods 2 feet.
6. 1 league 1 m. 7 fur. 10 rods 12$\frac{1}{2}$ feet.
7. 35 bushels 2 pks 6 qts.
8. 19 qrs. 6 bush. 2 pks.
9. 55 yards 2 qrs. 3 nails.
10. 44 yds. 1 qr. 3 nls.
11. 85 acres 119 rods.
12. 234 acres 138 rods.
13. 338 cubic feet 1722 cubic inches.
14. 25° 3′ 15″.
15. 35° 3′ 30″.
16. 54 yrs. 2 mo. 2 wks 6 ds. 2 hrs. 45 min. 6 secs.
17. 2 years 88 days.
18. 1 year 164 days.

Exercise 45.

1. £247 6s. 1d.
2. £24 0s. 9d.
3. 16 tns. 16 cwt. 23 lbs.
4. 403 ,, 17 ,, 31 lbs.
1356 ,, 19 ,, 72$\frac{4}{5}$.
5. 61 lbs. 10 oz. 10 dwts.
6. 984 gals. 1 qt. 1 pt.
1968 ,, 3 0
7. 14778 ml. 1 fur. 32 rd.
34482 ,, 4 ,, 8
16889 ,, 3 ,, 8
8. 2044 ls. 1 m. 4 fur. 30 r.
8178 0 3 0
15742 2 5 15
9. 8962 bush. 16 qts.
10456 ,, 8
11950 ,, 0
13443 ,, 24
10. 2968 qr. 5 bsh. 2 pk. 6 qts.
2720 4 qr 1 bsh. 2 pk.
11. 7821 a. 2 rods.
60162 ,, 80
451218 120
12. 1199 yr. 9 m. 3 w. 1 d.
2046 8 3 5
2540 9 1 5
13. 24645 cub. ft. 930 in.
131242 ,, 1504
1327148 ,, 1696
14. 176 rt. ang. 51° 13′ 30″
252 ,, 21° 45′ 0″
39955° 4′ 48″
15. £174673 18s. 7$\frac{1}{2}$d.
£195788 7s. 3d.
16. 40 tn. 6 cwt. 81 lb. 5 oz.
3667 12 84 7
4393 2 10 1
17. £14540116 18s. 3d.
£16871008 9s. 3d.

Exercise 46.

1. £4 17s. 3$\frac{1}{2}$d.
£3 4s. 10$\frac{1}{8}$d.
£2 4s. 10$\frac{31}{144}$d.
2. 6s. 10$\frac{1}{2}$d.

lbs.	oz.	dwts.	gr.
3. 44	8	5	10$\frac{1}{2}$
7	3	6	0
3	8	13	18$\frac{1}{2}$
1	11	9	5$\frac{7}{9}$
4. 51	3	10	15$\frac{3}{4}$
16	4	19	9$\frac{1}{2}$
10	6	5	6$\frac{1}{8}$
5	7	9	2$\frac{2}{3}$
1	11	8	23$\frac{19}{32}$

5. 46 bush. 8$\frac{1}{2}$ qts.
41 12$\frac{1}{4}$
37 14$\frac{1}{2}$
31 14$\frac{1}{2}$
16 12$\frac{3}{4}$
8 3$\frac{17}{32}$
6. 10 yds. 3 ft. 1$\frac{1}{2}$ in.
7. 9 yds. 1 qr. 0$\frac{1}{2}$ nls.
7 3 3$\frac{1}{8}$
4 2 2$\frac{1}{4}$

dys.	hrs.	min.	sec.
8. 24	8	42	40
7	14	43	20

yrs.	d.	hr.	m.	sec.
9. 10	35	1	13	11$\frac{9}{11}$
5	308	10	48	41$\frac{11}{13}$
1	123	9	7	31$\frac{17}{23}$
1	40	8	32	3$\frac{1}{10}$

10. 1° 48′ 41$\frac{1}{2}$″
1° 17′ 38″
1° 0′ 22$\frac{9}{11}$″
11. 10s. 11$\frac{1}{2}$ $\frac{7}{8}$d.
12. 15$\frac{185}{831}$.
13. 17$\frac{11707}{74106}$.
14. 135$\frac{13}{1106}$.
15. 137900.
16. 30.
17. 219.

LESSONS IN GEOGRAPHY.—XVIII.

LATITUDE AND LONGITUDE—FIRST MERIDIAN, ETC.

In the preceding view of the determination of the position of a given point, we have not considered all the possible positions of a point P round the point A, the origin of the co-ordinate axes. If these axes were produced in the preceding figures so as to assume the appearance represented in Fig. 10, then, with the same *given distances* or *rectangular co-ordinates*, there might be *four* different positions of the point P with reference to the rectangular axes X X′ and Y Y′, or the *north* and *south* straight line Y Y′, and the *east* and *west* straight line X X′. To prevent confusion, therefore, and to fix the exact position of the point in question, it might be agreed upon that every distance measured from the origin A, along the portion of the axis A X, should be called *east*, and every distance measured from the origin A along the portion of the axis A X′ should be called *west*; in like manner, that every distance measured upwards from the axis X X′ should be called *north*, and every distance measured downwards from the axis X X′ should be called *south*. Moreover, it might be agreed upon that every distance measured *upwards* from the axis X X′ should be called *north latitude*, and every distance measured *downwards* from the axis X X′ should be called *south latitude*; and in like manner, that every distance measured from the point A *to the right* or *eastward*, should be called *east longitude*, and every distance measured from the point A *to the left* or *westward*, should be called *west longitude*. Now this supposition is that which has actually been agreed upon; so that in a map of the world upon Mercator's projection, as it is called, the straight line Y Y′ would represent the *first meridian* or that of *Greenwich*; and the straight line X X′ would represent the *equator*; also, the point A would represent the point of intersection of this *meridian* with the *equator*, which are, in fact, the two rectangular axes to which all points on the earth's surface are referred, in order that their true positions (*geographical* positions) may be determined. Accordingly, the point P (Fig. 10) would be described as the position of a place in *north latitude* and *east longitude*; the point P′, that of a place in *north latitude* and *west longitude*; the point P″, that of a place in *south latitude* and *west longitude*; and the point P‴, that of a place in *south latitude* and *east longitude*.

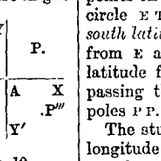


Fig. 10.

If the straight lines X X′, and Y Y′, which we have supposed to represent the first *meridian* and the *equator*, were to become circumferences of circles of the same size, they would then more truly represent the actual rectangular axes which are employed on the surface of the globe. The aspect they would then assume will be understood by reference to Fig. 6, where the circle P M E T P N Q S may represent the first meridian, and the circle E O Q R the equator, their point of intersection E being their origin as rectangular axes. We still call these rectangular axes, because the planes of the circles cut each other at right angles, and the spherical angles P E O, P E R on each side of the meridian are right angles, whether taken from the upper or north pole P, or from the lower or south pole P; so that we still have four right angles round the origin E; but these are now spherical right angles, that is, angles formed by the quadrants or fourth parts of the circumferences of these great circles of the sphere. In order to have a proper view of the rectangular axes on the sphere, we should require to be looking at the edge or *circumference* of the circle P E P Q, and not at its *plane* or surface as in the figure; then we should see the edge or *circumference* of the circle R E O Q cutting the former at right angles, and both exhibiting at a distance the same appearance as the lines X X′ and Y Y′ in Fig. 10. In this view, the point E being the origin of the axes, all points on the surface of the sphere included between the semicircle E M P S Q and the semicircle E O Q, are said to be in *north latitude* and *east longitude*; the longitude being measured from E along the *eastern half* of the equator E O Q, and the latitude from the same part of the equator on a meridian passing through any of the points in question and the two poles P P. All points on the surface of the sphere included between the semicircle E M P S Q and the semicircle E R Q, are said to be in *north latitude* and *west longitude*; the longitude being measured from E along the *western half* of the equator E R Q, and the latitude from the same part of the equator on a meridian passing through any of the points in question and the two poles P P. All points on the surface of the sphere included between the semicircle E T P N Q and the semicircle E R Q, are said to be in *south latitude* and *west longitude*; the longitude being measured from E along the *western half* of the equator E R Q, and the latitude from the same part of the equator on a meridian passing through any of the points in question and the two poles P P. Lastly, all points on the surface of the sphere included between the semicircle E T P N Q and the semicircle E O Q, are said to be in *south latitude* and *east longitude*; the longitude being measured from E along the *eastern half* of the equator E O Q, and the latitude from the same part of the equator on a meridian passing through any of the points in question and the two poles P P.

The student who reads the above explanation of latitude and longitude on the rounded surface of the earth for the first time, may have a difficulty in realising the appearance of the sphere from the diagram made on a flat surface, but he must endeavour by his natural ideas of perspective to obtain as clear a notion as he can. Of course the difficulty would be entirely removed by the actual inspection of a globe; but, as it may not be possible for him to have a globe by his side while he is reading this lesson, we must try what we can do by means of the small Map of the World in the next page, although it must be remembered that the surface of no solid body as a whole can be truly represented on a plane surface such as the page referred to. With that map before you, then, you will see the two sides of the globe represented in what are called the *eastern and western hemispheres*. In order to see the whole of only one side, or half of the globe, the eye must be supposed to be at an infinite distance, and still possessing the power of sight; accordingly, *two such sights* directly opposite to each other will enable you to see the whole of the globe. This is the reason that two circles are necessary to represent the globe, because only one-half can be seen at a time. If these two circles could be pasted along their edges or circumferences, back to back, so that their north and south poles coincided, and then inflated till they assumed the form of a globe, they would then form a pretty correct representation of the earth's surface. The equator, which you know is a circle equally distant from the two poles, is represented on the Map of the World by a straight line drawn across the middle of both hemispheres, marked by the word *equator*, and with degrees from 0° to 180° east, and from 0° to 180° west, reckoned from the *first meridian*.

In the map referred to, these degrees are marked only at the distance of every 20 degrees, on account of its smallness; in

this act he also closed the harbour against succours, at least until the French fleet should be driven away. To drive it away was the manifest business of the British admiral, and on the morning of the 20th of May, the day after his arrival, Byng gave the signal to bear down and engage the enemy. The number of ships was equal on both sides, though the French had twenty-four guns more than the British; but in point of numbers of men, the French exceeded their opponents by nearly 3,000. Still there was no reason why the battle should not take place, and accordingly, in obedience to orders from the commander-in-chief, Admiral West began the action by falling on to the French ships immediately opposed to his division. Soon after two o'clock in the afternoon, by which time West had driven one of the French ships out of line, Byng's division was about to come into action, when a series of accidents conspired to embarrass the commander, who did not prove himself superior to them. The *Intrepid*, of West's division, had so much of her rigging shot away, that she became unmanageable, and drifted foul of some of the other ships. Byng's line was thrown into confusion, and his own ship, the *Ramillies*, was obliged, in consequence, to bring up.

M. de la Galissonière took advantage of the circumstances to discontinue the fight, and Byng believing, as he asserted afterwards, that the French fleet would renew the fight next morning, ordered his ships to lie to, in order to repair the *Intrepid*, *Captain*, and *Defiance*, which had been so mauled as to incapacitate them for further service until they had been repaired. Next morning at daybreak, the French fleet not appearing, he called a council of war, and took their opinion as to whether he should follow the French fleet and bring it again to action, or whether he should leave Minorca to its fate, and go to the protection of Gibraltar, which *might be*, though it was not, threatened. For reasons which it is difficult to trace even now, the council was unanimous in recommending that Minorca, which the admiral had been sent out specially to protect, should be abandoned, and that Gibraltar should be the admiral's care. There seems to have been an idea that, do what they could, the citadel of St. Philip could not be delivered from the numerous enemy which was besieging it; and it does not seem to have been considered that if the French fleet could have been defeated, succours might have been thrown into the place, and that the French, blockaded on the sea-side, would have been placed between two fires, and the besiegers turned into the besieged. In an evil hour Admiral Byng acted on the advice of his council of war, and gave orders for the fleet to proceed to Gibraltar. On his arrival there, on the 19th of June, he found five ships of the line awaiting his orders, having been sent out by the Admiralty to counterbalance a reinforcement which it was understood was about to join M. de la Galissonière from Toulon. With this unexpected addition to his strength, he resolved to go back to Minorca, find out the French fleet, and try to execute his original instructions. But he delayed his departure, possibly unavoidably, but the delay was fatal to Port Mahon. Notwithstanding the odds against him, which included not only the army of the Duc de Richelieu but the returned French fleet with reinforcements under M. de la Galissonière, General Blakeney refused to take the same desperate view of his position as had been taken by Admiral Byng; and he held out for more than five weeks after the departure of the fleet. Even his enemies, though annoyed by his resistance, admired it; and when, towards the end of June, he found no succour coming, and that the garrison were much straitened for stores and weakened through sickness, he proposed to capitulate, the French granted him terms that were honourable to both sides alike. On the 29th of June Minorca was surrendered to the Duc de Richelieu, and on the 3rd of July, when Admiral Byng was thinking of starting from Gibraltar to relieve it, he was surprised by the arrival of Admirals Hawke and Saunders to supersede him and Admiral West in the command of the Mediterranean fleet.

A distinction was made between the cases of the two admirals even before they reached England, and when they did arrive, Admiral West was looked upon as the man who, by his conduct on the 20th of May, had saved the national honour from irredeemable disgrace. He was graciously received, and at the request of the king another command was given to him. Admiral Byng, however, was at once arrested, and the Ministers, against whose incapacity and sheer mismanagement the popular voice had long exclaimed, determined to let him be the scapegoat for the popular fury. There was a cry for blood, the king, whose one virtue was courage, and who cordially hated the bare appearance of cowardice, being among the most violent in urging the demand. It was resolved to bring the admiral to trial before a court-martial; and there was, it is to be feared, a strong predetermination to show no mercy in the event of the prisoner being found guilty.

The trial began on the 28th of December, 1756, and lasted many days, and then the members of the court came to a resolution that Admiral Byng had not done his utmost to relieve the citadel of St. Philip, and that he fell under part of the twelfth article of the existing articles of war.* As that article prescribed death as the only punishment for breach of any of the rules laid down therein, and left not any discretionary power to the court to moderate the punishment according to the circumstances of the case, the court had no choice but to pass sentence of death. That sentence was accordingly given, and the prisoner was condemned to be shot to death at such time, and on board of such ship as the Lords Commissioners of the Admiralty should please to direct. It appeared, however, upon the evidence of those who had the fullest opportunity of judging—the evidence of officers and men, who had stood close to the admiral during the action on the 20th of May—that there was no imputation whatever upon his personal courage or coolness, that he gave his orders easily, and that he made no effort to screen himself from the enemy's fire. From other circumstances it also appeared that what had happened could not be attributed to personal cowardice or disaffection; and it was only on condition of a unanimous recommendation to mercy, that the minority in the court agreed to find a verdict of guilty on the charges. The court found specially that the admiral was not guilty of cowardice or disaffection, and as to the negligence charged, they wrote to the Admiralty as follows:—"We cannot help laying the distresses of our minds before your lordships on this occasion, in finding ourselves under necessity of condemning a man to death, from the great severity of the twelfth article of war, part of which he falls under, which admits of no mitigation if the crime should be committed by an error in judgment; and therefore, for our own consciences' sake, as well as in justice to the prisoner, we pray your lordships in the most earnest manner to recommend him to His Majesty's clemency."

Nothing could have been stronger than this. The papers were forwarded to the king, but without any recommendation from the Admiralty. Viscount Torrington, the prisoner's kinsman, petitioned the king for mercy, and several of the Cabinet Ministers advised to the same end. The people had grown calmer, and on further reflection deemed that the Government which had sent the admiral away with an insufficient force was more to blame than the admiral, and the cry for Byng's blood was considerably lessened—indeed, it began to be thought by many that the admiral was an ill-used man. The king, however, was inexorable; he would not be moved by petitions, recommendations, or anything else; he consented to refer to the twelve judges the question, whether on technical grounds the sentence was legal; and having obtained an answer in the affirmative, nothing would induce him to spare Byng's life.

It seems that Byng had, until a day or so before the close of his trial, entertained the conviction that he would be acquitted. Conscious of his own innocence, he felt persuaded his judges would end by also thinking him innocent, and he expressed considerable surprise when a friend informed him of the sentence he might expect. Even after his condemnation he seems to have believed his life would be spared, and this belief was shared by almost every one else except the king and those who were bent on screening the Government at the expense of the individual. But a warrant was sent down to Portsmouth from the Admiralty (Admiral Forbes, one of the commissioners, refused to sign it), ordering Byng's execution for the 28th of February, and then the terrible earnestness of the prosecution was made manifest. Even then, however, efforts were made to save him by the exertions of friendly members in their place in Parliament; but the only result of their interposition was to prolong the admiral's life till the 14th of March.

On that day the boats of the fleet at Spithead were ordered to surround the *Monarch*, the third-rate in which, since his condemnation, Admiral Byng had remained in custody of the Admiralty marshal. All captains and certain other officers were required to witness the deed which was to be done, and at noon all things were ready. Shortly before that time, the prisoner, whose demeanour had been invariably dignified and composed, asked the marshal to take charge of a paper he had written, containing comments upon his trial, and on the circumstances under which he had acted at Minorca. "Happy for me," he wrote, "at this, my last moment, that I know my own innocence, and am conscious that no part of my country's misfortunes can be owing to me. I heartily wish the shedding of my blood may contribute to the happiness and service of my country, but cannot resign my just claim to a faithful discharge of my duty according to the best of my judgment, and the utmost exertion of my ability for His Majesty's honour and my country's service. I am sorry that my endeavours were not attended with more success, and that the armament under my command proved too weak to succeed in an expedition of such moment. Truth has prevailed over calumny and falsehood, and justice has wiped off the ignominious stain of my supposed want of personal courage, and the charge of disaffection. My heart acquits me of these crimes; but who can be presumptuously sure of his own judgment? If my crime is an error in judgment, or differing in opinion from my judges, and if yet the error in judgment should be on their side, God forgive them, as I do; and may the distress of their minds, and uneasiness of their consciences, which in justice to me they have represented, be relieved and subsided as my resentment has done. The Supreme Judge sees all hearts and motives, and to him I must submit the justice of my cause."

Having delivered this paper, Admiral Byng walked out from his cabin on to the quarter-deck, where the marines who were to kill him were already drawn up. He had resolved not to have his eyes bandaged; but the entreaties of his friends, who feared lest his looks should intimidate the soldiers, prevailed, and he suffered a handkerchief to be bound round his brows. In three minutes from the time of quitting his cabin, John Byng was placed in his coffin, having fallen instantaneously dead, with five bullets in his body.

Thus perished Admiral Byng, whose reputation has been cleared by posterity of the blemish which malice and interested hatred were so busy in casting upon it. His body was not cold before people began to cry out that he had been murdered, and the cruel persistency of the king in carrying out the sentence of death caused Byng to be raised in the popular estimation to a height of favour he scarcely deserved. The means by which the Government sought to hide their own defects, by the sacrifice of one man, recoiled on their own heads, and the ghost of Byng, like that of Banquo, haunted them terrifically at their feasts. The sacrifice they offered up did not propitiate the national resentment, but whetted it the rather; and those whose incompetency and mismanagement had brought so many disgraces, including the loss of Minorca, upon the nation, were driven from power. But amid the blaze of glory, which the genius of Pitt and his friends shed around the latter years of George II., people did not forget—and it was well they should not forget—the disgraceful seal which was put to the former years of national disgrace, by the execution, on the 14th of March, 1757, of Admiral Byng, on board the *Monarch*, in Portsmouth harbour.

* This article was modified in the time of George III., so as to admit of a less punishment for negligence, or error in judgment; and by the present articles of war, an officer, convicted as Admiral Byng was, would be *dismissed the service with disgrace*.

LESSONS IN BOOKKEEPING.—XIII.

SUBSIDIARY BOOKS.—THE DAY BOOK.

In this lesson is given the continuation of the Day-book, containing the entries of the Purchases and Sales of Cotton, from April to the end of June. The details of these are in the *Memoranda of Transactions*.

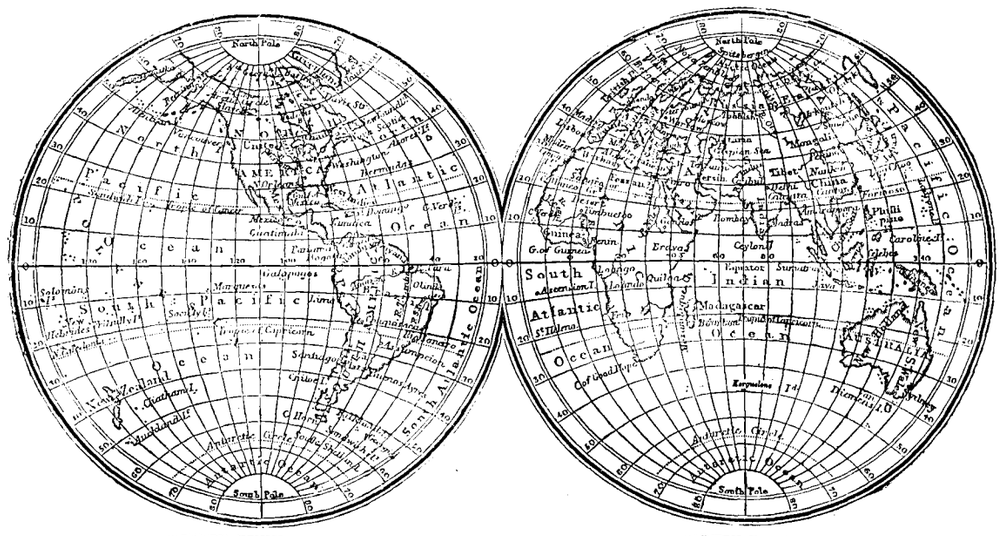
DAY BOOK. (4)

(4)

April 4th.	Dr. £	s.	d.	Cr. £	s.	d.
Cotton Account Dr. to Osmond and Co.	183	4	3			
Bought 16 bags of Berbice Cotton, Net 4960 lbs., at 9d. per lb.				186	0	0
Discount at 1½ per cent.	2	15	9			
7th.						
Cotton Account Dr. to Andrews and Co.	238	17	4			
Bought 23 bags Maranham Cotton, Net 7166 lbs., at 8d. per lb.				238	17	4
12th.						
Allison and Co. Dr. to Cotton Account	150	0	6			
Sold 12 bags West India Cotton, Net 4236 lbs., at 8½d. per lb.				150	0	6
18th.						
Thomas Jones Dr. to Cotton Account	226	11	4			
Sold 24 bales of Madras Cotton, Net 8580 lbs., at 6½d. per lb.				232	7	6
His Commission and other expenses	5	16	2			
20th.						
Lloyd and Co. Dr. to Cotton Account	223	9	10			
Sold 24 bales of Madras Cotton, Net 8216 lbs., at 6½d. per lb.				222	10	4
Incidental expenses				0	19	6
Carried forward £	1030	15	2	1030	15	2

larger maps they are marked at the distance of every 10 degrees; and in larger still, at less distances; the best being those where they are marked at the distance of every *single* degree; but these, of course, must be of enormous size. The first meridian, that of Greenwich, is known by its being marked with 0 on the map or the equator. On looking at the *eastern hemisphere*, you will see this 0 marked on the equator, in the *Gulf of Guinea*, south of the coast of Guinea in Africa; this is the origin of the rectangular co-ordinates, the *first meridian*, and the *equator*, and it is to this point that all measurements of *longitude* are to be referred. On running up the meridian, passing through this *zero* point, towards the *north pole*, you will find that it passes through London in the *British Isles*; this, you know, is not strictly the case, the *meridian* of St. Paul's Cathedral, London, being about 6′ or geographical miles *west* of the *meridian of Greenwich*; but this is so small in ordinary maps, that it is scarcely perceptible, and certainly not markable; whence the meridians of London and Greenwich are, for common purposes, considered the same. The meridian of Greenwich has been chosen as the *first meridian*, in preference to that of London, because Greenwich is the site of the *Royal Observatory*. Accordingly, all meridians which cross the equator *to the right* of that of Greenwich, are said to be meridians of places in *east longitude*; and all meridians which cross the equator to the left of that of Greenwich, are said to be meridians of places in *west longitude*. For example: if you look at *Peking, in China*, on this map, you will find that it lies *to the right* of the *first meridian* in the northern half of the *eastern hemisphere*, between two meridians which cross the equator, the one being that which is, or should be, marked at the point of intersection 110°; and the other that which is, or should be, marked at the point of intersection 120°: this enables you to guess, by the vicinity of Peking to the latter meridian, that its longitude is about 116° *east*; now the actual longitude is 116° 26′ E. Again, if you look at Buenos Ayres, in South America, on the same map, you will find that it lies to the left of the *first meridian* in the southern half of the *western hemisphere*, between two meridians which cross the equator, the one being that which is, or should be, marked at the point of intersection 50°, and the other that which is, or should be, marked at the point of intersection 60°: this enables you to guess, by the vicinity of Buenos Ayres to the latter meridian, that its longitude is about 58° *west*; now the actual longitude is 58° 25′ W.

On the first meridian, the degrees of latitude are not marked; but they are marked, in the Map of the World, on the circle which surrounds each hemisphere. On this circle, the points of its intersection with the equator are marked 0, to show that *latitude* begins to be reckoned from these points. Each of the four quadrants (or fourth parts) of these circles is marked with degrees from 0° to 90° reckoned from the equator to the poles. In the map referred to, these degrees are marked only at the distance of every 10 degrees, on account of its smallness; in larger maps, they are marked at less distances; and the best are those in which they are marked at the distance of every *single* degree; but these, of course, must be of very great size. In the same map, circles are made to pass through the corresponding points on the upper or northern quadrants of the outer or surrounding circle of each hemisphere, and of the upper or northern half of the middle straight line extending from polo to pole, at the distance of every 10 degrees; these upper quadrants, and this upper half, actually denoting the northern portions of meridians passing respectively through the points of the equator marked longitude 20° W., longitude 160° E., and longitude 70° E. These circles, which on the globe are parallel to the equator, are, from the nature of the projection employed in this map, not actually parallel to that line or to each other, being drawn from different centres; but they are still called *parallels of latitude*, and are used to enable us to determine the latitude of any place on the map. Similar parallels of latitude are drawn through the corresponding points on the lower or southern quadrants of the outer or surrounding circle of each hemisphere, in the same manner, and for the same purpose. For example: if you look at *Peking, in China*, on this map, you will see that it lies between the equator and the *north* pole in the *eastern hemisphere*, and just upon the *parallel of latitude* marked 40° at each side of the map: this enables you to guess that the *latitude* of Pekin is nearly 40° *north*; now the actual latitude is 39° 54′ N. Again, if you look at *Buenos Ayres, in South America*, on the same map, you will find that it lies between the equator and the *south* pole in the *western hemisphere*, and nearly in the middle between the *parallels of latitude* marked 30° and 40° at each side of the map: this enables you to guess that the latitude of Buenos Ayres is nearly 35° *south*; now the actual latitude is 34° 36′ S. Having thus shown how to find separately the latitude and longitude of any place on the surface of the globe by means of the circles and lines drawn in the Map of the World, it is easy for the student to combine these, and thus to determine the actual position of any place on the surface of the globe. Thus, we have found that the city of Peking, in China, is situated in lat. 39° 54′ N., and long. 116° 26′ E.; and that the city of Buenos Ayres is situated in lat. 34° 36′ S., and long. 58° 25′ W.



WESTERN HEMISPHERE. EASTERN HEMISPHERE.

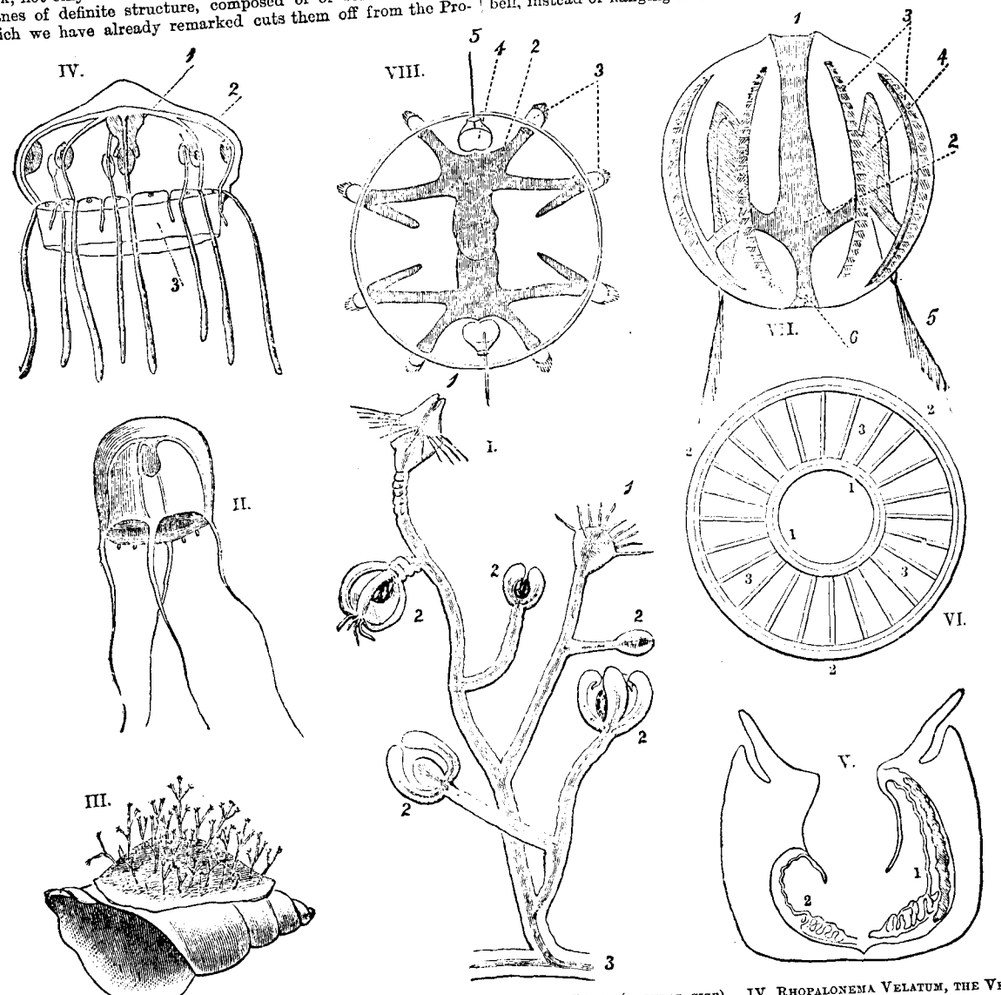
MAP OF THE WORLD.

COMPARATIVE ANATOMY.—IV.

CŒLENTERATA: HYDROZOA.

THE animals placed under this sub-kingdom exhibit their higher rank, not only in the distinctive character of possessing membranes of definite structure, composed of or containing cells, which we have already remarked cuts them off from the Protozoa, but also from the fact, that in this class we find the first indications of many of the structures which are necessary to, and acquire such a great development in, the animals higher than themselves. Definite membranes, muscular fibre, nervous and hepatic (liver) tissues are found in some of these animals.

A glance at any of the more common forms, such as are represented in Figs. I., II., III., will at once suggest that these animals have a mode of growth and a general form very similar to the higher forms of vegetables, such as grow in our fields and adorn our gardens. We may take as a typical representative of these animals, a genus called *Campanularia*. The very name is similar to that given to a common garden flower, the *Campanula*; and it is given to it for the same reason. Both have at the ends of their branches cup-shaped organs, very much like bells. It is true that, in the animal, the bell, instead of hanging as a bell should, has its mouth upward; but in another respect the resemblance is better maintained, for in the centre of the bell there rises a thick club-shaped body, which may well represent the clapper. The resemblance to a plant is maintained throughout the whole of the external form of this animal. With a creeping network of roots (if we may so call them), it encrusts some submarine rock, or stone, or shell. From this it sends up branching stems, each branch of which is terminated either with a flower-like cup, which protects a tubular body with a mouth at its far end, surrounded with a circlet of



I., II. EUDENDRIUM RAMOSUM (HYDROZOON). III. HYDROZOON ENCRUSTING A SHELL (NATURAL SIZE). IV. RHOPALONEMA VELATUM, THE VEILED CLUB-TENTACLED MEDUSA—A FREE SWIMMING MEDUSA. V. PERPENDICULAR SECTION OF A SEA ANEMONE. VI. TRANSVERSE SECTION OF A SEA ANEMONE. VII. PLEUROBRACHIA, A CTENOPHORE BELONGING TO THE ACTINOZOA. VIII. TRANSVERSE SECTION OF PLEUROBRACHIA (CTENOPHORE).

Refs. to Nos. in Figs. (I.) 1, feeding organs, with fringe of tentacles, mouth, and stomach (shaded); 2, flower-like organs of reproduction which become detached and swim away, as in Fig. II.; 3, creeping stem. (IV.) 1, polyp suspended within (2) the swimming-cup; 3, its veil. (V.) 1, organs of reproduction on the edge of a septum; 2, the face of a septum. (VI.) 1, the stomach wall; 2, the body wall; 3, septa joining the walls. (VII., VIII.) 1, mouth; 2, centre of the stomach; 3, comb-like locomotive organs; 4, sack into which the tentacles can be withdrawn; 5, tentacles cut short; 6, nerve-knot and organ of sense.

(5) DAY BOOK. (5)

April 22nd.	Dr. £	s.	d.	Cr. £	s.	d.
Brought forward	1030	15	2	1030	15	2
Cotton Account Dr. to Ovington and Co.						
Bought 24 bags of Demerara Cotton, Net 7362 lbs., at 8d. per lb.	245	8	0			
27th.				245	8	0
Thomas Jones Dr. to Cotton Account						
Sold 24 bales of Madras Cotton, Net 8068 lbs., at 6½d. per lb.	213	1	0			
His Commission and other expenses	5	9	2			
30th.				218	10	2
Thomas Jones Dr. to Cotton Account						
Sold 30 bags of Demerara Cotton, Net 9218 lbs., at 9d. per lb.	337	0	8			
His Commission and other expenses	8	12	10			
				345	13	6
£	1840	6	10	1840	6	10
May 2nd.						
Lloyd and Co. Dr. to Cotton Account						
Sold 16 bags of Berbice Cotton, Net 4960 lbs., at 10½d. per lb.	217	18	10			
Incidental expenses				217	0	0
4th.				0	18	10
Thomas Jones Dr. to Cotton Account						
Sold 24 bags of Madras Cotton, Net 8484 lbs., at 7d. per lb.	241	5	2			
His Commission and other expenses	6	3	10			
				247	9	0
Carried forward £	465	7	10	465	7	10

(6) DAY BOOK. (6)

May 5th.	Dr.			Cr.		
Brought forward	465	7	10	465	7	10
Powell and Co. Dr. to Cotton Account						
Sold 22 bags of Maranham Cotton, Net 7166 lbs., at 10d. per lb.	299	17	2			
Incidental expenses				298	11	8
13th.				1	5	6
Perkins and Co. Dr. to Charges Account						
For Commission, etc., on the purchase of 30 bags of New Orleans Cotton, value £212 6 8	5	6	8			
16th.				5	6	8
Perkins and Co. Dr. to Charges Account						
For Commission, etc., on the purchase of 40 bags of Sea-island Cotton, value £610 19 4	15	19	2			
27th.				15	19	2
Brown and Smith Dr. to Cotton Account						
Sold 12 bales Madras Cotton, Net 3896 lbs., at 6d. per lb.	97	8	0			
				97	8	0
£	883	18	10	883	18	10
June 1st.						
Powell and Co. Dr. to Cotton Account						
Sold 24 bags of Demerara Cotton, Net 7362 lbs., at 10d. per lb.	308	5	0			
Incidental expenses				306	15	0
30th.				1	10	0
Charges Account Dr. to Petty Cash Account						
For petty expenses paid from January 1st to this day, as per Petty Cash Book	57	8	9			
				57	8	9
£	365	13	9	365	13	9

LESSONS IN CHEMISTRY.—X.

LOWER OXIDES OF NITROGEN AND COMPOUNDS OF THE GAS WITH HYDROGEN.

THE *protoxide of nitrogen, nitrous oxide,* or *laughing gas* (N_2O, atomic weight = 44; density, because it is a compound gas, 22), is best prepared by heating in a flask *ammonium nitrate;* the salt first melts, and by slightly raising and continuing the heat it becomes decomposed, resolving itself into nitrous oxide and water, which comes away as steam. This is expressed thus:—

$$NH_4NO_3 = N_2O + 2H_2O.$$

The gas cannot be collected over cold water unless with much loss, for 100 cubic inches of water at 13° Cent. absorb 77 of the gas. However, if the water be hot, a very small quantity is retained, hence the gas must be collected over hot water or mercury, upon which metal it has no action.

Properties.—The gas is colourless and without smell, but possesses a sweetish taste.

When subjected to a pressure of about 30 atmospheres at the temperature of 0° Cent., by a process which will be described in a succeeding lesson, the gas becomes a clear liquid. The same phenomenon is exhibited if the gas be cooled down to −88° Cent., that is to say, liquid nitrous oxide boils at −88°, or the vapour of that liquid (that is nitrous oxide gas) has a tension equal to one atmosphere at the temperature of −88° Cent.; and as it requires a pressure of 30 atmospheres at 0° Cent. to liquefy it, we say that at 0° Cent. the gas has a tension of 30 atmospheres. When liquid nitrous oxide is mixed with bisulphide of carbon, and caused rapidly to evaporate under the exhausted receiver of an air-pump, the greatest known degree of cold is obtained,—140° Cent.

When a body in a state of ignition is plunged into this gas, the gas is decomposed into nitrogen and oxygen, this latter causing the body to burn with the same brilliance as if it were in pure oxygen. With sulphur the process is somewhat peculiar: if the sulphur be only ignited feebly, the flame will be extinguished, showing that there is some effort required to determine the decomposition of the gas; therefore the sulphur must be in a state of thorough ignition.

The resulting compounds are exactly those in the cases alluded to in the lesson on oxygen.

If the experiment of burning phosphorus in this gas be arranged as in Fig. 34—that is, a jar of the gas over water, the stopper of the jar being rapidly removed, and in its place a cork fitted, through which is passed a "deflagrating spoon," in which is a piece of ignited phosphorus—it will be observed that the water in the jar will have no tendency to rise; whereas if the gas had been oxygen instead of nitrous oxide, as the phosphorus consumed the oxygen, of course the water would rise to fill the place of the gas. The explanation of this fact is, that in nitrous oxide there is as large a volume of nitrogen as of the compound gas, that is, in two volumes of the gas there are two volumes of nitrogen and one volume of oxygen, these three volumes being condensed into two. The combination of gases by volume offers no difficulty if the student remember that simple gases are reckoned as *one* and compound gases as *two* volumes. To illustrate this statement—

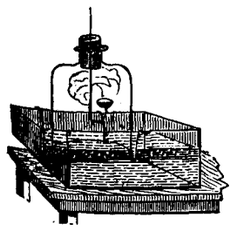


Fig. 34.

$$5N_2O + 2P = P_2O_5 + 10N$$

represents the process which takes place when phosphorus is burnt in nitrous oxide. The P_2O_5 (phosphoric acid), which is formed, being a solid, does not enter into our calculations of the volumes of the gases; but it will be observed that there are five atoms of a compound gas (N_2O), and on the other side of the equation ten atoms of the simple gas N: hence, according to the above statement, if we reckon the compound gas as two volumes, we shall have *ten volumes* of N_2O, and after the combustion has taken place we shall still have an equal quantity (ten volumes) of gas left—namely, ten volumes of the simple gas N, which is verified by the experiment.

To give another example: carbonic oxide burns with oxygen to form carbonic acid gas, thus:—

$$CO + O = CO_2.$$
$$2 + 1 = 2.$$

The figures represent the volumes, that is, two volumes of CO (carbonic oxide) and one volume of oxygen combine to form two volumes of CO_2 (carbonic acid). We shall find that ammonia is separated into its component gases, nitrogen and hydrogen, under certain circumstances, or as thus expressed:—

$$NH_3 = N + 3H.$$
$$2 = 1 + 3;$$

or two volumes of ammonia when decomposed become one volume of nitrogen and three of hydrogen, or four volumes of the constituent gases, in combining to form ammonia, condense into two volumes. We shall often meet with illustrations of this simple rule.

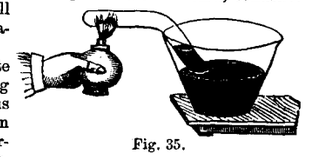


Fig. 35.

There is a more delicate method of demonstrating the composition of nitrous oxide. The bent tube in Fig. 35 is filled with mercury, a small piece of potassium having been introduced into the bent part by an iron wire; the tube is inverted into a capsule of mercury, and nitrous oxide gas passed into it. Heat is then applied to the potassium, the end of the tube beneath the mercury being covered by the finger to prevent the escape of the gas when combustion takes place. The potassium takes the oxygen from the gas, forming potash, and the nitrogen is left. After the combustion is perfected, the finger may be removed, and it will be found that the mercury stands at the same point in the tube, thus proving that although the oxygen has been abstracted, it retains its original volume.

The most remarkable property of nitrous oxide, and from which it takes the name of "laughing gas," remains to be mentioned. It may be inhaled from an india-rubber bag. Place the tube from the bag in the mouth, close the nostrils, and breathe the gas in the bag. After about 2½ minutes a pleasurable sensation will be experienced, which expresses itself in uncontrolled fits of laughter, or it may be exhibited in muscular exertion, which, if the subject be strong, amounts to "dangerous." There is little or no danger in this experiment to the majority of persons; but where the heart is diseased, or in persons of full habit, it had better not be attempted. Within the last few months the pure gas, unmixed with air, has displaced chloroform in minor operations, especially in dentistry. The patient breathes the gas and becomes unconscious and insensible to pain. The effect lasts a minute, or a little longer.

Nitric Oxide ($N_2O_2 = NO$; combining weight, 30; density, 15).—As the termination *ic* will indicate, this gas contains more oxygen than nitrous oxide. It is easily obtained by acting on copper with nitric acid diluted with 2½ times its volume of water. The action is thus expressed:—

$$3Cu + 8HNO_3 = 3(Cu2NO_3) + 4H_2O + N_2O_2.$$

The flask will be found full of red fumes, for nitric oxide combines at once with oxygen to form nitric tetroxide, which is a deep-coloured gas. This action is an infallible test for the presence of nitric oxide. The gas may be collected in the usual way over water, and it will be found to be colourless. It is less ready to support combustion than nitrous oxide, seeing that it requires a greater heat to decompose it, so that its oxygen may take part in the combustion. Phosphorus, when immersed in this gas, must be very thoroughly ignited, or it will be extinguished. Pelouze suggests the following manner for procuring this gas perfectly pure:—Digest hydrochloric acid with iron filings till it will dissolve no more; decant—that is, pour off—the clear liquid, and add to it its own bulk of hydrochloric acid. Place the liquid in a retort, and add potassium nitrate (saltpetre), and the nitric oxide begins to come off in large quantities. The composition of the gas may be determined as in the case of nitric oxide. If the formula be N_2O_2, it will be evident that we must have as much nitrogen left after the combustion as there was nitric oxide before. Thus:—

$$N_2O_2 = 2N + 2O.$$
$$2 = 2 + 2.$$

The oxygen, being in a solid state in the potash, is not taken into

feelers, or else with a fruit-like rounded organ, which, like a fruit, eventually drops off when fully developed. It is true that if we were to attempt to guess at the functions of these organs from this analogy, we should find these appearances very deceptive. These creatures never derive any nutriment through their roots or stems as plants do, but only through the little mouths at the ends of the branches. Again, the flower-like heads are in function rather like leaves than flowers. Nevertheless, whatever the function, the general plan of structure and growth is identical, and the likeness was so marked that naturalists were long before they would admit that these creatures were not plants. The animals whose branching stems are so exactly like to plants and shrubs, are microscopic; but this same resemblance to vegetables is exhibited, though in a less striking form, in the higher and larger members of the sub-kingdom. If the reader, while peering into the clear waters of a pool left by the ebb of a spring tide, should see a rock covered by a multitude of flower-like heads, each with many circles of purple-tipped tentacles radiating from a common centre like the anthers of the wild rose or the buttercup, all of which seem to float and sway passively with each little eddy he excited, he would certainly take them for sea flowers. Even the common *actinia*, which is left dry on the rock, collapsed into a dome of jelly, might readily be taken for a flower when, at the first approach of the sea, it expands from this bud-like condition into a spreading disc, fringed not only with tentacles, but with a circular row of bright blue knobs.

Otherwise well-educated men, who know nothing of the natural sciences (and the number of these is large), often declare that the lowest animal is but little removed from the highest plant. This, however, is a popular error, and the reverse of this is the case. The true statement is that both kingdoms start from the same point. The simplest and lowest forms of both, especially in their immature condition, are almost identical. At this simplest and earliest stage of development, the plant makes quite as decided an approach towards the typical life of an animal as does the animal make a counter-approach towards the typical life of a vegetable. The young spore of a conferva (vegetable) is locomotive, and moves by the same mechanism as a protozoon. Thus the animal and vegetable kingdoms not only meet at their lowest point, but the vegetable, so to speak, travels more than half way to effect the meeting. From this common point of contact the two kingdoms slowly diverge from one another; but the divergence is so gradual, the angle of divergence is so small, that for some distance they move in an almost parallel course. Now, as the vegetable stops far short of the development of the animal kingdom, we must look for the parallel to its higher forms, not in the lowest animals of all, but in those at some little distance up the scale; not in the last and lowest division, *Protozoa*, but in the penultimate sub-kingdom, *Cœlenterata*. It must, however, be remembered that the analogy to plants is only a parallel. There are no intermediate forms connecting the most plant-like hydrozoon with the most coral-like plant. To find the links of the chain of life which connects them, we must run downward through all the grades of animal life, to mount up again by the different grades of vegetable development. We shall find that though there are fundamental differences, yet the analogy is very strict between Cœlenterata and plants in very many respects.

Though unlimited growth and repetition of parts be the main characteristic of both Cœlenterata and the higher plants, some of the former are simple enough. Just as the little pasch-flower (*Anemone pulsatilla*) sends up its one blossom in the grass, so does the little fresh-water hydra extend its few tentacles around the mouth end of its tubular body, while it attaches itself, by the other end of the tube, to a water-weed.

This animal is simply a tube or bag, while its tentacles are narrower tubes, whose hollows communicate with the main one. These are arranged in a circle round the mouth, which is a perforation in the free end of the tube. The bag is flexible, and composed of two layers of tissue closely adhering to one another. The stuff of which the bag is made is double, and the lining is so like the outer stuff, that the bag can be turned inside out, as Baron Munchausen served the wolf, without deranging its economy. The long arms sway about in search of food. Any little animal unfortunate enough to come in contact with them, becomes benumbed by some stinging organs they contain. They then close around the prey, and press it in through the mouth into the interior, where its soft parts are dissolved, and its insoluble part is passed out again by the way it entered.

This short description leads us to remark upon the character which cuts off the Cœlenterata from the higher animals. In the case mentioned, it will be noticed that the animal is, so to speak, all stomach. The bounding wall of the stomach is also the wall of the body. In the higher animals the food cavity is distinct from the body cavity. These higher animals consist of a tube within a tube. The nutriment derived from food by them is strained through the walls of the inner tube, or otherwise abstracted from it before it can be applied to the maintenance of the tissues of their bodies. In all the Cœlenterata, the food tube is not shut off from the cavity of the body. In the *hydra*, the stomach is identical with the body cavity; in others, the stomach is continuous with the body cavity, being only partially cut off from it by a circular valve, so that the stomach acts as a kind of porch or vestibule to detain the food a short time, and it is then passed on into the lower part of a tube of equal dimensions. In others, the central stomach divides into radiating hollows, and these divide and subdivide, and often produce a network of fine canals. In these the stomach presents the structure, and has also the office of both stomach and blood system of higher animals. All the animals which have stomachs such as we have described, belong to the subdivision of the Cœlenterata called *Hydrozoa*. The other subdivision, called *Actinozoa*, presents a different arrangement. With them, although the stomach freely communicates with the body cavity, it is not identical with it, and cannot be said to be continuous with it. Indeed, these animals show an approach to a higher grade by having a stomach within the body wall; but this tube within a tube is not a perfect one, but opens below into the general cavity of the body. Also a number of partitions run from the body wall to the stomach, so as to maintain the latter in its position, and to divide the body cavity into compartments. This arrangement is well seen in Figs. V. and VI.

To return to the Hydrozoa. The simple hydra is a locomotive tube, but it fixes itself by one end in a temporary manner. This animal produces young not only from eggs in the ordinary way, but also by putting forth buds from its sides, which, while attached to the parent, develop mouths and arms, and then become separated, being able to live for themselves.

The hydra, therefore, exhibits functions and tendencies which, when carried to a greater extent in other species, produce very many modifications, and these may be grouped under two types, which, though apparently very different, are, as we shall see, closely connected with one another.

1st, the fixed and branched hydrozoa, with long branching stem, each of whose heads is very like the hydra; and 2nd, the free swimming hydrozoa, which float at large in the ocean, and have locomotive organs to raise them to the surface and propel them along.

The animals which range themselves round the first of these types are the most perfect examples of the vegetative habit. The home of the Cœlenterata is the water, and almost all except the hydra live exclusively in the salt waters of the ocean. These *fixed* hydrozoa, of course, need not only an atmosphere of water, but a bottom whereon to grow. They are to be found around our coasts, some of them in the pools left by the retreating tide between high and low-water mark. The dredge has brought up some of these animals from great depths, and it is probable that they flourish at still lower levels; but it is unlikely that they could live under the enormous pressure exerted by the overlying waters in the profundity of mid-ocean. Most of these plant-like compound animals are invested with a horny sheath which covers the stem and branches, so that the beautiful patterns in which they grow may be preserved after the soft parts of the animal have been dried up. A collection of such dried specimens gives a far better idea of the animals than a dry herbarium gives of the different species of plants; for the hard parts being of a stiffer nature, and external instead of internal, the outer form is far better preserved. Some of these hard sheaths or skeletons have at the end of each branchlet a little cup which, in the living state of the animal, defends the little hydra-like *polypite* (as it is called). In another order the sheath ends abruptly, allowing the polypite to be protruded nakedly beyond it.

The animals represented by the other type are far more independent. They need no sea-bottom, and are not confined to the coast, but swim freely in the sea far from any land. The naturalist who during a sea-voyage has energy enough to construct a surface-net and trail it from the vessel's stern in fine calm weather, is sure to be rewarded by obtaining many of these animals. They, however, of course, collapse when removed from their element, and have to be re-immersed in a pail of water before they exhibit their beautiful structure. We have said these animals swim in mid-ocean; but how do they swim? They swim by means of two different kinds of organs, one active and the other passive. One order is possessed of a float or bladder which holds air, so that by means of this they can be kept near the surface while attached to their float, and hanging down from it either directly or by the intervention of a long living rope, the polypites extend themselves in order to be ready to devour any small prey with which they or their tentacles come in contact, as the whole system is drifted by wind and current along the surface. Other free-swimming hydrozoa have, in addition to or in lieu of floats, flexible and contractile cups, to the outside of which the strings of polypites are slung. These cups the animal causes to be suddenly contracted by bringing the sides of the cup forcibly together, and so driving out the water. This motion causes the cup to be driven in the direction towards which the bottom of the cup is turned, and so to drag after it the chain of polypites. The cup is then allowed slowly to dilate by the elasticity of its substance, and is then again forcibly contracted. It may be conjectured that these swimming organs, though they have a locomotive function, are not used to effect locomotion in any definite direction, except it be upward or downward. No doubt, the instinct of these creatures, low as it is, induces them to seek the surface in fine calm weather, and to sink to stiller depths when rain and storms come. These again may also be used to effect change of place when the waters are stagnant; but, of course, the animals so moved do not pursue their prey. Trailing as a car from its balloon, these creatures are floated through the ocean and find their food haphazard. The question arises, how do these soft and feeble creatures secure live things which have much greater power of locomotion than themselves, and whose struggles, one would think, would be sufficient to tear the delicate arms of their captors quite away? Their power of capture is rather chemical than mechanical. All the Cœlenterata have small organs embedded in their tissues near the surface, called thread-cells. They are especially numerous in the tentacles, and consist of small double-walled sacs. The outer sac bursts under the slightest excitement or touch, and a long fine thread, which lay coiled up between the two sacs, and is attached to the end of the inner sac, is darted forth with a rapid motion. This thread is a sting which conducts poison into the body of the animal it touches; but whether the poison is contained in the inner sac, and is passed up through the thread, or whether it lies between the sacs, does not seem to be ascertained. Whatever the method, the fact of the stinging sensation produced by the thread-cell is demonstrable enough. Not only are the little animals which come in contact with the arms of the hydrozoa seen to become benumbed and helpless, but even upon man the stinging is sometimes severe. One of the largest of the float-bearing hydrozoa, which is a very conspicuous object at sea, not only from its comparatively large size, but also from the beauty of the rainbow tints which shine forth from its float, is called the Portuguese man-of-war. This animal furnishes the rough-and-ready seaman with a means of gratifying his taste for practical jokes. The Portuguese man-of-war is put in a pail, and the novice is induced to touch it, when he not only becomes the victim of the discharge from the man-of-war, but also of a broadside of laughter from the crew of his own vessel. Aristotle was so well acquainted with the stinging power of these animals, that he called them Acalephæ (or nettles).

There is another order of free-swimming hydrozoa, which differ from those described in that their swimming cup is single, and instead of having the living rope with its polypites and tentacles slung on to its outside, has a single polypite suspended from the centre of its under or concave side, while the tentacles are arranged at regular intervals round the margin of the cup. The mouth of the polypite leads into a central stomach, which sends out radial canals to run to the margin, and these are there connected with a circular canal, which runs round the lip of the cup. These are called Medusæ, from Medusa, whom Neptune loved for her golden locks, which were afterwards converted into headed snakes. Whether the large round disc-like bodies of these creatures, which every one must have seen who has been by the seaside, best represent the Gorgon before or after the transformation, must be left to the imagination of each individual. These creatures are also remarkable because they present the first indications of those organs of sense which become so complicated in higher animals. Around the margin of the cup or bell of some Medusæ, sometimes situated just opposite each tentacle, and sometimes between these, sometimes protected by a kind of flap and exposed nakedly on a slight projection, are found a number of little roundish bodies. These generally consist of a little vesicle with a nerve ending behind it, and a spot of bright-coloured pigment behind this again. Other of these bodies enclose in a vesicle a little crystal of carbonate of lime. It is thought that the first are adapted to receive impressions of light; and the last, vibrations of sound. In fact, they are the simplest eyes and ears known in the animal kingdom.

Another order of the hydrozoa are like the simple hydra in that they have a disc by which they can fix themselves in a temporary way, but they differ from these animals in that they possess an organ expanded round the polypite, called an umbrella. This organ they can use as a swimming organ when they détach themselves.

Thus the Hydrozoa have been divided into seven orders, thus defined:—

1. *Hydridæ*.—Animals characterised by a single locomotive polypite.

2. *Corynidæ*.—Animals, simple or compound, which are fixed, and have no cups developed from the hard outer layer to protect the polypites.

3. *Sertularidæ*.—Compound animals, with protective cups to their polypites.

4. *Calycophoridæ* (Cup-bearers).—Free-swimming animals, with an undivided string of polypites slung to the outside of one or more swimming cups.

5. *Physophoridæ* (Float-bearers).—Like the last, but having floats.

6. *Medusidæ*.—Animals with a single polypite hanging from the centre of a large cup-like disc.

7. *Lucernaridæ*.—Animals characterised by an umbrella.

These would seem at first sight to be good marked characters, by which to distinguish the orders; but in reality these orders are only provisional, and their unsatisfactory character will illustrate how futile it is to endeavour to classify animals before we know their whole life-history. It is found that some of the flower-like heads of the orders 2 and 3 become developed into animals precisely like those belonging to the order 6, and then drop off and swim away as complete Medusæ. Further, some of the order No. 7, which swim freely, give birth to young that become permanently fixed, and grow for some time like animals of the second and third order. The circle of life, however, is completed in both cases, for the free-swimming Medusæ have young which grow into compound animals, like the stock from which they were derived, and the fixed young of the Lucernaridæ, when exposed to fresh or unfavourable conditions, have their tubular bodies transversely divided into a number of saucer-shaped discs, which one by one become detached, and swim away to become developed into an umbrella-bearing Lucernarid.

The phenomenon above described is called an "alternation of generations," but the phrase is an objectionable one.

In the engraving, two forms (Figs. VII., VIII.) taken from the other class, which is called *Actinozoa*, are given, in order to show the contrast between them and the Hydrozoa; but we must leave the description of them for another lesson.

READING AND ELOCUTION.—XVIII.

ANALYSIS OF THE VOICE—(*continued*).

RULES ON EXPRESSIVE TONES (*continued*).

Rule 4.—*Awe* has usually a "suppressed" force, a "very low" note, and a "very slow" movement. *Solemnity, reverence*, and *sublimity* have a "moderate" force, a "low" note, and a "slow movement." All four of these emotions are uttered with "effusive medial stress," and deep, but "pure," "pectoral quality;" together with a prevalent "monotone."

account: hence two volumes of N_2O_2 = two volumes of nitrogen; but this is found not to be the case, for upon removing the finger, the mercury rises in the bent tube exactly *one-half* the volume occupied by the gas. Therefore the formula for nitric oxide must be NO, and not N_2O_2:—

$$NO = N + O.$$
$$2 = 1 + -;$$

that is, the volume of nitrogen is one-half that of the nitric oxide, which agrees with the result of the experiment.

This gas has not yet been liquefied.

Nitric trioxide, or *nitrous acid* (N_2O_3; combining weight, 76; density, 38).—This gas is noted for its deep-red colour. The most ready method of preparing it is by heating in a capacious retort 1 part of starch with 8 of nitric acid. The gas liberated is almost pure N_2O_3.

It forms compounds called *nitrites*. A very minute trace of any nitrite may be detected by mixing a dilute solution of potassium iodide with starch and a little dilute hydrochloric acid. Render the liquid to be tested also acid with hydrochloric acid; then mix the two liquids; if any nitrite be present, the liquid will become blue. These salts may frequently be detected in the well-water of towns.

When this gas is reduced to a temperature of −18° Cent., the red fumes become a dark-blue liquid. When added to water, it is at once decomposed into nitric oxide and nitric acid, thus:—

$$3N_2O_3 + H_2O = 2HNO_3 + 4NO.$$

Nitric tetroxide, or *nitric peroxide* (NO_2; combining weight, 46; density, 23).—The reddish-brown fumes which appear when nitric oxide meets with oxygen are chiefly of this substance.

It is best prepared by heating lead nitrate in a small glass retort. The fumes which are given off are a mixture of peroxide of nitrogen and free oxygen; if they are conducted through a bent tube which is surrounded by ice and salt, the peroxide becomes condensed into a liquid. The reaction is thus expressed:—

$$2(Pb2NO_3) = 2\,PbO + 4NO_2 + O_2.$$

The red fumes are very suffocating, but will support the combustion of a taper immersed in them. This compound may be distinguished from the former, nitrous acid, by its power of imparting to a neutral solution of potassium sulpho-cyanide, a red tint; an excess of the peroxide, however, renders the liquid again colourless.

The *compounds of nitrogen and hydrogen are*:—

Amidogen	NH_2
Ammonia	NH_3
Ammonium	NH_4

Amidogen (NH_2) is not known in a separate state, but it is believed to exist as a constituent of numerous compounds which chiefly belong to organic chemistry, and are termed *amides*.

Ammonia (NH_3; combining weight, 17; density, 8·5).—This compound receives its name from the fact that it was first prepared from the dung of the camels which the Arabs collected at the temple of Jupiter Ammon, the halting-place before the journey of the desert of Libya was undertaken. Nitrogen and hydrogen do not combine directly with each other, but it seems whenever they are liberated together by the decomposition of any compound containing them, they unite to form ammonia, and it appears frequently to be formed when hydrogen, in its *nascent* state—that is, just liberated from its combination—meets with nitrogen of the air. Thus, if iron filings be moistened and exposed to the air they become oxidised, partly at the expense of the oxygen of the water; and the hydrogen as it is liberated forms, with the nitrogen, ammonia, which is found in the compound. This is also exhibited when tin, zinc, iron, and some other metals are acted on by dilute nitric acid, thus:—

$$9HNO_3 + 4Zn = 4(Zn2NO_3) + 3H_2O + NH_3.$$

The whole action is not expressed by this formula—for the water which dilutes the acid is decomposed—and the equation may be rectified by using the liberated constituents of the water. Any organic bodies which contain nitrogen when distilled in a closed vessel give off ammonia. Formerly this method was resorted to for its production from horn clippings, hence its name—spirits of *hartshorn*. It is now obtained from the refuse products of the distillation of coal in the manufacture of gas. For the laboratory it may be prepared by gently heating equal weights of quick-lime (oxide of calcium), made into a paste with water and sal-ammoniac, which is ammonium chloride.

$$CaO + 2NH_4Cl = CaCl_2 + 3H_2O + 2NH_3.$$

The gas must either be collected over mercury or by displacement, as in the case of hydrogen (Fig. 23), as it is one-half as heavy as air. Its specific gravity is 0·59, and it possesses the well-known pungent odour of "smelling salts."

When breathed it has a violent irritating power on the pulmonary passages. It is a powerful base, neutralises the strongest acids, and returns the colour to litmus paper reddened by an acid.

It is very soluble in water. The liquid at 0° Cent. and 760 mm. pressure is capable of absorbing 1149 times its volume. If a jar of the gas be held with its mouth downwards to the surface of water, the water will rush into the jar as into a vacuum, and unless the glass be strong the jar will probably break.

When water containing ammonia is heated, the gas is given off, so that at 20° Cent. only half the quantity of gas is retained which the water possessed at 0° Cent.

When submitted to a pressure of 7 atmospheres at the ordinary temperature of the air, the gas becomes a liquid, which boils at −38·5° Cent., and freezes into a transparent solid at −175° Cent.

This fact has been advantageously applied by M. Carré to freeze water. A saturated solution of ammonia is placed in a strong iron vessel, which is connected by a pipe with a "receiver," which is a cavity in the thick wall of a cylindrical vessel. When heat is applied to the liquor ammonia, the gas is given off in large quantities; but not being able to escape, it finds itself under great pressure, and begins to condense into a liquid in the receiver. The interior of the cylindrical vessel is filled with water, the heat is now removed from the other vessel, and the temperature of the water it contains is reduced by pouring cold water over it. But this renders the water it contains capable of absorbing the gas again, and therefore the liquefied gas in the "receiver" begins to evaporate rapidly; this, however, it cannot do, without absorbing a large quantity of latent heat, and hence the water which the "receiver" surrounds freezes.

Ammonium (NH_4).—Place a globule of mercury in a cavity in a piece of sal-ammoniac, and moisten it with liquor ammonia; then if the positive wire of a battery be attached to the salt, and the mercury be touched with the negative, the globule will swell and assume all the appearance of an amalgam. When the current is suspended, the mercury returns to its ordinary state, giving off ammonia and hydrogen.

There is only one way of accounting for this, namely, that sal-ammoniac is a chloride of a metal (NH_4Cl), and that in the ordinary way electrolysis took place—the metal combining with the mercury formed an amalgam. But this compound only having permanence under the influence of the current, decomposes when the current is interrupted.

Nessler's test discovers the most minute quantity of ammonia. Saturate the solution supposed to contain ammonia with potash, then add potassic iodide saturated with mercuric iodide. If any ammonia be present, a "brick-dust" precipitate will appear.

The composition of ammonia is discovered by leading the gas through a red-hot porcelain tube, or by passing a series of electric sparks. Either of these methods resolves the compound into its components, which are found to occupy double the volume of the gas, as might be expected from this equation, which has been previously alluded to:—

$$NH_3 = N + 3H$$
$$2 = 1 + 3;$$

that is, two volumes of NH_3 become, when decomposed, four volumes of the mixed gases.

LESSONS IN GREEK.—X.

THE THIRD DECLENSION (*continued*).

THERE is yet another class in the subdivision of nouns whose nominatives append *s* to the stem (see page 258), of which the stem ends in ν or ντ. As examples, take ἡ ῥις, ῥιν-ος, the nose; ὁ δελφις, δελφιν-ος, a dolphin; ὁ γιγας, γιγαντ-ος, a giant; ὁ οδους, οδοντ-ος, a tooth (Latin, *dens*, English, *dentist*).

Singular.

Nom.	ῥις.	δελφις.	γιγας.	οδους.
Gen.	ῥιν-ος.	δελφιν-ος.	γιγαντ-ος.	οδοντ-ος.
Dat.	ῥιν-ι.	δελφιν-ι.	γιγαντ-ι.	οδοντ-ι.
Acc.	ῥιν-α.	δελφιν-α.	γιγαντ-α.	οδοντ-α.
Voc.	ῥιν.	δελφις (ιν).	γιγαν.	οδους.

Plural.

Nom.	ῥιν-ες.	δελφιν-ες.	γιγαντ-ες.	οδοντ-ες.
Gen.	ῥιν-ων.	δελφιν-ων.	γιγαντ-ων.	οδοντ-ων.
Dat.	ῥι-σι.	δελφι-σι.	γιγα-σι.	οδου-σι.
Acc.	ῥιν-ας.	δελφιν-ας.	γιγαντ-ας.	οδοντ-ας.

Dual.

N.A.V.	ῥιν-ε.	δελφιν-ε.	γιγαντ-ε.	οδοντ-ε.
G.D.	ῥιν-οιν.	δελφιν-οιν.	γιγαντ-οιν.	οδοντ-οιν.

To this class belong the following adjectives:—

1. In -ας, -αινα, -αν, as μελας, μελαινα, μελαν (gen. μελανος, μελαινης, μελανος), black; and ταλας, ταλαινα, ταλαν, unhappy.

2. Πας, πασα, παν (gen. παντος, πασης, παντος), all, every; and its compound ἁπας, ἁπασα, ἁπαν.

3. Ἑκων, ἑκουσα, ἑκον (gen. ἑκοντος, ἑκουσης, ἑκοντος), willing; and ακων, ακουσα, ακον, unwilling (ἀ *privative* making ἑκων into ακων).

4. The adjectives in -εις, -εσσα, -εν. For example, χαριεις, χαριεσσα, χαριεν, lovely, which have in the dative plural of the masculine and neuter gender -εσι instead of -εισι, as it is in λειφθεις, left behind; for the participles in -εις, -εισα, -εν, form the case regularly in -εισι.

Singular.

Nom.	ὁ χαριεις,	ἡ χαριεσσα,	το χαριεν.
Gen.	χαριεντος,	χαριεσσης,	χαριεντος.
Dat.	χαριεντι,	χαριεσσῃ,	χαριεντι.
Acc.	χαριεντα,	χαριεσσαν,	χαριεν.
Voc.	χαριεν,	χαριεσσα,	χαριεν.

Plural.

Nom.	χαριεντες,	χαριεσσαι,	χαριεντα.
Gen.	χαριεντων,	χαριεσσων,	χαριεντων.
Dat.	χαριεσι,	χαριεσσαις,	χαριεσι.
Acc.	χαριεντας,	χαριεσσας,	χαριεντα.
Voc.	χαριεντες,	χαριεσσαι,	χαριεντα.

Dual.

N.A.V.	χαριεντε,	χαριεσσα,	χαριεντε.
G.D.	χαριεντοιν,	χαριεσσαιν,	χαριεντοιν.

Singular.

Nom.	ὁ λειφθεις,	ἡ λειφθεισα,	το λειφθεν.
Gen.	λειφθεντος,	λειφθεισης,	λειφθεντος.
Dat.	λειφθεντι,	λειφθεισῃ,	λειφθεντι.
Acc.	λειφθεντα,	λειφθεισαν,	λειφθεν.
Voc.	λειφθεις,	λειφθεισα,	λειφθεν.

Plural.

Nom.	λειφθεντες,	λειφθεισαι,	λειφθεντα.
Gen.	λειφθεντων,	λειφθεισων,	λειφθεντων.
Dat.	λειφθεισι,	λειφθεισαις,	λειφθεισι.
Acc.	λειφθεντας,	λειφθεισας,	λειφθεντα.
Voc.	λειφθεντες,	λειφθεισαι,	λειφθεντα.

Dual.

N.A.V.	λειφθεντε,	λειφθεισα,	λειφθεντε.
G.D.	λειφθεντοιν,	λειφθεισαιν,	λειφθεντοιν.

VOCABULARY.

Ακτις, -ινος, ἡ, a beam, ray.	Ευπορος, -ον (with gen.), easily passed, abounding.	Μαχη, -ης, ἡ, fight, battle.
Αυτος, he himself (Latin, *ipse*); ὁ αυτος, the same (Latin, *idem*).	Ἡλιος, -ου, ὁ, the sun.	Οσφραινομαι (gen.), I smell something.
Βρωμα, -ατος, το, food.	Κωτίλος, -η, -ον, loquacious.	Ποτε, once (an enclitic).
Ελεφας, -αντος, ὁ, an elephant, ivory.	Λειαινω, I make smooth, polish, masticate.	Φιλανθρωπος, man-loving, philanthropic.
	Λιβυη, -ης, ἡ, Lybia, Africa.	Χωρα, -ας, ἡ, country, district.

EXERCISE 31.—GREEK-ENGLISH.

1. Ου πασιν ανθρωποις ὁ αυτος νοῦς εστιν. 2. Τοις οδουσι τα βρωματα λειαινομεν. 3. Οἱ δελφῖνες φιλανθρωποι εισιν. 4. Εστιν* ανδρος αγαθου παντα κακα ανδρειως φερειν. 5. Πολλαι Λιβυης χωραι ευποροι εισιν ελεφαντος. 6. Παντες κωτιλον ανθρωπον εχθαιρουσιν. 7. Τοις γιγασι ποτε ην μαχη προς τους θεους. 8. Ταις του ἡλιου ακτισι χαιρομεν. 9. Ῥινων εργον εστιν οσφραινεσθαι.

* The verb εστι with a genitive, as here, signifies "it is the duty of," "it is becoming in."

EXERCISE 32.—ENGLISH-GREEK.

1. We have ivory. 2. Ivory is produced (γιγνομαι) in districts of Africa. 3. The rays of the sun delight the shepherds. 4. The brothers and the sisters are delighted by the rays of the sun. 5. The sister is lovely. 6. We admire fine ivory. 7. Many elephants are in Africa. 8. The business of the teeth is to masticate the food. 9. It is the duty of every man to worship the divinity. 10. To the gods there once was (in idiomatic English, the gods once carried on) a war against (προς) the giants.

According to οδους are formed words compounded with οδους, as ὁ, ἡ μονοδους (gen. μονοδοντος), having one tooth; according to γιγας, adjectives in -ας, (gen. -αντος), as ὁ, ἡ ακαμας, unsubdued, unwearied.

2. NOUNS WHICH IN THE GENITIVE HAVE A VOWEL BEFORE THE TERMINATION -ος.

I pass on to this second great division of nouns (for the first great division the learner must refer to page 195); and here, first, I must take up substantives which end in -ευς, -αῦς, and -οῦς. The stem of these ends in υ. The υ remains at the end of the word and before consonants, but disappears in the middle between vowels. Nouns in -ευς have in the accusative singular -α, and in the accusative plural -ας; take in the genitive singular what is called the Attic form in -ως, instead of -ος; and in the dative singular, as well as in the nominative plural, admit contraction, which, however, is commonly not found in the accusative plural. If a vowel precedes -ευς, the whole singular and plural is contracted, as in χοευς. Nouns in -αῦς and -οῦς take the contraction only in the accusative plural. The words about to be declined are ὁ βασιλευς, a king; ὁ χοευς, *a measure* of liquid (about a gallon); ὁ, ἡ βοῦς, a bull *or* cow, an ox (Latin, bos, bovis); and ἡ γραῦς, an old woman.

Singular.

Nom.	βασιλευς.	χοευς.	βοῦς.	γραῦς.
Gen.	βασιλε-ως.	χυ(εω)ῶς.*	βο-ος.	γρα-ος.
Dat.	βασιλεῖ.	χοεῖ.	βο-ι.	γρα-ι.
Acc.	βασιλε-α.	χο(εα)ᾶ.	βοῦν.	γραῦν.
Voc.	βασιλεῦ.	χοεῦ.	βοῦ.	γραῦ.

Plural.

Nom.	βασιλεῖς.	χοεῖς.	βο-ες.	γρᾶ-ες.
Gen.	βασιλε-ων.	χο(εω)ῶν.	βο-ῶν.	γρα-ων.
Dat.	βασιλεῦσι.	χοεῦσι.	βουσι.	γραυσι.
Acc.	βασιλε-ας.	χο(εα)ᾶς.	(βο-ας) βοῦς.	(γρᾶ-ας) γραῦς.
Voc.	βασιλεῖς.	χοεῖς.	βο-ες.	γρᾶ-ες.

Dual.

N.A.V.	βασιλε-ε.	χοε-ε.	βο-ε.	γρᾶ-ε.
G.D.	βασιλε-οιν.	χοε-οιν.	βο-οιν.	γρα-οῖν.

VOCABULARY.

Αρχω (gen.), I govern.	Ἑκτωρ, -ορος, ὁ, Hector.	Ὁμηρος, -ου, ὁ, Homer.
Ατιμαζω, I honour not, dishonour, despise.	Επιμελεια, -ας, ἡ, attention to, care.	Οφθαλμος, -ου, ὁ, an eye.
Αχαριστος, -ον, unthankful.	Θυω, I sacrifice.	Πατροκλος, -ου, ὁ, Patroclus.
Αχιλλευς, -εως, ὁ, the hero Achilles.	Ἱερευς, -εως, ὁ, a priest	Πολυλογος, -ον, talkative.
Βουλομαι, I wish, will.	Κυρος, -ου, ὁ, Cyrus.	Τε (enclitic) — και, and—also, both.
Γονευς, -εως, ὁ, a parent.	Ληρος, -ου, ὁ, idle talk, chatter.	Τηλεμαχος, -ου, ὁ, Telemachus.
Εικαζω (dat.), I liken to, compare with.	Νομευς, -εως, ὁ, a shepherd.	Φονευω, I put to death, kill, murder.
	Νομη, -ης, ἡ, a pasture	
	Οδυσσευς, -εως, ὁ, Ulysses.	

EXERCISE 33.—GREEK-ENGLISH.

1. Οἱ βασιλεῖς επιμελειαν εχουσι των πολιτῶν. 2. Ἡ αγελη τῷ νομεῖ ἑπεται. 3. Ἑκτωρ ὑπ' Αχιλλεως φονευεται. 4. Οἱ ἱερεις τοις θεοῖς βοῦς θυουσιν. 5. Κυρος παῖς ην αγαθων γονεων. 6. Οἱ αχαριστοι τους γονεας ατιμαζουσιν. 7. Πειθου, ω παι, τοις γονεῦσιν. 8. Τηλεμαχος ην Οδυσσεως υἱος. 9. Βουλου τους γονεας προ παντος εν τιμαις εχειν. 10. Οἱ των γραῶν ληροι τα ωτα τειρουσιν. 11. Καλως αρχεις, ω βασιλεῦ. 12. Αἱ γρᾶες πολυλογοι εισιν. 13. Οἱ νομεῖς την βοῶν αγελην εις νομην αγουσιν. 14. Ὁμηρος τους Ἡρας οφθαλμους τοις των βοῶν εικαζει. 15.

* That is, χοεως is contracted into χοῶς, χοεα into χοᾶ, χοεων into χοῶν, and χοεας into χοᾶς.

Note.—When great force is expressed in the language, the tone becomes "loud" in *awe*.

Example of Awe.

O Thou unutterable Potentate!
Through nature's vast extent, sublimely great!—
But here, on these gigantic mountains here,
Thy greatness, glory, wisdom, strength, and spirit,
In terrible sublimity appear!
Thy awe-imposing voice is heard,—we hear it!—
The Almighty's fearful voice: attend! It breaks
The silence, and in solemn warning speaks.
Thou breathest! [$_{OO}$—] forest oaks of centuries
Turn their uprooted trunks towards the skies.
Thou thunderest! [$\|_{OO}$=] adamantine mountains break,
Tremble, and totter, and apart are riven!
[$_{OO}$] At God's almighty will,
The affrighted world falls headlong from its sphere.
Planets, and suns, and systems disappear!

Solemnity.

Father! thy hand
Hath reared these venerable columns; Thou
Didst weave this verdant roof. Thou didst look down
Upon the naked earth, and, forthwith, rose
All these fair ranks of trees. They, in thy sun,
Budded, and shook their green leaves in thy breeze,
And shot towards heaven. The century-living crow,
Whose birth was in their tops, grew old and died
Among their branches, till, at last, they stood,
As now they stand, massy and tall and dark,
Fit shrine for humble worshipper to hold
Communion with his Maker!

Reverence.

Oh! let me often to these solitudes
Retire, and in Thy presence reassure
My feeble virtue. Here, its enemies,
The passions, at thy plainer footsteps shrink
And tremble, and are still.
[$_{XX\ \ XX}$=] Be it ours to meditate,
In these calm shades, Thy milder majesty,
And, to the beautiful order of Thy works,
Learn to conform the order of our lives!

Sublimity.

Hail! holy Light, offspring of heaven first born,—
Or, of the Eternal, coeternal beam,
May I express thee unblamed? since God is Light,
And never but in unapproached light
Dwelt from eternity,—dwelt then in thee,
Bright effluence of bright essence increate;
Or hear'st thou, rather, pure ethereal stream,
Whose fountain who shall tell? Before the sun,
Before the heavens thou wert, and at the voice
Of God, as with a mantle, didst invest
The rising world of waters, dark and deep,
Won from the void and formless infinite.

Rule 5.—*Revenge* is "loud" and "low" in utterance; when deliberate, it is "slow,"—when violent, it is "quick;" it has the "medial stress;" and "aspirated," "pectoral," and "guttural quality," combined. It is marked by a prevalent "downward slide."

Examples.

O'N them, HUSSARS!—Now give them REIN and HE'EL!
Think of the ORPHANED CHILD, the MURDERED SIRE:
Earth cries for BLOOD,—[$_{H}$] in THU'NDER on them WHE'EL!
This hour to Europe's fall shall set the TRIUMPH SEAL!

Shylock. There I have *another* bad match: a BA'NKRUPT, a PRO'DIGAL, who dare scarce *show* his *head* on the Rialto;—a BE'GGAR, that used to come so *smug* upon the *mart*: *let him look to his* BO'ND: he was wont to call me U'SURER; LET HIM LOOK TO HIS BO'ND: he was wont to lend money for a CHRISTIAN CO'URTESY: *LET HIM LOOK TO HIS BO'ND!*

Rule 6.—*Scorn* is characterised by "loudness," by drawling "slowness," and a tone which, in the emphatic words, begins on a "high" and slides to a "low" note; by "thorough stress," and often a laughing "tremor," making the beginning, the middle, and the end of every emphatic sound distinct, and prominent, and cutting to the ear. The "quality" of the voice in this tone is strongly "aspirated," but not "guttural;" the "inflection" is usually "falling," but sometimes becomes the "wave" or "circumflex."

Examples.

Thou SLA'VE, THOU WRETCH, *THOU COWARD!*
Thou little *valiant*, great in *villainy!*
Thou ever *strong* upon the *stronger side!*
Thou FO'RTUNE'S *champion*, that dost *never fight*
But when her *humorous ladyship* is *by*
To teach thee *safety!*
Pale TRE'MBLING, COWARD!—[*Tremor*] *there* I throw my *gage:*
By *that*, and all the rights of knighthood *else*,
Will I make *good* against thee, *arm* to A'RM,
What I have *spoke*, or thou canst worse *devise*.

Rule 7.—*Indignation* is marked by full "loudness," "low" note, and deliberate "slowness;" a swelling "medial stress;" and the effect arising from the blending of "pectoral" and "guttural" tone, to all the extent consistent with "pure" "orotund," in vehement style. The characteristic inflection is uniform "falling."

Examples.

In this complicated crisis of *danger*, *weakness*, and *calumny*, terrified and insulted by the *neighbouring powers*, unable to *act* in America, or acting only to be DESTRO'YED, WHE'RE ‖ is the MAN ‖ who will venture to flatter us with the hope of success from *perseverance* in measures productive of *these dire effects?*—Who | has the EFFRO'NTERY to attempt it? WHE'RE ‖ is *that man?* Let him, if he DA'RE, STAND FORWARD, and SHOW his FA'CE.

Rule 8.—*Courage, joy, ardent love*, and *ardent admiration*, are distinguished by "loud," "high," and "lively" utterance; swelling "medial stress;" perfectly smooth and "pure" "quality" of tone; and frequent "falling" inflections.

Example of Courage and Ardent Admiration.

Now | for the FIGHT!—*now* | for the CA'NNON PEAL!—
FO'RWARD!—through BLOOD, and TOIL, and CLOUD and FIRE!
Glorious—the SHOUT, the SHOCK, the crash of STE'EL,
The VOLLEY'S ROLL, the ROCKET'S BLASTING SPIRE.

Joy.

Thou Child of Joy!
SHOUT round me: let me HEAR thy shouts, *thou happy Shepherd Boy!*

Ardent Love and Admiration.

Oh! speak again, bright angel; for thou art
As glorious to this sight, being o'er my head,
As is a *winged messenger of heaven*
Unto the white upturned wondering eyes
Of *mortals*, that fall back to *gaze* on him,
When he bestrides the lazy-pacing clouds,
And sails upon the bosom of the air.

Rule 9.—*Excessive grief* and *sorrow* are expressed by "loud," "high," and "slow" utterance; "tremor," or "intermittent stress;" and "pure" "quality," where not interrupted by sob, or "aspiration." The "falling inflection" prevails throughout the utterance of these emotions.

Example.

Capulet. Hâ! let me *see* her:—*Out, alas!* she's *cold;*
Her blood is settled; and her joints are stiff;
Life and these lips have long been separated;
Death lies on her, like an untimely frost
Upon the sweetest flower of all the field.
Accursed time! unfortunate old man!
Lady Capulet. ACCU'RSED, UNHAPPY, WRE'TCHED, HA'TEFUL day!
Most MISERABLE hour *that e'er time saw*,
In lasting labour | of his pilgrimage!
But *one, poor one*, ONE POOR and LOVING CHILD,
But *one* thing to rejoice and solace in,
And cruel *death* | hath *catched* it from my *sight!*

LESSONS IN GEOMETRY.—XVIII.

To any reader who has carefully studied our lessons on Geometry up to this point, and looked through the table of angles of regular polygons appended to the last lesson, it will be obvious that there are various methods of constructing any regular multilateral figure whose sides and angles are equal to one another. They may be drawn indeed by the aid of the protractor only in the first place; or by means of the circle and

protractor, or circle and scale of chords in the second place; or, lastly, by a regular process of geometrical construction.

The construction of the triangle, or trigon, which stands first in the table of regular polygons, already referred to, and which is the equilateral triangle, has been explained in Problem XVII. (Vol. I., page 209), and that of the square, or tetragon, in Problem XVIII. (Vol. I., page 255). As the remarks which will be made on the construction of the pentagon by the different methods above enumerated will apply equally to these, due regard being had to the difference in the number of the sides and the opening of the angles, nothing more need be said about them except in availing ourselves of them in the construction of figures whose sides are multiples of 3 and 4; as the hexagon, the number of whose sides is 3×2, or 6; and the octagon, the number of whose sides is 4×2, or 8; any number being a multiple of a lesser number by that number. This brings us to

PROBLEM XLVI.—*To construct a regular pentagon on a given straight line by the aid of the protractor only.*

Let A B (Fig. 65) be the given straight line on which it is required to construct a regular pentagon. Produce A B indefinitely both ways to X and Y, and apply the base, or straight edge of the protractor, to the straight line X Y, so that the mark or notch in the centre of the base line shall rest on the point A. On referring to the table given in the last lesson, we find that the "angle of the polygon" for the pentagon, or, in other words, the angle formed by any two sides of the pentagon, is 108 deg. The degrees on a protractor are usually marked by tens; look therefore to the left of 90 for 110, and make a mark on your paper at the extremity of the *second line to the right* of 110 on the protractor, which will of course indicate 108. This is represented by the point z in Fig. 65, the extremity of the fine line on the semi-circular arc of the protractor marked 108. Join A z and produce it indefinitely to P, and along A P set off A C equal to A B. Apply the protractor to the straight line A P, so that the mark in the centre of its base line may rest on C, as indicated by the dotted lines in the diagram, and determine the direction of C Q, and set off along it C D equal to C A or A B. Repeat the process to find the point E, and then join E B. The figure A C D E B is a regular pentagon, and it is described on the given straight line A B as required.

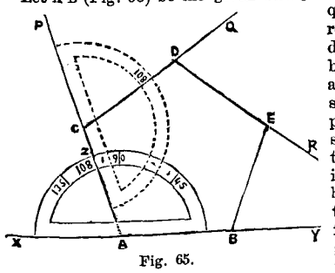


Fig. 65.

The process above described applies equally to the construction of any regular polygon having the angle of the polygon expressed in degrees only; but when the angle of the polygon is expressed in degrees and fractional parts of a degree, this mode of construction would be attended with difficulty and much uncertainty, unless the protractor were sufficiently large to admit of minutes being marked along its edge as well as degrees. For the sake of practice, which alone can ensure accuracy as well as neatness and nicety in geometrical drawing, the reader may attempt the construction, by means of the above process, of all the regular polygons in the table given at the end of the last lesson, whose angles are expressed in degrees only.

PROBLEM XLVII.—*To construct a regular pentagon on a given straight line by the aid of the circle and protractor.*

Let A B (Fig. 66) be the given straight line on which it is required to construct a regular pentagon. Bisect A B in F, and at the point F draw the straight line F G of indefinite length at right angles to A B. On referring to the table we find that each of the angles at the base of the triangles into which the pentagon may be divided by drawing straight lines from each of its angles to the centre, or, in other words, half the angle of the polygon, is 54 degrees. Apply the protractor to the straight line A B, so that the mark in the centre of the base line or chord may rest on A, and set off the straight line A H of indefinite length, making an angle of 54 deg. with A B. From the point K, the point of intersection of the straight lines A H, F G, with the radius K A, describe the circle A E D C B, and opening the compasses to the extent of the straight line A B, set off the points E, D, C, in the circumference of the circle A E D C B. Join A E, E D, D C and C B. The figure A E D C B is a regular pentagon, and is described on the straight line A B as required.

If it be required merely to describe a regular pentagon, nothing being said about its construction on a given straight line, we may proceed in the following manner:—From any point, K (Fig. 66), as centre, with any distance, K A, as radius, describe the circle A D B. Join A K, and at the point K, in the straight line A K, make, by the aid of the protractor, the angle A K B equal to an angle of 72 deg. This is done because the angle at the apex of the triangles into which a pentagon may be divided by drawing straight lines from each of its angles to its centre, is an angle of 72 deg., as may be seen from the table. Join A B, and opening the compasses to the extent of A B, set off the points E, D, C in the circumference of the circle A D B, as before, and join the chords A E, E D, D C, C B, to complete the pentagon.

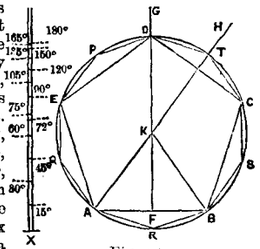


Fig. 66.

This gives us the key to the method of inscribing any regular polygon in a given circle, or, in other words, the method of dividing the circumference of a given circle into any number of equal parts. This method may be generally expressed for any polygon as follows:—

At the centre of the given circle make an angle containing the number of degrees in the angle at the apex of the equiangular and similar triangles into which the polygon may be divided by drawing straight lines from each of its angles to its centre. Join the points in which the circumference of the circle is intersected by the legs of the angle, or, in other words, draw the chord of the arc of the circumference of the circle intercepted between the legs of the angle. The straight line thus obtained will be one side of the required polygon, which may be completed by setting off arcs along the circumference of the circle, by opening the compasses to the extent of the chord of the arc intercepted between the legs of the angle made at the centre of the given circle, to determine the length of the side of the required polygon. The polygon is of course finally finished by drawing the chords of the arcs thus set off along the circumference of the given circle.

The student is recommended to attempt the construction of all the polygons named in the table whose angles are expressed in terms involving degrees only.

PROBLEM XLVIII.—*To construct a regular pentagon on a given straight line without the aid of the protractor and the circle; that is, by a regular process of geometrical construction.*

Let A B be the given straight line on which it is required to construct a regular pentagon without the aid of the protractor and circle. Produce A B indefinitely both ways to X and Y, and bisect it in C. At the extremity A draw the straight line A P, of indefinite length, at right angles to A B, and along it set off A E, equal to A B, and join C E. Then from C as centre, with the distance C E, describe the semicircle F E G, meeting the straight line X Y in the points F and G. From A as centre, with the distance A G, describe the arc G H, and from B as centre, with the distance B F, describe the arc F K, and let the arcs G H, F K, intersect in the point L. Bisect the arcs F L, G L, in the points M and N, and join A M, M L, B N, N L. The figure A B N L M is a regular pentagon, and it is described on the given straight line A B as required.

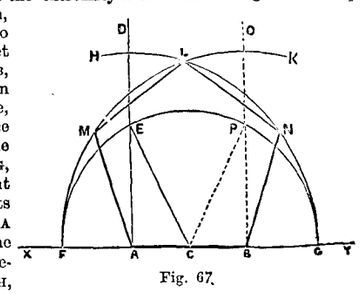


Fig. 67.

Πατροκλος φιλος ην Αχιλλεως. 16. Κυρον, τον των Περσων βασιλεα, επι τη τε αρετη και τη σοφια θαυμαζομεν.

EXERCISE 34.—ENGLISH-GREEK.

1. The flocks follow the shepherd. 2. The king has care of (for) the citizen. 3. Ears are tired by the idle talk of the old woman. 4. An old woman is talkative. 5. The shepherd leads the herd of oxen to the city. 6. Oxen are sacrificed to the gods by (ὑπο with gen.) the priests. 7. O priests, sacrifice an ox to the gods. 8. Children love their (the) parents. 9. Parents are loved by their children. 10. It is the business of a good shepherd to take (have) care of his herds.

KEY TO EXERCISES IN LESSONS IN GREEK.—IX.

EXERCISE 25.—GREEK-ENGLISH.

1. The ravens croak. 2. Avoid flatterers. 3. Keep away from the deceiver. 4. Men delight in the harp, in the dance, and in song. 5. Horses are driven by whips. 6. The harps delight the minds of men. 7. A grasshopper is friendly to a grasshopper, and an ant to an ant. 8. The shepherds sing to their pipes. 9. Among the Athenians there were contests between quails and cocks. 10. The shepherds drive the flocks of goats into the meadows. 11. The life of ants and quails is very laborious. 12. Many have a good countenance, but a bad voice.

EXERCISE 26.—ENGLISH-GREEK.

1. Φευγω κολακα. 2. Κορακες κρωζουσι. 3. Τερπεσθε φορμιγγι. 4. Ορχηθμοι τους ανθρωπους τερπουσι. 5. Ελαυνουσιν ἱππους μαστιγι. 6. Οἱ θυμοι των ανθρωπων ελαυνονται φορμιγγι. 7. Αἱ συριγγες τερπουσι τους ποιμενας. 8. Αἱ αιγες εις τον λειμωνα ελαυνονται. 9. Ὁ ποιμην ᾳδει προς την συριγγα. 10. Καλην μεν ωπα εχει ἡ θυγατηρ, κακην δε οπα.

EXERCISE 27.—GREEK-ENGLISH.

1. The birds sing. 2. Favour begets favour, (and) strife (begets) strife. 3. We count youth happy. 4. Need begets strife. 5. Rich men often conceal their baseness by (means of) wealth. 6. O fair boy, love your good brother and your fair sister. 7. Avarice is the mother of every kind of baseness. 8. The poor are often happy. 9. Wisdom in the hearts of men stirs up marvellous longings for the beautiful. 10. Death sets men free from their cares. 11. Friendship springs up by means of resemblance (in disposition). 12. Wine creates laughter. 13. Deliberation comes to the wise in the night. 14. The wise punish baseness. 15. Men often delight themselves with light (or vain) hopes.

EXERCISE 28.—ENGLISH-GREEK.

1. Ορνιθες ᾳδουσι. 2. Χαρις χαριν τικτει, ερις εριν. 3. Σοφιᾳ εγειρεται εν τοις των ανθρωπων θυμοις θαυμαστον ερως αγαθων. 4. Τερπομαι ᾠδῃ των ορνιθων. 5. Αἱ ᾠδαι των ορνιθων τερπουσι τον ποιμενα. 6. Τερπομεθα ορνισι. 7. Οἱ ανθρωποι επονται τοις αναξι. 8. Οἱ ανθρωποι πειθονται τῳ ανακτι.

EXERCISE 29.—GREEK-ENGLISH.

1. In difficult matters few companions are faithful. 2. The suppliants touch our knees. 3. Death is a separation of the soul and body. 4. Wealth furnishes men with various aids. 5. Do not yield to the words of wicked men. 6. Do not, my son, be a slave to the service of the body. 7. The Greeks pour cups of milk as libation-offerings to the nymphs. 8. Accustom yourself to, and exercise your body with, toil and sweat. 9. Chatterers vex (or weary) the ear with repetitions (of the same story). 10. Accustom your soul, my son, to good deeds. 11. Evil stories do not lay hold of our ears. 12. We listen with our ears. 13. Do not hate a friend for a small fault. 14. My son, taste the milk. 15. The soldiers bear lances.

EXERCISE 30.—ENGLISH-GREEK.

1. Ω νεανιαι, εθιζετε τα σωματα συν πονῳ και ἱδρωτι. 2. Ορεγομεθα των αγαθων πραγματων. 3. Πολλοι τερπονται χρυσῳ. 4. Ἐξ αγαθων πραγματος γιγνεται κλεος. 5. Τους καλους μυθους των σοφων θαυμαζομεν. 6. Τα των αγαθων ανθρωπων αγαθα πραγματα θαυμαζεται. 7. Οἱ στρατιωται μαχονται λογχαις. 8. Ου διαμειβομαι τον πλουτον της αρετης τοις αναξι. 9. Μη πειθεσθε τοις λογοις των ψευλων.

THE HISTORY OF ART.

X.—RAFFAEL.

THE culminating point of the Renaissance was during the first quarter of the sixteenth century; and the most famous name in art of this or any other period is that of Raffaello Sanzio, whom we English generally call Raffael. With him we reach the final stage of modern painting. Everything before Raffael is felt by most of us to be more or less mediæval: everything since him is felt to be purely modern. Whether the change of which he is the great exponent was in every respect an advance or not, at any rate it has been thorough and lasting. In our own days a few painters, struck by some of the best characteristics of the earlier Italian artists—their minute fidelity, their sincerity, their earnestness, their lack of theatrical effects or trickiness—have gone back in some matters to the pre-Raffaelites for their models; but even they have been largely and necessarily influenced by those new ideas and principles which Lionardo introduced and which Raffael and Michel Angelo perfected, while all other modern art is directly affiliated upon the Renaissance schools. It is not without the highest reason, therefore, that we look upon Raffael as the great epoch-making personage in the history of modern art.

Raffaello Sanzio was born at Urbino, in the States of the Church, in 1483. He was thus thirty years the junior of Lionardo, and eight years younger than Michel Angelo. But his comparatively short life makes him more the contemporary of the one, and rather the predecessor than the follower of the other; for Lionardo died only one year before his younger fellow, while Michel Angelo outlived him by over forty years. For this reason, though the date of Raffael's birth is later than that of Michel Angelo's, it is best in such a brief sketch as this to place the elder painter after the younger one, because his lifetime will carry us many stages further down in the history of the development of art. Michel Angelo's later works belong to a far more advanced school—not in principles, indeed, but in order of evolution—than those of Raffael.

As in many other cases, especially in Italy, Raffael's love for art, and his skill in the manual dexterity of his craft, were hereditary endowments. His father, Giovanni Santi, or Sanzio, was a painter of some eminence, not without touches of the same peculiar qualities which gave so much value to the works of the son. Young Raffael took his first lessons in art in his father's studio at Urbino while he was still a mere child, and when Giovanni died, the boy, then only eleven years old, went to Perugia, where he became an assistant to Pietro Vanucci, better known by his nickname of Perugino, one of the richest colourists and best handiworkers of his age, but a firm adherent of the older conventional mediæval school. Some of Perugino's later works, however, have probably been touched up in part by his great pupil. Naturally, young Raffael learnt at first to follow in the steps of his master, and the paintings which he produced while under Perugino's influence are commonly said to be in his "early bad style." At twenty-one, however, in the most plastic period of life, he went to Florence, where he fell in with all the great works of the Florentine school, and could trace the gradual emancipation of art from the days of Giotto to those of Lionardo, who had then returned to his native town, and had just completed his famous cartoon of the Battle of the Standard. Here, too, he had the opportunity of studying some of Michel Angelo's greatest works. Under the influence of these new ideas, Raffael's style soon moulded itself in a totally new direction. Casting off the conventional principles which he had learned from Perugino, the young artist threw himself with fervour into the new life of the Renaissance, and became a principal figure in the movement which was then stirring the heart of all contemporary Italy. As yet, however, Raffael remained to a great extent a follower rather than a leader, aiming at the sort of excellence which he found in Lionardo, in Michel Angelo, and in his friend Fra Bartolomeo, instead of striking out a wholly new line for himself. He had thrown off the rude composition and artificial grouping of Perugino, he had attained to great skill in the management of drapery and of light and shade, but he had not yet developed the peculiar Raffaelite beauty of expression and harmony.

Raffael remained four years in Florence, till the pope (Julius II.) invited him to Rome to decorate the Vatican. This was in 1508, when he had reached the age of twenty-five, and ranked already among the most famous painters of the day. The rest of his brief life was passed in the papal capital, where he died at the early age of thirty-seven, in 1520. At Rome the old imperial Roman frescoes on the Thermæ of Titus, now obliterated by time and weather, were still distinctly visible, and the study of these remarkable monuments (which must have somewhat resembled the frescoes of Pompeii, though doubtless of a much higher character than those provincial decorations) appears largely to have affected his further development. The contrast between the light and airy grace of the old Græco-Roman school and the stiffness of the traditional mediæval art, upon whose principles his artistic education had been conducted,

could not fail deeply to impress a young painter of such plastic gifts, already emancipated by his Florentine career, and ready to proceed further in the same direction whenever opportunity offered. Raffael set to work at Rome to infuse modern art with some of the old Greek lightness and grace. The product was seen in what is known as his third, or Roman style, which differs from the Florentine in its individuality and its great combination of various excellences. No longer content with following his masters, Raffael began, in his celebrated fresco of "Philosophy, or the School of Athens," to invent a new style for himself. If we compare the freedom of the figures, the naturalness of the grouping, the depth and mastery of the perspective, and the admirable power of true and noble expression displayed in this magnificent work, with any previous masterpiece of art—even with Lionardo himself—we can see at once what is the nature of that supreme excellence which has made Raffael the greatest name among the whole roll of modern painters. Whether we look at the conception itself, in its totality and in its detail, or at the technical mastery with which it is expressed—whether at the glorious realisation of a grand philosophic epoch and of noble intellectual personalities, or at the harmony of its arrangement and the perfection of its design, or at the natural anatomical pose of the figures, or at the drapery, the management of light, and the perspective, or at the beauty and delicacy of the colouring, or at the power and truth of the touch—we must acknowledge alike in every particular both the highest command of hand and muscle, and the informing soul blended into a whole by the subtlest interfusion of mental gifts and manual ability.



PHILOSOPHY, OR THE SCHOOL OF ATHENS. (*By Raffael.*)

At Rome, Raffael became the founder of a school, whose works cannot always be absolutely distinguished from his own, while many of them must have been executed under his eye, or even have received numerous touches from his hand. The best-known among his scholars are Giulio Romano and Caravaggio. Not a few pictures by other artists have also been attributed to so famous a painter either fraudulently or ignorantly, and it is therefore difficult to decide in some cases which are really his own works. But of his undoubted compositions there are quite enough to fill up the limits of a short and marvellously industrious life. In the first, or Peruginesque style, the "Marriage of the Virgin," at Milan, is the most familiar from numerous engravings, and best represents the comparative conventionality and stiffness of his boyish works, though even here it is possible to see in the germ those higher qualities which afterwards developed themselves under more favourable circumstances. Of his Florentine period, when his genius began first to allow itself somewhat freer play, we have an excellent example in the "St. Catherine" of our own National Gallery; while the "Madonna," or Virgin under a canopy, of the Pitti Palace at Florence may be taken as the best Italian specimen. "The School of Athens," of which we give an engraving, opened his third manner, and still necessarily remains upon the walls of the Vatican, together with the other magnificent series of frescoes of which it forms a part; not all of them, however, are entirely due to the pencil of the master himself. Perhaps his two most famous works are the oil-paintings of "St. Cecilia," at Bologna, and the "Madonna di San Sisto," in the gallery at Dresden. Equally exquisite in tenderness of feeling and in beauty of rendering are the well-known "Virgin and Child" and the "Madonna Ansidei" in our own National Gallery. But the "Transfiguration," his last work, familiar to almost every one by engravings, is often considered to be the noblest production of his genius in its more sublime and spiritual mood.

One of the best examples of Raffael's style which can be seen in England is that displayed by the seven cartoons, which were long placed upon the walls of Hampton Court Palace, but now form a part of the great national treasure at South Kensington. These cartoons are not paintings in any of the recognised methods, but are large coloured designs for the tapestry of the Sistine Chapel at Rome, and they are executed in the large and free style which suits that kind of wall-decoration. Sent to Flanders as models for the tapestry-workers, they were pur-

PROBLEM XLIX.—*To construct a regular pentagon by aid of the circle and the scale of chords.*

Let X (Fig. 66) represent a scale of chords constructed to suit the radius of the circle A D B (see Problem XX., Vol. I., p. 256), for the purpose of obviating the necessity of making another figure. Then with K as centre and a distance equal to the chord of an angle of 60 deg. on the scale, describe the circle A D B. Apply the compasses to the scale of chords, and open them to the extent of the space intercepted between X and the dotted line marked 72 deg., and mark any two points on the circumference, as A and B, with the compasses opened to the extent indicated. These are the extremities of an arc, the chord of which subtends an angle of 72 deg. at the centre, K, of the circle A D B. Set off the arcs A E, E D, D C, along the circumference of the circle and join A E, E D, D C, and C B. The figure A E D C B is a regular pentagon.

The learner should construct a scale of chords on a large scale, if he be not in possession of one, and then draw all the regular polygons named in the table whose angles are expressed in terms involving degrees only, according to the process just described.

LESSONS IN LATIN.—XVIII.

PREPOSITIONS.

THE Latin prepositions may be divided into two classes, according to the cases which they govern or require. Some require an accusative, others require an ablative case.

PREPOSITIONS GOVERNING THE ACCUSATIVE CASE.

Ad, *to, at.*
Ante, *before.*
Apud, *at, near, in the house of, in the writings of.*
Cis *or* Ci'tra, *on this side of.*
Circa, *around, about* (used of both time and place).
Circum, *around* (of place only).
Circiter, *about* (of time).
Contra, *over against* (of place), *against* (of hostility).
Erga, *in regard to.*
Extra, *out of, without* (in opposition to *within*).
In, *into.*
Infra, *beneath.*
Inter, *among.*
Intra, *within.*
Juxta, *beside.*
Ob, *on account of.*
Penes, *in the power of.*
Per, *through, by means of.*
Post, *after.*
Præter, *passing by, near.*
Prope, *near.*
Propter, *on account of.*
Secundum, *along.*
Supra, *above.*
Trans, *across.*
Ultra, *beyond.*
Versus, *towards.*

Versus stands with ad or in, the accusative being between the two, thus: in Italiam versus, *toward Italy;* ad oceanum versus, *toward the ocean.* The *ad* and *in* are omitted before names of cities; as, Romam versus, *toward Rome.*

VOCABULARY.

Arma, -orum, pl., *arms.*
Caducus, -a, -um, *falling, perishable.*
Camēlus, -i, m., *a camel.*
Causa, -æ, f., *a cause, a reason* (E. R. *to cause, excuse*).
Cometa, -æ, m., *a comet.*
Commemoro, 1, *I mention, speak of.*
Congrego, 1, *I meet together* (E. R. *congregation*).
Depascor, 1, *I feed upon.*
Exspiro, 1, *I breathe out, expire, die.*
Finis, -is, m., *an end.*
Galli, -orum, *the Gauls, the French.*
Generōsus, -a, -um, *generous.*
Metus, -ūs, m., *fear.*
Mirabilis, -e, *admirable.*
Mors, mortis, f., *death.*
Navigatio, -ōnis, f., *navigation.*
Odium, -i, n., *hatred.*
Officium, -i, n., *duty* (E. R. *official*).
Periculōsus, -a, -um, *dangerous* (E. R. *perilous*).
Piscis, -is, m., *a fish.*
Pictus, -a, -um, *painted* (E. R. *picture*).
Pluto, -ōnis, *Pluto, the ruler of the lower regions in classical mythology.*
Propero, 1, *I hasten.*
Raritas, -ātis, f., *rarity.*
Rhenus, -i, m., *the Rhine.*
Seges, segĕtis, f., *a field of corn.*
Species, -ei, f., *appearance, beauty.*
Vestis, -is, f., *a garment* (E. R. *vest*).
Victus, -a, -um, *conquered.*

EXERCISE 69.—LATIN-ENGLISH.

1. Nulla firma amicitia est inter malos. 2. Propero ad mortem. 3. Galli habitant trans Rhenum. 4. Nulla habemus arma contra mortem. 5. Vir generosus mitis est erga victos. 6. Cometæ ob raritatem et speciem sunt mirabiles. 7. Servi parent propter metum, boni propter officium. 8. Navigatio juxta litus* sæpe est periculosa. 9. Nemo est beatus ante mortem. 10. Quam ob causam (ob quam causam) rides? 11. Infra luna omnia sunt caduca. 12. Multos per annos (per multos annos) inter barbaros habitas. 13. Plutonis regnum infra terram ponitur. 14. Imperium populorum est penes reges. 15. Pisces extra aquam exspirant. 16. Res præter opinionem cadit. 17. Camelus odium adversus equos gerit. 18. Pictæ vestes apud Homerum commemorantur. 19. Multa animalia congregantur et contra alia dimicant. 20. Hippotămus segetes circa Nilum depascitur.

* By Virgil, and generally in the writings of the Latin poets, this word is spelt *littus.*

EXERCISE 70.—ENGLISH-LATIN.

1. There is no faithful society among the bad. 2. Man has no arms against death. 3. Beyond death is life. 4. We hasten to the Rhine. 5. The friends are before the house. 6. My sons are at my house (*apud me*). 7. Are your children at your house? 8. The king is mild towards the conquered. 9. After death good men are happy. 10. What is (there) below the earth? 11. God is above and through all things. 12. Men dwell below the clouds. 13. My children are in my power. 14. In (*apud*) Cicero are many beautiful sayings (*dicta*). 15. I love the country on account of thee (on thy account). 16. The soldiers are within the walls.

PREPOSITIONS WHICH GOVERN THE ABLATIVE CASE.

A, before consonants; Ab, before vowels; Abs, before t and qu — *by or from.*
Ab'sque, *without.*
Clam, *without the knowledge of.*
Co'ram, *in the presence of.*
Cum, *with.*
De, *concerning.*
E, not before vowels; Ex, before vowels and consonants — *out of.*
In, *in.* [motion).
Præ, *before* (of place, denoting
Pro, *before* (of place).
Si'ne, *without.* [case).
Ten'us, *as far as* (stands after its

Cum is united with pronouns, thus: te'cum, *with thee;* vobis'cum, *with you;* nobis'cum, *with us.*

VOCABULARY.

Alienus, -a, -um, *another's* (E.R. *alienate*).
Aliquando, adv., *sometimes.*
Apes, apis, f., *a bee.*
Aquila, -æ, f., *an eagle.*
Auditus, -ūs, m., *the hearing.*
Aufugio, 3, *I flee.*
Canto, 1, *I sing.*
Coccyx, -ygis, m., *a cuckoo.*
Commeo, 2, *I move, proceed.*
Debilito, 1, *I weaken.*
Dens, dentis, m., *a tooth* (E. R. *dentist*).
Elephantus, -i, m., *an elephant.*
Hebesco, 3, *I grow dull.*
Infans, -antis, *an infant*
Inventus, -a, -um, *discovered.*
Inventus est, *was discovered.*
Latro, -ōnis, m., *a robber.*
Metellus, -i, m., *Metellus, a Roman commander.*
Mori, *to die.*
Morior, 3, *I die.*
Nidifico, 1, *I build a nest.*
Nidus, -i, m., *a nest.*
Nihil potest, *has no power.*
Occasus, -ūs, *a going down.*
Opes, opum, f., *power, riches, etc.* (This noun is used in the sing. in the gen., acc., and abl. cases as if from nom. ops, and when used in the sing. means *aid, assistance.*)
Ortus, -ūs, m., *a rising.*
Pario, 3, *I bring forth.*
Phœnices, -um, m., *the Phœnicians.*
Possum, *I am able.*
Potest, *is able, has power.*
Remedium, -i, n., *a remedy* (E. R. *remedial*).
Senectus, -ūtis, f., *old age.*
Sidus, -eris, n., *a star, a constellation.*
Sinus, -ūs, m., *a bosom, bay,* or *gulf.*
Triumphus, -i, m., *a triumph.*
Unquam, *ever.*
Venenum, -i, n., *poison.*
Viator, -ōris, m., *a traveller.*
Visus, -ūs, m., *the sight.*
Xerxes, -is, m., *Xerxes, a Persian monarch.*

EXERCISE 71.—LATIN-ENGLISH.

1. Venenum aliquando est pro remedio. 2. Infans nihil potest sine alienâ ope. 3. Aquilæ non nidificant in arboribus. 4. Coccyx parit in alienis nidis. 5. Senectute hebescunt sensus. 6. Quidam homines nati sunt cum dentibus. 7. Xerxes cum paucissimis militibus ex Græcia aufugit. 8. Metellus elephantos ducit in triumpho. 9. Cantat coram latrone viator. 10. Sidera ab ortu solis ad occasum commeant. 11. Britannia a Phœnicibus inventa est. 12. Apes sine reginâ esse non possunt. 13. Dulce est pro patria mori.

EXERCISE 72.—ENGLISH-LATIN.

1. Is poison ever a remedy? 2. Xerxes fights in Greece. 3. In old age the sight and the hearing are weakened. 4. Does the cuckoo build in another's nest? 5. Thy sister sings before many (persons). 6. They hasten from the west to the east. 7. Coming out of Greece the army hastens into Italy. 8. Metellus with many soldiers is in Britain. 9. My son is born without teeth. 10. Is the army without elephants? 11. The elephants are led in triumph by the general. 12. Is it sweet to die for (one's) country? 13. What are mortals without the aid of God? 14. Do all birds build (their) nests in trees? 15. The boy is in the house without the knowledge of his father. 16. It is sweet to see infants happy in the bosom of their mother. 17. Is thy sister with thee? 18. Without his father the boy has no power. 19. My daughter is with me. 20. How many children are (there) with you? 21. How many men are there in Britain?

FORMATION OF WORDS.

I have thus gone through the several parts of speech in the Latin language, in a general way, aiming chiefly to make you familiar with the nouns and adjectives. Before I pass on to a full treatment of the verb and to the laws of literary combination comprised under the name of syntax, I wish to show you how great is the verbal treasure of which you have laid the foundation; and at the same time to lead you to some acquaintance with the manner in which words are formed. Without here entering into a learned discussion as to which was the original part of speech, I shall take the verb as containing the primitive root, and aid you in deducing therefrom other forms. In the course of the previous lessons you had the verb amo, *I love.* Now in becoming aware of the meaning of amo, you learnt the import of all words derived from amo; thus, taking am or ama as the root, you are led to

Am or ama, *love.*
Amo, v., *I love.*
Amor, n., *love.*
Amator, n., *a male lover.*
Amatrix, n., *a female lover.*
Amanter, adv., *lovingly.*
Amabilis, adj., *lovable.*
Amabiliter, adv., *lovably.*
Amabilitas, n., *lovableness.*

Then with the help of prepositions, and in, signifying *not*, you have—

Inamabilis, adj., *not lovable.*
Adamo, *I begin to love.*
Deamo, *I love greatly.*
Redamo, *I love again.*

A careful inspection of the list will show you how one word ensues from another. Thus amabilitas comes immediately from amabiliter, which in its turn comes from amabilis; and amabilis, an adjective in bilis, is formed from the stem ama. The root ama, am, or ma, is also traceable in other languages, being the foundation of μητηρ (mee'-teer), *mother*, in Greek, whence comes the Latin mater, which also means *a mother.* We must not, however, diverge from our subject. Before you proceed to study the following lists, you will do well to commit to memory this

LIST OF PREPOSITIONS AS USED IN COMBINATION WITH VERBS, ETC.

PREPOSITIONS.	FORMS INTO WHICH THEY PASS.
A, *away, from;*	ab, abs, au.
Ad, *to;*	ac, af, ag, al, an, ap, ar, as, at.
Am'bi, *on both sides, round:*	amb, am.
An'te, *before.*	
Cir'cum, *around:*	circun, circu.
Cum, *with;*	co, cog, col, com, con, cor.
Con'tra, *against.*	
De, *down.*	
Dis, *apart, in different directions;*	di, dif, dir.
E, *out of, out and out, thoroughly:*	ex, ef.
In, *into;*	i, il, im, ir.
In'ter, *between:*	intel.
In'tro, *within.*	
Ob, *against;*	o, oc, of, og, op, os.
Per, *through, thoroughly;*	pe, pel,
Post, *after.*	
Præ, *before.*	
Præ'ter, *along, by.*	
Pro, *forwards;*	prod, pol, por.
Re, *back;*	red.
Re'tro, *backwards.*	
Se, *apart.*	
Sub, *under;*	su, suc, suf, sug, sul, sum, sup, sur.
Sub'ter, *beneath.*	
Super, *over.*	
Trans, *across.*	

Remark that in, *not*, changes the *n* like in, *into.*

FORMATION AND CONNECTION OF WORDS.

LAUD (PRAISE).	DOCE (TEACH).
Laudo, *I praise.*	Doctus, *taught, learned.*
Laus, *praise.*	Docte, *learnedly.*
Laudate, *praisingly.*	Doctor, *a teacher.*
Laudatio, *a praising.*	Doctrina, *teaching.*
Laudator, *a male praiser.*	Documentum, *a proof.*
Laudatrix, *a female praiser.*	Docilis, *teachable.*
Laudabilis, *praiseworthy.*	Docilitas, *teachableness.*
Laudabiliter, *in a praiseworthy manner.*	Indocilis, *unteachable.*
	Indocibilitas, *unteachableness.*
Allaudo, *I praise greatly.*	Addoceo, *I teach thoroughly.*
Allaudabilis, *worthy of great praise.*	Condocco, *I teach together, exercise.*
Collaudo, *I praise in several respects.*	
Collaudatio, *a great praising.*	Dedoceo, *I unteach, that is, I cause to forget or renounce.*
Collaudator, *a great praiser.*	
Collaudabilis, *worthy of praise in several respects.*	Edoceo, *I teach out and out,* "by heart."
Illaudabilis, *not worthy of praise.*	Perdoceo, *I teach thoroughly.*
Perlaudabilis, *worthy of great praise.*	
	ORN OR ORNA (ADORN).
Docco, *I teach.*	Orno, *I adorn.*
Docenter, *in the way of teaching.*	Ornate, *ornamentally.*
Ornatio, *an adorning.*	Motiuncula, *a small movement.*
Ornator, *a male adorner.*	Motor, *a mover.*
Ornatrix, *a female adorner.*	Moto, *I move frequently.*
Ornamentum, *an ornament.*	Mobilis, *movable.*
	Mobilitas, *movableness.*
Adorno, *I adorn greatly.*	Mobiliter, *movably.*
	Momentum, *moving power.*
Adornate, *very ornamentally.*	
Exorno, *I adorn completely.*	Immobilis, *immovable.*
Exornatio, *a complete adorning.*	Immobilitas, *immovability.*
Exornator, *a male decorator.*	Admoveo, *I move to.*
Inornatus, *unadorned.*	Admotio, *a moving to.*
Perorno, *I adorn thoroughly.*	Amoveo, *I move away.*
	Commoveo, *I move together.*
MOVE (MOVE).	Commotio, *a commotion.*
	Demoveo, *I move down.*
Moveo, *I move.*	
Motio, *a moving.*	Dimoveo, *I separate by moving.*
Motus, *motion or movement.*	Promoveo, *I move forward.*

Now from these instances you may infer what a number of words you have already come into contact with. If in these lessons you have had 1,000 Latin words, you have obtained a clue to the import of some 10,000 Latin words, and require only a little reflection to aid you to a full perception of them and of their signification.

I advise you to prosecute your studies now on your own basis, while at the same time you go forward with me. The way in which you may assist yourself is this: procure a Latin dictionary, and write out lists of connected words according to the models just given. With a little care you will be able to find the words in the dictionary. If you use a good dictionary, you will make few mistakes. Having made a list, commit it to memory. Then make and learn others in succession. In this way you will learn not only the Latin, but a good deal of philology, or the science of language; and your progress will be rapid as well as sure.

You may perhaps be thinking what dictionary to purchase. The best and cheapest that you can buy is "Cassell's Latin-English and English-Latin Dictionary," which contains an incredible amount of useful information. The price of this useful volume is 3s. 6d.

KEY TO EXERCISES IN LESSONS IN LATIN.—XVII.

(Vol. II., p. 122.)

EXERCISE 67.—LATIN-ENGLISH.

1. What o'clock is it? 2. It is ten o'clock. 3. Is it six o'clock? 4. It is five o'clock. 5. The year in which we now live (*vivimus*) is the one thousand eight hundred and sixty-eighth since the birth of Christ. 6. My father is in his sixty-fourth year. 7. Your sister is in her sixty-third year. 8. My mother is in her fifty-eighth year. 9. Your father is in his fifty-eighth year. 10. The elder brother is in his thirty-third year. 11. The younger brother is in his twenty-second year. 12. The elder sister is in her twenty-eighth year. 13. The younger sister is in her twentieth year. 14. There are a thousand soldiers in the city. 15. Two thousand enemies besiege the city. 16. One thing (*aliud*) pleases one person, another (thing pleases) another. 17. One thing displeases one person, another (thing displeases) another. 18. The soldiers of each army are very brave. 19. Each is a vice, both to believe everything, and nothing. 20. The perfidious man reposes confidence in scarcely any one. 21. The friendship of one faithful man has more worth than the society of many unfaithful. 22. The true power of virtue is known to the wise man only. 23. The inhabitants of the whole city are joyful concerning the victory of the army. 24. The life of no man is in every respect happy. 25. I have two friends, and I love both greatly. 26. My friend has two sons and two daughters.

EXERCISE 68.—ENGLISH-LATIN.

1. Decem milia milites hostium in patriam irrumpunt. 2. Mille milites urbem defendunt. 3. Urbs a duobus millibus quingentis militum defenditur. 4. Duodetriginta milia equitum, et tredecim milia quingenti peditum patriam defendunt. 5. Pater meus agit annum quintum et septuagesimum. 6. Mater mea agit annum sexagesimum tertium. 7. Frater meus major natu agit annum septum et tricesimum. 8. Frater meus minor natu agit annum tricesimum. 9. Soror mea major natu agit annum tricesimum quartum. 10. Soror mea minor natu agit annum duodevicesimum. 11. Quota hora est? 12. Undecima. 13. Quid annum agis? 14. Ago annum alterum et quinquagesimum. 15. Habemus fidem neutri, neque infido neque assentatori. 16. Nullius vita est beatior quam sapientis. 17. Pater ambulat cum duobus filiis et duabus filiabus. 18. Duo fidi amici sunt una anima in duobus corporibus. 19. Alia aliis placent. 20. Aliud alii displicet. 21. Deus totius vitæ est moderator.

chased by Charles I., and have ever since remained in England. Though they lack, of course, the finer touches of Raffael's finished works, they yet exhibit very well the main broad features of his style; though it is to be feared that a misapprehension of their true object and nature has often led hasty observers to misunderstand the character of Raffael's paintings. Those who have the opportunity should not fail to correct their impressions derived from these large and free designs by a study of the few other works by Raffael which may be seen in the National Gallery.

Nor must we omit to mention that Raffael, like most of the other great men of the Italian Renaissance, did not confine his attention to painting alone. As an architect, he had for a time direction of the building of St. Peter's, at Rome, that vast embodiment of the Renaissance ideas round which all the artistic work of the period centres. When we consider that he died just as he had completed his thirty-seventh year, an age at which men are now considered almost as still beginners, we can estimate once more the greatness of this great artistic epoch, which could number as contemporaries three such men as Raffael, Michel Angelo, and Lionardo.

The position which Raffael has obtained in the history of art is twofold. In the first place, his is one of the great epoch-making names, at least as great in this respect as Phidias in Greek or as Giotto in early Italian art. He forms, as it were, the boundary figure between mediævalism and the modern European school. All before him we still describe as pre-Raffaelite, all after him seems to us purely of our own type in art. It is true, the world might in some respects with greater justice have pitched upon Lionardo as forming the first among the strictly modern painters, but the fame of the younger artist has not unnaturally eclipsed that of the elder, partly because we have more of Raffael's pictures still existing than of Lionardo's, and partly because Raffael made a real and great advance even upon the manner of his vigorous predecessor. Mankind generally love to seize upon a single personage as the central figure to symbolise and sum up a movement or an epoch, and their instinct has rightly caused them to single out the personality of Raffael as such a central figure for the whole grand artistic movement of the Italian Renaissance. But besides all this, in the second place, even apart from his historical importance in the development of art, Raffael stands out also as the greatest name in all the annals of art on the strength of his actual performances taken by themselves. He ranks first by the same sort of general consent as that by which Shakespeare ranks first among poets, or Newton among scientific thinkers. There may be many, whose opinions are entitled to the highest respect, who would place Raffael second to some other favourite painter, but almost all would place him second to one alone. And as in the old Greek story, Themistocles was adjudged by all alike the second place, while many others were adjudged the first, we may take this general consent of opinion as justly entitling Raffael to rank at the head of all the artistic roll. In his union of every high quality of technical execution and of vivid conception, in his admirably harmonious combination of all those qualities in mind, hand, and eye, which go to make up the perfect artist, he has never been equalled. Art, of course, has learned some new lessons since his time, especially in technique, but no subsequent painter has possessed such a grandly-tempered union of all the chief artistic gifts as that which distinguished Raffael. It is his breadth of grasp even more than his subtle sweetness that has given him his unique power of extorting our admiration and our applause throughout so many centuries.

LESSONS IN ARITHMETIC.—XXXII.

RULE OF THREE—SINGLE AND DOUBLE.

1. THIS is a name given to the application of the principles of Simple Proportion to concrete quantities. We have shown (Art. 5, Lesson XX., Vol. I., page 343) that if any three numbers be given, a fourth can always be found such that the four numbers shall be proportionals. Hence, if three concrete quantities be given, two of which are of the same kind, and the third of another kind, a fourth quantity of the same kind as the third can be found such that it shall bear the same ratio to the third quantity as the first two bear to each other; or, what is the same thing, so that the four quantities shall be proportionals.

It is evident, since a concrete quantity can only be compared with another of the same kind (*Obs.* 11, Lesson XXVII., Vol. II., page 102), that the fourth quantity determined must be of the same kind as the third quantity. In order that the ratios of the two pairs of quantities may be equal, either two must be of one kind and two of another, or all four must be of the same kind.

2. Suppose we have the following question proposed:—

EXAMPLE.—If the rent of 40 acres of land be £95, what will be the rent of 37 acres?

It is evident that the sum required must bear the same ratio to £95 that 37 acres do to 40 acres.

Hence we have, writing the ratios in the form of fractions,

$$\frac{\text{Sum required.}}{£95} = \frac{37 \text{ acres}}{40 \text{ acres}} = \textit{the abstract number } \frac{37}{40}.$$

Therefore the sum required $= \frac{37}{40} \times £95$, which can be reduced to pounds, shillings, and pence.

3. The last question might also have been solved thus:—

Since 40 acres cost £95,
1 acre costs £$\frac{95}{40}$;
And therefore 37 acres cost $\frac{37 \times 95}{40}$ pounds.

4. In solving such a question by the Rule of Three, the statement of the proportion is generally written thus:—

acres. acres.
40 : 37 : : £95 : sum required.

Then, by equating the product of the extremes and means, we get the result. We have put the first example, however, in the fractional form, in order to indicate clearly the fact that the ratio of the two quantities of the same kind (acres in this case) is an abstract number, by which the other quantity, the £95, is multiplied. When we state the question in the second way, and talk about multiplying the means and extremes together, some confusion might arise from the idea of multiplying 37 acres by £95. The fact to be borne in mind is that the rule is merely the expression of the fact that the *ratios* of two pairs of quantities are equal.

5. The example we have given is what is called a case of *direct* Proportion—that is to say, if one quantity were increased, the corresponding quantity of the other kind would be increased. Thus, if the number of acres were increased, the number of pounds they cost would be increased.

If, however, the case be such that, as one of these corresponding quantities be increased, the other is proportionally diminished, the case is one of what is called *Inverse Proportion*. For instance:—

EXAMPLE.—If 35 men eat a certain quantity of bread in 20 days, how long will it take 50 men to eat it?

Here, evidently, the more men there are, the less time will they take to eat the bread; hence, as the number of men increases, the corresponding quantity of the other kind—*viz.*, the number of days—*decreases*.

Hence, since 50 men are *more* than 35 men, the required number of days will be *fewer* than the 20 days which correspond to the 35 men.

In stating the proportion, therefore, in order to make the ratios equal, if we place the larger of the two terms of one ratio in the first place, we must place the larger of the two terms of the other ratio in the third place.

Thus, placing 50 men in the first place, we must put 20 days (which, we can see, will be larger than the required answer) in the third place, and then the statement would be correctly made thus:

50 : 35 : : 20 days : required number of days.

Therefore the required number of days $= 20 \times \frac{35}{50}$ days $= 14$ days.

N.B.—We might reduce the example to a case of Direct Proportion thus, which will, perhaps, explain the above method more clearly:—

35 men eat $\frac{1}{20}$ of the bread in one day.
50 " $\frac{1}{\text{required number of days}}$ " " "

Hence, since the quantity eaten in one day will increase with the number of men, we have—

As 35 : 50 : : $\frac{1}{20}$: $\frac{1}{\text{required number of days}}$;

Therefore required time $= 20 \times \frac{35}{50} = 14$ days, as before.

6. The last question might also have been solved thus:—

35 men eat the quantity in 20 days;
Therefore 1 man eats $\frac{1}{35}$ of the quantity in 20 days;
Therefore 1 man eats $\frac{1}{35 \times 20}$ of the quantity in 1 day;
Therefore 50 men eat $\frac{50}{20 \times 35}$ of the quantity in 1 day;
And therefore 50 men would occupy $\frac{1}{\frac{50}{20 \times 35}}$, or $\frac{20 \times 35}{50}$ days in eating the bread.

N.B.—To get the time occupied in doing a certain work, when the amount done per unit of time (say per day) is given, we must evidently divide the whole quantity of work by the amount done in a day. In the case given above, the bread being considered the unit, $\frac{50}{20 \times 35}$ of the bread is eaten in 1 day, and therefore $\frac{1}{\frac{50}{20 \times 35}}$, which is the whole amount eaten divided by the amount eaten in one day, will be the whole time occupied.

7. Hence we get the following statement of

Simple or Single Rule of Three.

Write down the ratio of the two quantities which are of the same kind, putting the greater in the first place. Then observing from the nature of the question whether the fourth quantity required will be greater or less than the third one which is given, place the greater of the two in the third place of the proportion, and multiply the extremes and means together.

EXERCISE 51.—EXAMPLES IN SINGLE RULE OF THREE.

1. If 16 barrels of flour cost £28, what will 129 cost?
2. If 641 sheep cost £485 15s., what will 75 cost?
3. If £11 5s. buy 63 pounds of tea, how many can be bought for £385?
4. A bankrupt pays 6s. 4d. in the pound: what will be received on a debt of £2,563 10s.?
5. What is £1,460 worth in dollars, allowing 4 dollars 84 cents to a pound, and 100 cents to a dollar?
6. If $\frac{1}{4}$ lb. of snuff cost £$\frac{3}{14}$, what will 150 lbs. cost?
7. A man bought $\frac{1}{8}$ of a vessel, and sold $\frac{2}{5}$ of what he bought for £8,240, which was just the cost of it: what was the whole vessel worth?
8. If $\frac{5}{7}$ of a yard cost $\frac{3}{4}$ of a crown, what will $3\frac{3}{5}$ yards cost?
9. If 10 men build a wall in 7 days, how long would it take 24 men to build it?
10. If 6 men build a wall in 15 days, how many men would it take just to finish it in $22\frac{1}{2}$ days?
11. If $\frac{3}{7}$ of a ton costs 9s. $8\frac{1}{2}$d., what would $4\frac{2}{3}$ of a cwt. cost?
12. If a twopenny loaf weighs 1 lb. 2 oz. when wheat is 50s. a quarter, what should it weigh when wheat sells for 60s.?
13. If the weight of a cubic inch of distilled water be $253\frac{7}{11}\frac{5}{2}$ grains, and a cubic foot of water weighs 1000 oz. avoirdupois, find the number of grains in a pound avoirdupois.
14. If 1 lb. avoirdupois weighs 7,000 grains, and 1 lb. troy weighs 5,760 grains, find how many pounds avoirdupois are equal to 175 lbs. troy.
15. Find the rent of 27a. 3r. 15p. at £1 3s. 6d. per acre.
16. The price of standard silver being 5s. 6d. per ounce, how many shillings are coined out of a pound troy?
17. A bankrupt's assets are £1,500 10s., and he pays 9s. $3\frac{1}{2}$d. in the pound: what are his debts?
18. If standard gold is worth $1\frac{113}{123}$d. per grain, how many sovereigns would be coined out of a pound troy of gold?
19. What is the income of a man who pays 53s. 10d. tax when it is 7d. in the pound?
20. Raising the income-tax 1d. in the pound increases my amount of tax by £2 3s. 4d., and the tax I actually pay is £15 3s. 4d.: what is the rate of the income-tax?
21. A barrel of beer lasts a man and his wife 3 weeks, she drinking half the amount he does: how long would it last 5 such couples?

KEY TO EXERCISE 50, LESSON XXXI. (Vol. II., page 270).

	£	s.	d.
1.	3	0	10.
2.	5	6	$5\frac{1}{4}$.
3.	8	14	$10\frac{2}{3}$.
4.	14	8	$11\frac{1}{2}$.
5.	25	17	1.
6.	20	18	$2\frac{2}{3}$.
7.	23	11	$5\frac{1}{3}$.
8.	45	12	6.
9.	48	5	$8\frac{1}{2}$.
10.	91	5	0.
11.	132	6	8.
12.	157	15	$6\frac{1}{2}$.

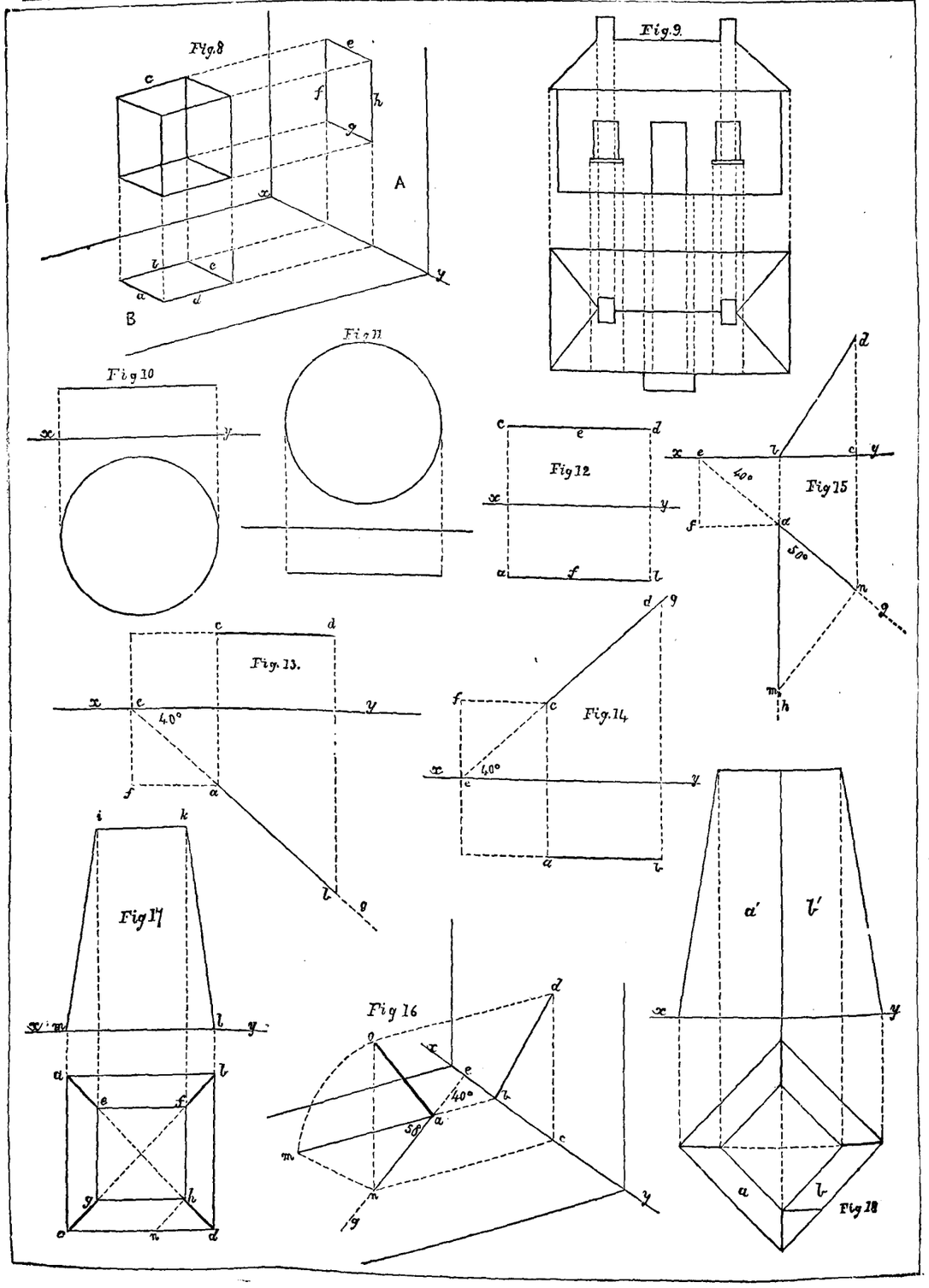
13. ·014.
14. ·023.
15. ·025.
16. ·115.
17. ·889.
18. ·938.
19. 3·786.
20. 15·997.

GEOMETRICAL PERSPECTIVE.—III.

BEFORE proceeding farther and deeper into our subject, we wish to draw the pupil's attention to an explanation of *projection*, a term applied not only to perspective but also to other systems of representation, namely, *orthographic* and *isometric*. Our reason for introducing this now, is in order to make it clearly understood how the *plan* of an object is to be treated when we are about to make a perspective drawing of that object, as we very frequently meet with cases when the *plan of the object* to be represented must be drawn according to the *position* which that object presents, whether horizontal or inclined. The *plan*, as we said in Lesson I., is produced by perpendicular lines drawn from every part of an object upon a horizontal plane. Now, there can be no difficulty in drawing a plan when the subject represented by it is parallel with the ground or horizontal plane; but it occurs sometimes that it is placed at an angle with *both planes*, that is, with the picture-plane and ground-plane: therefore in cases of this kind it is necessary to understand the first principles of *orthographic projection*, namely, projection by straight lines upon vertical and horizontal planes. We have mentioned above another method of projection, *isometric*; as the term has been introduced, we will explain its meaning and then pass it by, as it does not, like orthographic, form any auxiliary to perspective. The term *isometric* signifies *like-measurement*, that is, all the parts of the drawing, both near and distant, are drawn to one and the same scale, also the plan and elevation are combined in one drawing. It is a method much used by architects and engineers when they wish to give what is generally called a *bird's-eye view* of a building, etc., without diminishing the distant parts, as shown in perspective projection. A drawing made isometrically will enable a stranger to understand the proportions, position, and general character of a subject probably better than any other system; hence the reason of its frequent use.

The extent to which we intend to proceed with orthographic projection must be limited to that which relates to, and can assist us in, our present subject, by which we hope to make it a valuable auxiliary in our efforts to render the science of perspective easy and intelligible.

The difference between the results of perspective and orthographic projection is caused by the altered position of the eye when viewing the object. In perspective *the eye is in one place only*, and from that place is included all that can be seen within the angle of sight. In orthographic projection *the eye is supposed to be opposite every part at the same time, above* the object when the *plan* is represented, and *before it* when the *elevation* is represented; consequently, in perspective, all the visual rays proceeding from the object to the eye converge to one point; but in orthographic projection these rays are drawn parallel with each other, and perpendicularly to the plane of projection, whether the plane is horizontal or vertical. To make this clear, we request the pupil to compare Figs. 5 and 6 of the last Lesson with Fig. 8, when he will notice that the characteristic difference between the two systems rests entirely upon the different treatment of *the lines of projection*, which, as we have said, converge in one case, and are parallel in the other. Fig. 8 is to show how a cube is projected orthographically upon vertical and horizontal planes of projection. A is the vertical, and B the horizontal. C is the cube in space, that is, at a distance from both planes of projection. If straight lines are drawn from the angles of the cube *perpendicularly to and meeting* the plane B, and then lines (*a*, *b*, *c*, *d*) be drawn to unite them, we shall have a *plan* of the cube; and as the edges in this case are placed perpendicularly with the ground, the *plan* will be a square. Again, if *horizontal* and *parallel* lines are drawn from the angles of the cube until they meet the vertical plane A, and are then joined by the lines *e*, *f*, *g*, *h*, we shall produce the *elevation*; and because the horizontal edges of the cube are perpendicular to the vertical plane of projection, the drawing in this case also will be a square. Consequently, it will be seen that the drawing of the plan or the elevation is the same size as the object on the respective plane to which the object is parallel, according to the given scale of that object, as in Figs. 10 and 11. This result makes orthographic projection of much importance for practical purposes. The working drawings for the guidance of builders and mechanists are made by this method. Horizontal lengths and breadths are shown both in the plan and elevation, but



heights are indicated only in the elevations. Sometimes when the subject is a simple one—for instance, a plain wall—its course and thickness will be shown in the plan, and its height marked by *indices* in brackets at the end, as (10·5 feet), meaning that it is to be built 10 feet 6 inches high. Fig. 9 *is the plan and front elevation of a cottage.* It will be seen that if the *plan* be drawn first, perpendicularly dotted lines must be drawn parallel with each other from every angle, and from the terminations and projections of each line, which will determine the extent of the *elevation* and of its several parts, but not its height. If the *elevation* be drawn first, the perpendicularly dotted lines are projected downwards to produce the *plan.* In orthographic projection we usually draw a line to represent the meeting or *axis* of the two planes of projection, the horizonal and the vertical, which, as in Fig. 10, we have marked $x\,y$; therefore it must be remembered that all above that line is understood to be the *vertical plane of projection* upon which the elevations are drawn, and all below it *the horizontal plane* upon which the plans are drawn. The plan of a circle when parallel with the ground is a circle of the same size indicated by the scale. The elevation is a straight line only, equal to the diameter (Fig. 10). If the circle is standing on its edge perpendicularly to the ground, then its *plan* is a straight line only, and the elevation is a circle (Fig. 11). To illustrate the positions (Fig. 10), let the pupil hold a penny-piece horizontally before, and level with, his eyes; he will see the edge, *the elevation;* then let him place it upon the ground, and look down upon it; he will see the whole circumference, *the plan.* Reverse the position of the penny, and do the same for Fig. 11. We trust there will be no difficulty now in understanding the position of the eye with respect to both planes of projection. As we intend to devote the present Lesson to the consideration of this subject, preparatory to more important questions in perspective, we will give our pupils a few simple problems for practice, reserving others of a more complicated nature till they are required in future Lessons.

PROBLEM II. (Fig. 12).—*A rod, 4 feet long, is parallel with, and 2 feet from, both planes; draw its plan and elevation. Scale ½ inch to the foot.*—First draw $x\,y$, the axis of the planes, and draw $a\,b$, 4 feet long, parallel with and 2 feet from $x\,y$; then from the extremities a and b draw perpendicular lines to c and d; mark c and d 2 feet above $x\,y$, and join them; e will be the elevation, and f the plan.

PROBLEM III. (Fig. 13).—*When the same rod is at an angle of 40° with the vertical plane and parallel with the horizontal plane.*—Draw a line $e\,g$ at an angle of 40° with $x\,y$, make $e\,f$ equal to 2 feet, and draw $f\,a$ parallel to $x\,y$: a will be the plan of one end of the rod 2 feet from the vertical plane; upon $e\,g$ and from a make $a\,b$, the plan, equal to 4 feet: draw the perpendicular lines $a\,c$ and $b\,d$, and draw $c\,d$, the elevation, parallel with and 2 feet above $x\,y$.

PROBLEM IV. (Fig. 14).—*When a rod is at an angle of 40° with the ground and parallel with the vertical plane.*—Draw $e\,g$ at an angle of 40° with $x\,y$, and draw the perpendicular $e\,f$ 2 feet from $x\,y$, also $f\,c$ parallel with $x\,y$; cut off $c\,d$, equal to 4 feet, the whole extent of the rod: from c and d draw perpendiculars cutting $x\,y$ to a and b; join $a\,b$, for the plan, parallel with $x\,y$.

When the object is at an angle with both planes, the angle of inclination with the horizon is made on the horizontal plane.

PROBLEM V. (Fig. 15).—*Let the rod have one end on the ground, and let it rise at an inclination of 50°, and let its plan be at an angle of 40° with the vertical plane.*—Draw the line $e\,a\,g$ at the given angle 40° with the vertical plane; upon this line the plan will be represented. Draw $a\,h$ at an angle of 50° with $a\,g$, and make $a\,m$ equal to the length of the rod; from m draw $m\,n$ perpendicular to $a\,g$; $a\,n$ will then be the plan of the rod when inclined to the horizon at 50°. Draw $n\,c\,d$ and $a\,b$ at right angles with $x\,y$, and make $c\,d$ equal to $m\,n$; join $b\,d$; the line $b\,d$ will be the vertical elevation. That this may be more clearly understood, we will draw the *eidograph* of the problem, Fig. 16, that is, the figure or appearance it would present when placed in conjunction with the two planes of projection (Fig. 8 is also an *eidograph*). In Fig. 16 $a\,o$ is the given rod, and $a\,n$ is its plan. Now in order to get the inclination of $a\,o$, the rod, which is raised from the paper at an inclination of 50°, must be rabatted, that is, thrown down upon the horizontal plane; the course of the dotted arc $o'm$ will show this. We must construct the angle of the inclination of the rod upon the horizontal plane, that is, the angle it forms with the ground; therefore $m\,a\,n$ will be equal to $o\,a\,n$; this was the reason the angle $m\,a\,n$ in Fig. 15 was made 50°. By comparing Figs. 15 and 16, the same letters being used in both, the corresponding lines will be seen, and it will be understood why $c\,d$ in Fig. 15 is made equal to $m\,n$, because, as in Fig. 16, $m\,n$ is equal to $n\,o$, the distance of the upper end of the rod from the ground, and $n\,o$ is equal to $c\,d$, therefore $m\,n$ is equal to $c\,d$.

PROBLEM VI. (Fig. 17).—*The frustrum of a right square pyramid rests with its base on a horizontal plane, the lengths of the edges of the top and base being respectively 1·3 and 2·4 inches, and the height 2·8 inches; draw its plan and elevation.*—If a pyramid be divided into two parts by a plane parallel to its base, the part next the base is called a *frustrum* of a pyramid, or sometimes a truncated pyramid. Draw the square $a\,b\,d\,c$, the plan of the base 2·4 inches side (see Lessons in Geometry, Problem XVIII., Vol. I., page 255), and within it the square $e\,f\,h\,g$, the plan of the top 1·3 inch side. In order to place the plan of the top so that the edges shall be equidistant from the edges of the plan of the base, proceed as follows:—Draw the diagonals $c\,b$ and $a\,d$, make $c\,n$ equal to 1·3 inch, and draw $n\,h$ parallel to $c\,g\,f\,b$; draw $g\,h$ parallel to $c\,d$; the rest will be evident, as the angles are in the diagonals, and the sides are parallel to $a\,b$ and $a\,c$ respectively. Having drawn the plans, then draw $x\,y$, the ground line, parallel to one side of the square; draw $a\,m$ and $b\,l$; draw the lines $e\,i$ and $f\,k$, continuing them above $x\,y$ equal to the height of the frustrum 2·8 inches; join $i\,m$, $k\,l$, and $i\,k$; $m\,i\,k\,l$ will be the elevation. The pupil will observe that other elevations can be drawn from the *same* plan, opposite any other side, when required for working purposes—a common practice in drawing extra elevations for building construction; in these cases all that is necessary is to arrange the ground line or axis of the planes opposite the side of which the elevation is required. Fig. 18 is the same subject as Fig. 17: $x\,y$ is placed parallel to one of the diagonals of the plan, consequently two faces of the frustrum are seen, a' and b', shown in the plan as a and b.

LESSONS IN FRENCH.—XXXVII.

SECTION LXXXI.—THE DEMONSTRATIVE PRONOUN *CE* (§ 105).

1. The pronoun **ce** answers to the English pronoun *it*, used before the verb *to be*, or a verb followed by *to be*, when the latter is itself followed by a personal, a demonstrative, or a possessive pronoun. In this case, the English personal pronouns are expressed:—*I* by **moi**, *thou* by **toi**, *he* by **lui**, *she* by **elle**, *we* by **nous**, *you* by **vous**, *they* (m.) by **eux**, *they* (f.) by **elles**.

The verb is used in the singular, except before personal pronouns of the third person plural, and before possessive and demonstrative pronouns in the plural. In the interrogative form, however, the verb remains in the singular even before personal pronouns of the third person plural.

C'est moi, c'est lui, c'est elle.	*It is I, it is he, it is she.*
Ce sont elles qui parlent.	*It is they who speak.*
Ce peuvent être les miens.	*They may be mine.*
Est-ce eux? Est-ce elles?	*Is it they?*
Sont-ce ceux que vous connaissez?	*Are they those you know?*
Non, ce ne sont pas ceux que je connais.	*No, they are not those I know.*

2. If the relative pronoun **qui** and another verb follow **être**, this second verb must agree in number and person with the pronoun preceding the relative:—

C'est vous qui avez fait cela.	*It is you who have done that.*
C'est nous qui avons déchiré cette soie.	*It is we who have torn that silk.*

3. **Ce** is also the equivalent of the English pronoun *it*, used impersonally with the verb *to be*, when the latter is not followed by an adjective* [§ 108 (5)]:—

Ce fut en Allemagne qu'il trouva son ami.	*It was in Germany that he found his friend.*

4. **Celui qui, celle qui, ceux qui,** m., **celles qui,** f., are

* **Etre,** used impersonally, and not followed by any of the words mentioned above and in Sect. 82, has for subject **il**:—

Il est vrai que je l'ai dit.	*It is true that I have said it.*
Il est difficile de le croire.	*It is difficult to believe it.*

equivalent to the English pronouns, *he who, she who, they who;* celui que, celle que, ceux que, celles que, render *he whom,* &c.

Celui ou celle qui chante.	*He or she who sings.*

MISCELLANEOUS EXAMPLES.

Est-ce vous qui nous avez avertis de cela ?	*Is it you who have warned us of that ?*
C'est nous qui vous en avons avertis.	*It is we who have warned you of it.*
Est-ce vous, mesdames, que nous avons rencontrées ?	*Is it you, ladies, whom we have met ?*
Ce n'est pas nous, ce sont eux que vous avez vus.	*It is not we; it is they whom you have seen.*
Ce n'est pas vous, ce sont eux qui ont fait cela.	*It is not you; it is they who have done that.*
C'est en Angleterre que je vous ai vu.	*It is in England that I have seen you.*
Connaissez-vous ces deux Portugais ?	*Do you know those two Portuguese ?*
Je connais celui qui parle à M. L.	*I know him who speaks to Mr. L.*

EXERCISE 157.

Appel-er, 1. *to call.*	Connaissance, f. *acquaintance.*	Expliqu-er, 1. *to explain.*
À toute force, *by all means.*	De jour en jour, *from day to day.*	Guerre, f. *war.*
Avert-ir, 2. *to warn.*	De temps en temps, *from time to time.*	No, *number.*
Blessure, f. *wound.*		Phrase, f. *sentence.*
Combl-er, 1. *to overwhelm.*		Prélud-er, 1. *to prelude.*

1. Est-ce vous, Madame, qui avez appelé votre domestique ? 2. Ce n'est pas moi qui l'ai appelé. 3. Est-ce vous, mon ami, qui voulez à toute force aller en Espagne ? 4. Ce n'est pas moi, c'est mon cousin. 5. N'est-ce pas lui qui a averti ce matelot de son danger ? 6. Ce n'est pas lui, c'est moi qui l'en ai averti. 7. Est-ce nous que vous attendez de jour en jour ? 8. Ce n'est pas vous, ce sont eux que j'attends. 9. Est-ce vous, Madame, qui nous avez comblées de bienfaits ? 10. Ce n'est pas moi, Mesdames. 11. N'est-ce pas en Italie que vous avez fait connaissance avec lui ? 12. Ce n'est pas en Italie ; c'est en Russie. 13. Est-ce vous, Mesdames, ou vos cousines que nous avons vues au bal ? 14. C'est nous, ce ne sont pas nos cousines que vous avez vues. 15. Ne connaissez-vous pas ces deux messieurs ? 16. Je connais celui qui parle à Madame L. Est-ce vous qui avez reçu une blessure à la guerre ? 18. Ce n'est pas moi, c'est mon voisin. 19. N'est-ce pas vous qui nous avez expliqué cette phrase ? 20. Est-ce vous, Monsieur, qui demeurez au N° 18 ? 21. Ce n'est pas moi qui y demeure. 22. Entendez-vous ces musiciens ? 23. J'entends celui qui chante. 24. Je n'entends pas bien celui qui joue. 25. Nous entendons ceux qui préludent.

EXERCISE 158.

1. Is it you, my friend, who have warned me of my danger ? 2. It is not I who have warned you of it. 3. Is it they whom you expect from day to day ? 4. It is not they whom we expect. 5. Is it you who have done this ? 6. It is not we ; it is you who have done it. 7. Was it in England that you bought this hat ? 8. It was not in England ; it was in Germany. 9. Was it not in Russia that you became acquainted with him ? 10. It was not in Russia ; it was in Italy. 11. Was it you who were calling us ? 12. It was not we ; it was he. 13. Are you not acquainted with the two Poles who are reading ? 14. I know the one who is near you. 15. Is that (*est-ce là*) the lady whom you expected ? 16. It is not (she). 17. Is it you, gentlemen, who have loaded my brother with kindness ? 18. It is not (we), Sir ; we have not the pleasure of knowing him. 19. Is it you who have been wounded in the (*au*) arm ? 20. It is not (I). 21. Do you not hear those two ladies ? 22. I do not hear the one who sings. 23. I hear the one who plays. 24. Was it you who came to our house this morning ? 25. It was not I ; I was in London then (*alors*). 26. Was it you, Sir, who did us that favour ? 27. It was not (I) ; it was my sister. 28. Was it your son who wished by all means to go to London ? 29. It was not he ; he is now in Germany. 30. Is it you who wrote that letter ? 31. We have written no letter. 32. Who lives at (*au*) N° 20 ? 33. I live there (*c'est moi*). 34. Is it we whom you have seen ? 35. It was not you whom I saw.

SECTION LXXXII.

1. The pronoun **ce** (and not the pronouns **il, elle,** &c.) must be used for *he, she, they,* coming before the verb *to be,* or a verb followed by *to be,* when the latter is followed by a proper name, a noun, or an adjective used substantively, *preceded* by the *definite, indefinite,* or *partitive article,* or by a *possessive* or *demonstrative adjective.* When the word used in apposition with **ce** is plural, and in the third person, the verb is put in the plural, although **ce** remains unchanged [§ 105 (2) (3)] :—

C'est Henri.	*It is Henry.*
C'est Louis et Marie.	*It is Louisa and Mary.*
C'est un Polonais.	*He is a Pole.*
Ce sont des Anglais.	*They are Englishmen.*
C'est cette dame qui m'a parlé de vous.	*It is that lady who spoke to me of you.*
Ce doit être votre ami.	*It must be your friend.*

2. **Ce** is used as the nominative of the verb **être,** in sentences like the following, and the conjunction **que** is used idiomatically after it. The verb in this case is not put in the plural :—

Qu'est-ce que ces enfants ?	*What are those children ?*
Qu'est-ce que l'Italie ?	*What is Italy ?*
Qu'est-ce que le jardinage ?	*What is gardening ?*

3. **Que** is used in a number of sentences in order to give greater force to the expression :—

Ce sont de bons livres que les vôtres.	*Yours are indeed good books.*
Je dis que oui ; je crois que non.	*I say yes ; I believe not.*

MISCELLANEOUS EXAMPLES.

Qui sont ces messieurs qui parlent à M. L.	*Who are the gentlemen who speak to Mr. L.*
Ce sont mes cousins, qui viennent d'arriver.	*They are my cousins, who are just arrived.*
De quel pays sont ces marchands ?	*Of what country are those merchants ?*
Ce sont des Polonais ; ils viennent d'arriver.	*They are Poles ; they are just arrived.*
Ils ne sont pas Polonais ; ils sont Russes.	*They are not Poles ; they are Russians.*
Ce ne sont pas des Polonais ; ce sont des Russes.	*They are not Poles ; they are Russians.*
Qu'est-ce que la Touraine ?	*What is Touraine ?*
C'est le jardin de la France.	*It is the garden of France.*
Votre fenêtre ne donne-t-elle pas sur la rue ?	*Does not your window look on the street ?*
Non, c'est sur la cour qu'elle donne.	*No, it looks on the yard.*
Je crois que oui ; je crois que non.	*I believe so ; I believe not.*

EXERCISE 159.

Bris-er, 1. *to break.*	Écossais, e, *Scotch.*	Soieries, f. p. *silk stuffs.*
Charron, m. *wheelwright.*	Étranger, e, *foreign.*	Sucre, m. *sugar.*
Confitures, f. p. *preserves.*	Fenêtre, f. *window.*	Suisse, *Swiss.*
Donn-er, 1. *to give, look.*	Lyon, *Lyons.*	Surprend-re, 4. ir. *to catch, surprise.*
	Mouchoir, m. *handkerchief.*	Vol-er, 1. *to steal.*
	Roue, f. *wheel.*	

1. Connaissez-vous ces étrangers ? 2. Oui, Monsieur, ce sont les frères de notre voisin. 3. Ne sont-ils pas Écossais ? 4. Non, Monsieur, ils sont Suisses. 5. Ne sont-ce point des Écossais qui vous ont fait présent de cette casquette ? 6. Non, Monsieur, ce sont des Suisses. 7. N'est-ce pas votre domestique qui vous a volé du vin ? 8. Ce n'est pas lui, c'est son frère. 9. N'est-ce pas lui qui a pris vos confitures ? 10. Ce n'est pas lui ; ce sont ses enfants. 11. Ne sont-ce pas là les enfants que vous avez surpris à voler votre sucre ? 12. Ce sont leurs frères. 13. Ne sont-ils pas cousins ? 14. Ils ne sont pas cousins ; ils sont frères. 15. Qu'est-ce que ces soieries ? 16. Ce sont des marchandises qu'on vient de nous envoyer. 17. N'est-ce pas une belle ville que Lyon ? 18. C'est une grande et belle ville. 19. N'est-ce pas là le mouchoir que vous avez perdu ? 20. Je crois que oui. 21. N'est-ce pas sur le jardin que donnent vos fenêtres. 22. Oui, Monsieur, c'est sur le jardin qu'elles donnent. 23. N'est-ce pas notre charron qui a fait cette roue ? 24. Ce n'est pas lui qui l'a faite. 25. Ce sont nos amis qui l'ont brisée, et c'est le menuisier qui l'a faite.

EXERCISE 160.

1. Is that lady your friend's sister ? 2. No, Sir, she is a stranger. 3. Who are the two gentlemen who are speaking to your sister ? 4. They are Swiss gentlemen. 5. Are those the gentlemen whom you have invited ? 6. It is they (*eux*). 7. Do you not know that man ? 8. I know him very well ; he is the man who has stolen my wine. 9. What is Italy ? 10. It

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is the garden of Europe. 11. Is not that the letter which you intended to carry to the post-office ? 12. No, Sir, it is another. 13. Is the city of Havre fine ? 14. Yes, Sir, Havre is truly a large and beautiful city. 15. Is not that the man whom you have caught stealing your fruit ? 16. It is not ; it is another. 17. Is not this the cup that you have bought ? 18. Yes, Sir, I believe so. 19. Do not the windows of your room look on the street ? 20. No, Madame, they look on the garden. 21. Do not the windows of your dining room look on the yard (*cour*) ? 22. No, Sir, they look on the lake (*lac*). 23. Is it that little child who has taken your preserves ? 24. It is his brother and sister. 25. What are those engravings ? 26. They are engravings which I bought in Germany. 27. Are those gentlemen Scotch ? 28. They are not Scotch ; they are Italian. 29. Are those ladies Scotch ? 30. No ; they are the Italian ladies who came yesterday. 31. What is Marseilles ? 32. It is one of the finest cities in (*de*) France. 33. Is it not your tailor who made that coat ? 34. It is not he ; it is an English tailor who made it. 35. It is your friend who broke my watch.

KEY TO EXERCISES IN LESSONS IN FRENCH.

EXERCISE 47 (Vol. I., page 183).

1. Are you going to write to him ? 2. I am going to write to him and communicate to him this news. 3. Are you going to speak to him of me ? 4. I am going to speak to him of you and of your companion. 5. Do you send them fine trees ? 6. I send them apple-trees, pear-trees, and cherry-trees. 7. Do you not send me cherry-trees ? 8. I do not (*send you any*), you have some already. 9. Are you right to speak to them of this affair ? 10. I am not wrong to speak to them of this affair. 11. Come to us. 12. Come to us this afternoon. 13. Do you go to them every day ? 14. I go to them every evening. 15. Do you give them good advice ? 16. I give them good advice and good examples. 17. Do you speak to us about your sisters ? 18. I speak to you of them. 19. Do you not speak to us about our brothers ? 20. I speak to you of them. 21. Do you not love them ? 22. We love (*them*) and respect them. 23. Do you think of this book or do you not (*think of it*) ? 24. We think (*of it*) and (*we*) speak of it. 25. We do not think of it.

EXERCISE 48 (Vol. I., page 183).

1. Quand allez-vous écrire à M. votre frère ? 2. Je vais lui écrire demain matin. 3. Avez-vous l'intention de lui écrire tous les lundis ? 4. J'ai l'intention de lui écrire tous les mardis. 5. Avez-vous envie de lui parler aujourdhui ? 6. J'ai envie de lui parler, mais il n'est pas ici. 7. Où est-il ? 8. Il est chez lui. 9. Leur parlez-vous ? 10. Oui, Monsieur, je leur parle de cette affaire. 11. Vous donnent-ils de bons avis ? 12. Ils me donnent de bons avis et de bons exemples. 13. Allez-vous trouver Mademoiselle votre sœur tous les jours ? 14. Je vais la trouver tous les matins à neuf heures moins un quart. 15. Aime-t-elle à vous voir ? 16. Elle aime à me voir, et elle me reçoit bien. 17. Pensez-vous à cette affaire ? 18. J'y pense toute la journée. 19. En parlez-vous avec M. votre frère ? 20. Nous en parlons souvent. 21. Envoyez-vous votre compagnon chez moi ? 22. Je l'envoie tous les jours. 23. Êtes-vous chez vous tous les jours ? 24. J'y suis tous les matins à dix heures. 25. Aimez-vous à aller à l'église ? 26. J'aime à y aller tous les dimanches avec un compagnon (*m.*, compagne, *f.*). 27. Parlez-vous de vos maisons ? 28. J'en parle. 29. M. votre frère parle-t-il de ses amis ? 30. Oui, Monsieur, il parle d'eux. 31. Pense-t-il à eux ? 32. Oui, Monsieur, il pense à eux. 33. Pense-t-il à cette nouvelle ? 34. Oui, Monsieur, il y pense. 35. Je les aime et je les honore.

EXERCISE 49 (Vol. I., page 206).

1. Will you give this book to my brother ? 2. I can lend it to him, but I cannot give it to him. 3. Will you send them to us ? 4. The milliner can send them to you. 5. Do you show them to her (*to him*) ? 6. I see (*them*) and show them to her (*to him*). 7. Are you afraid to lend them to us ? 8. I am not afraid to lend them to you. 9. Can you not send us some fish ? 10. I cannot send you any, I have but little. 11. Will you speak to them of it ? 12. I will speak to them of it, if I do not forget it. 13. Do you often come to see them ? 14. I come to see them every morning and every evening. 15. Do you not speak to them of your journey to Poland ? 16. I speak to them of it, but they will not believe me. 17. Do I see my acquaintances on Mondays ? 18. You see them every day of the week. 19. Do they send you more money than our merchant's clerk ? 20. They send me (*of it*) more than he. 21. Do you send any to the bookseller ? 22. I send him some when I owe him (*some*). 23. Are you not wrong to send him some ? 24. I cannot be wrong to pay my debts. 25. They give you some, and they lend you some when you want it.

EXERCISE 50 (Vol. I., page 206).

1. Voulez-vous nous envoyer cette lettre ? 2. Je veux vous l'envoyer, si vous voulez la lire. 3. Je veux la lire, si je puis. 4. Pouvez-vous me prêter votre plume ? 5. Je puis vous la prêter, si vous voulez en avoir soin. 6. Puis-je parler à M. votre père ? 7. Vous pouvez lui parler, il est ici. 8. Avez-vous peur de l'oublier ? 9. Je n'ai pas peur de l'oublier. 10. Voulez-vous les lui envoyer ? 11. J'ai l'intention de les lui envoyer si j'ai le temps. 12. Est-ce que vous lui parlez (*lui parlez-vous*) de votre voyage ? 13. Je lui parle de mon voyage. 14. Je leur en parle. 15. Pouvez-vous le lui communiquer ? 16. J'ai envie de le lui communiquer. 17. Voyez-vous vos connaissances tous les lundis ? 18. Je les vois tous les lundis et tous les jeudis. 19. Où avez-vous l'intention de les voir ? 20. J'ai l'intention de les voir chez M. votre frère et chez Mlle. votre sœur. 21. Pouvez-vous l'y envoyer tous les jours ? 22. Je puis l'y envoyer tous les dimanches, s'il le veut. 23. Pouvez-vous me les donner ? 24. Je puis vous les donner. 25. Qui veut leur prêter des livres ? 26. Personne ne veut leur en prêter. 27. Votre libraire veut leur vendre de bons livres et de bon papier. 28. Est-il à la maison ? 29. Il est chez son frère. 30. Avez-vous tort de payer vos dettes ? 31. J'ai raison de les payer. 32. Voulez-vous nous l'envoyer ? 33. Je veux (*bien*) vous l'envoyer, si vous en avez besoin. 34. Voulez-vous nous les donner ? 35. Nous voulons les donner à vos connaissances. 36. Leur y en avez-vous envoyé ? 37. Oui, je leur y en ai envoyé.

EXERCISE 51 (Vol. I., page 207).

1. I have seen him and his father. 2. We recognised her mother and her. 3. Thou hast slandered me, her, and them. 4. Have you noticed the countess and him ? 5. They have supported thee and thy cousin with all their credit. 6. I know only him here. 7. He wishes to see her only. 8. In three months, thou hast written to me only twice. 9. He has looked at you only once. 10. Did your clerk write to you and to your partner ? 11. Yes, he wrote several times to my partner and to myself. 12. Your calumnies have injured her, him, and me. 13. They have sent us to you to settle the business. 14. Your mother has sent you to me that I may introduce you to them. 15. My guardian has entrusted me to her, because he knows nobody but her in this town. 16. We ran up to him as soon as we caught sight of him. 17. Your brother will have recourse to you in case of need. 18. The king applied to them several times. 19. Look out ! *or* Mind ! *or* Beware ! (*Take care of thyself.*) 20. She spoke only to you. 21. Observe them.

EXERCISE 52 (Vol. I., page 207).

1. Avez-vous vu elle et son père ? 2. As-tu reconnu sa mère et lui ? 3. Ont-ils calomnié toi, lui, elle et moi ? 4. Nous avons vu la baronne et lui. 5. Ils ont appuyé votre oncle et vous de tout leur crédit. 6. Je ne connais qu'elles ici. 7. Nous ne voulons voir qu'eux. 8. En un an, elle ne m'a écrit qu'une seule fois. 9. En trois heures, vous ne m'avez regardée qu'une seule fois. 10. Mon commis a écrit à vous et à votre associé. 11. Avez-vous parlé plusieurs fois à eux et au prince ? 12. Pourquoi avez-vous nui à elle, à lui et à moi ? 13. Vous ont-ils envoyé à moi pour terminer notre affaire ? 14. Votre père m'a envoyé à vous, pour que vous me présentiez à elle. 15. Le général m'avait confié à eux parce qu'il ne connaissait qu'eux dans cette ville-là. 16. Ma mère courut à moi, et me dit qu'elle avait toujours pensé à moi. 17. Ceci a rapport à moi. 18. Nous nous fions à eux. 19. Il faut prendre garde à soi. 20. Je ne veux écrire qu'à vous. 21. Ils ont fait attention à nous.

EXERCISE 53 (Vol. I., page 214).

1. Do you like bread or meat ? 2. I like bread, meat, and fruit. 3. Have we peaches in our garden ? 4. We (*there*) have peaches, strawberries, raspberries, and cherries. 5. Does your brother like cherries ? 6. He does not like cherries much, he prefers plums. 7. Have you vegetables ? 8. I do not like vegetables. 9. We have neither vegetables nor fruit. 10. We like neither vegetables or fruit. 11. Do you go every day to your brother's wood ? 12. I do no (*there*) go every day. 13. Does your sister bring the flowers ? 14. She brings them. 15. Does your mother bring flowers ? 16. She brings some every Monday. 17. Do you see General Bertrand ? 18. I do not see him, I see Corporal Duchêne. 19. Are your sisters weary ? 20. My sisters are weary of studying. 21. Is the president at home ? 22. No, Sir, he is at Colonel Dumont's. 23. Does he live far from here ? 24. He does not live far from here. 25. Where does he live ? 26. He lives at Captain Lebrun's.

LESSONS IN GEOGRAPHY.—XXIII.

EUROPE (*continued*).

THE maps that accompany our present lesson in Geography present accurate delineations of the principal features of France and the great Scandinavian and Iberian peninsulas. We shall supplement these in our next with a map of the countries of Central and Southern Europe on nearly the same scale as the map of France in this lesson.

We now proceed with an enumeration of the *islands* which belong to Europe. Of these, by far the most important, both in political and commercial importance, are the British Isles.

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Under this head are included Great Britain, anciently called *Albion* or *Britannia*, and divided into the three countries of England, Wales, and Scotland; and Ireland, anciently called *Hibernia*, with various islands of much smaller dimensions lying around or near the coast. The principal of these are the Isle of Man, in the Irish Sea, situated at nearly an equal distance from England, Scotland, and Ireland; the Isle of Anglesea, which is separated from the mainland of Wales by the Menai Straits; the Scilly Isles, anciently called *Cassiterides*, or the *Islands of Tin*, adjacent to Cornwall, the real tin region; the Isle of Wight, south of, and forming part of, Hampshire; the Hebrides, or Western Islands, lying west of Scotland; the Orkney and Shetland Islands, north of Scotland; and the Channel Islands, Guernsey, Jersey, Alderney, and Sark, which lie to the north-west of France.

Next to the British Islands, the most important in the north of Europe are those which belong to and form part of the kingdom of Denmark, and lie in the channel or passage to the Baltic, called the Cattegat — viz., Zealand, which contains Copenhagen, the capital of that kingdom, with Fünen, Laaland, Falster, Moen, Langeland, Bornholm, and various others. In other parts of the Baltic are the islands of Rugen, Oland, Gottland, Aland, Oesel, and Dago. The islands called the Azores, or Western Islands, which are generally considered to belong to Europe, and of which Terceira and St. Michael are the principal, are situated about 800 miles W. of Portugal, to which they belong. The island of Iceland, which belongs to Denmark, and is celebrated for its hot springs and its volcanoes, is situated on the edge of the arctic circle, and having its northern point within the Arctic Ocean; the Faroe Isles, which belong to the same kingdom, and are situated N.W. of the Shetland Isles. Ferro, one the Canary Isles, once formed the site of the *first meridian*, to which all nations referred the longitude, and it is to be regretted that this did not retain its position as the *universal meridian* for the world at large, and for the simplification of the mode of reckoning the longitude in different countries. The islands which lie in the most northern regions of Europe are the Lofoden Isles, W. of Norway; Spitzbergen, and Nova Zembla, in the Arctic Ocean.



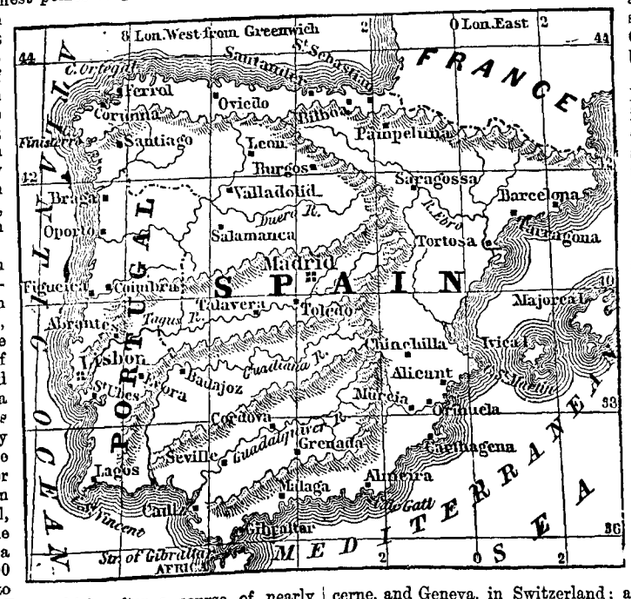
The *islands* of the greatest importance in the south of Europe, and which lie in the Mediterranean Sea, are the following:—Corsica, which belongs to France, lying in the Tuscan Sea; Sardinia, S. of Corsica, and separated from it by the Strait of Bonifacio; the Balearic Isles—viz., Majorca, Minorca, Ivica, and Formentera, E. of Spain; Sicily, S.W. of Naples, and separated from it by the Strait of Messina; Malta, S. of Sicily, and belonging to Great Britain; the Ionian Islands—viz., Corfu, Cephalonia, Zante, Santa Maura, Theaki or Ithaca, Cerigo, and Paxo, situated W. of Greece, and S.W. of Turkey, in the Ionian Sea, and now belonging to Greece; Candia or Crete, S.E. of Greece; many of the islands of the Archipelago—namely, the Negropont (anciently *Eubœa*), Andros, Syra, Naxia, Paros, Antiparos, Hydra, Spezzia, Egina, etc., lying E. and S.E. of Greece; and Lemnos or Stalimene, Imbros, Samothraki, and Thaso, lying S. of Turkey, and belonging to that power. The chief islands in the Mediterranean reckoned as belonging to Asia are Lesbos or Mitylene, Scio or Chios, Samos, Patmos, Rhodes, and many others, lying to the E. of Turkey in Asia, or rather Asia Minor; and Cyprus, situated in the Levant, which is now under the administration of Great Britain.

The principal *capes* (Latin, caput, *a head*) in Europe are the following:—The North Cape, on the island of Mageröe, in lat. 71° 10′, and long. 26° 1′ E., is commonly reckoned the most northern point of Europe; but this, according to some authors, is Nordkyn, in Finmark, in lat. 71° 6′ N.; the north point of Nova Zembla is in lat. 77° 4′ N., and long. 77° 5′ E.; the Naze (German, the *nose* or *beak*), the most southern point of Norway, on the Skager-Rack; the Skaw, or most northern point of Jutland, in Denmark; Cape La Hogue, in France; Capes Ortegal and Finisterre, in Spain, of which the latter, as the name indicates (Latin, finis, *the end*; terræ, *of the earth*), was deemed by the ancients the end or uttermost extremity of the world; Cape Roca, near Lisbon, and Cape St. Vincent, in 5° 36′ W.; Cape Spartivento and Cape di Leuca, in Italy, and being in lat. 36° 22′ N., and long. 22° 28′ E.; Cape Passaro, in Sicily; and others of less importance. In the British Islands, Dunnet Head, and not Cape Wrath, is the most northerly point of Great Britain; also Lizard Point, and not Land's End, is the most southerly point. The most northerly point of Ireland is Mullin or Malin Head, and the most southerly point Mizen Head, and not Cape Clear, which is on an island called Clare Island.

The northern *highlands* of Europe are those which contain the Scandinavian system chain of mountains, extending from the Naze to the North Cape, and consisting of the Langefield, the Dovrefield, and the Kiolen ranges, of which the highest point is Skageslöestinden, in the southern range, about 8,670 feet above the level of the sea; and the Uralian or Ouralian chain, extending from the shores of the Arctic Ocean to beyond the source of the Ural river, which falls into the Caspian Sea, and forms, with both, the boundary between Europe and Asia. The south-eastern *highlands* of Europe are the Caucasian chain of mountains, between the Caspian Sea and the Black Sea, of which the highest peak is Mount Elburz, about 18,500 feet above the level of the sea, and the highest mountain in Europe. The southern *highlands* of Europe consist of the Balkan (anciently *Hæmus*) Mountains in Turkey, the highest points being about 10,000 feet above the sea level; the Eastern Alps (German, *mountains*), stretching from the Balkan range to the commencement of the Western Alps, north of the Adriatic, of which the highest summits are Mont Blanc and Mont Rosa, each more than 15,000 feet above the level of the sea, and which border Switzerland on the south, and Italy on the north; the Carpathian Mountains in the north of Hungary and Transylvania; the Hercynian Mountains, in Germany; the Cevennes and the Vosges, in France; the Pyrenees, between France and Spain, of which the highest points or peaks are Mont Perdu and Maladetta, each more than 11,000 feet high; the Cerro Mulhacen, the highest point of the Sierra Nevada, in Spain, 11,633 feet above the level of the sea; and Etna, the Sicilian volcano, which is nearly of the same elevation as the Pyrenean peaks, being 10,874 feet in height.



The principal *rivers* in Europe are the following:—The Volga, which rises in the Valdai Hills, in Russia, runs a course through that country of about 2,400 miles, and falls into the Caspian Sea at Astrakhan, where its delta (or land enclosed by its mouths in the shape of the Greek letter Δ, or *delta*) is about fourteen miles wide. The Ural, which rises in the Ural Mountains, runs a course of about 1,800 miles, and falls into the Caspian Sea; the Don, which, after a course of nearly 1,000 miles, falls into the Sea of Azof, at the town of Azof; the Dnieper, which, after a course of a little more than 1,200 miles, falls into the Black Sea at Kherson; the Dniester, which flows from the Carpathian Mountains, and, after a course of 500 miles, falls into the same sea at Akerman; the Danube, which has its source in the Black Forest (Schwarzwald), flows through Bavaria, Austria, and Bulgaria, and, after a course of nearly 1,800 miles, falls into the Black Sea at Ismail; the Rhine and the Rhone, which both spring from the Swiss Alps, take opposite courses, the former running through the Lake of Constance, after a northern course of about 600 miles through Germany, France, and the Netherlands, falls into the German Ocean, after losing itself in the Waal, the Maese or Meuse, the Leck, and the Old Rhine, and forming the great delta of Holland between Rotterdam and Amsterdam; the latter running through the Lake of Geneva, after a southern course of about 645 miles through France, falls into the Mediterranean Sea at the Gulf of Lions, where it also forms a delta; the Arno and the Tiber, on the west of Italy, fall into the Tuscan Sea; and the Po and the Adige, on the east of Italy, fall into the Adriatic; the Xucar and the Ebro, of Spain, fall into the Mediterranean; the Douro and the Tagus, of Portugal, with the Guadalquivir of Spain, fall into the Atlantic; the Dwina and the Onega, of Russia, fall into the White Sea; the Vistula and the Oder, of Germany, fall into the Baltic Sea; and the Elbe, of the same country, into the German Ocean, at Hamburg.



The chief *lakes* of Europe are the following:—In the north, Ladoga and Onega, in Russia, the largest in Europe, the former being 130 miles long and 70 miles broad, the latter smaller; Peipus and Ilmen, in the same country, very considerably less (the last-named is connected with Lake Ladoga and the river Volga by means of canals, and thus a line of communication is formed between the Baltic and the Caspian Seas); the Lakes Wener, Wetter, and Mälar, in Sweden, with the river Gotha, which form a line of communication between the middle of the Baltic Sea and its entrance. In the south of Europe the lakes of Constance, Lucerne, and Geneva, in Switzerland; and of Maggiore, Lugano, and Como, in Italy, are all remarkable for the beauty of their scenery. The following table contains some useful particulars relating to the lakes of Europe.

TABLE OF PRINCIPAL EUROPEAN LAKES.

Lakes.	Countries.	Areas in Square Miles.	Elevations in Feet.	Greatest Depths in Feet.
Ladoga	Russia	6,190	59	...
Onega	Russia	3,400	...	...
Ilmen	Russia	390	107	...
Peipus	Russia	1,250	...	...
Saima	Russia	2,000	...	...
Enare	Russia	685	...	...
Wener	Sweden	2,120	147	288
Wetter	Sweden	840	295	432
Mälar	Sweden	760	...	...
Geneva	Switzerland	82	1,230	984
Neuchâtel	Switzerland	90	1,437	426
Lucerne	Switzerland	30	1,380	900
Zurich	Switzerland	30	1,342	600
Constance	Switzerland	228	1,250	964
Platten Sea, or Lake Balaton	Hungary	420	918	39
Maggiore	Italy	80	678	1,800
Como	Italy	66	684	600
Garda	Italy	183	320	95

We append a summary of the principal islands, capes, mountains, and rivers of Europe. In the summary of the rivers, the ocean or sea into which each river flows is named.

SUMMARY OF PRINCIPAL ISLANDS.

Aland, Baltic.
British Islands, N. Atlantic.
Candia, S. of Greece.
Corsica, S. of Sardinia.
Cyprus, the Levant.
Fünen, W. of Zealand.
Gothland, Baltic.
Greek Isles, Archipelago.
Iceland, Arctic Circle.
Malta, S. of Sicily.
Negropont, Archipelago.
Nova Zembla, Arctic Ocean.
Sardinia, S. of Corsica.
Sicily, S. of Italy.
Spitzbergen, Arctic Ocean.
The Azores, N. Atlantic.
The Balearic Isles, E. of Spain.
The Ionian Isles, W. of Greece.
Zealand, Cattegat.

SUMMARY OF PRINCIPAL CAPES.

Finisterre, W. of Spain.
La Hague, France.
Matapan, S. of Morea.
Naze, S. of Norway.
North Cape, I. Magerōe.
Ortegal, Spain.
St. Vincent, S. of Portugal.
Spartivento, S. of Italy.
Tarifa Point, Gibraltar.

SUMMARY OF PRINCIPAL MOUNTAINS.

Alps, N. of Italy.
Apennines, Italy.
Carpathian, Hungary.
Dovrefield, Norway.
Etna (volcano), Sicily.
Pyrenees, France.
Ural, Russia.
Vesuvius (volcano), Naples.

SUMMARY OF PRINCIPAL RIVERS.

Danube, Black Sea.
Dnieper, Black Sea.
Dniester, Black Sea.
Don, Black Sea.
Douro, Atlantic Ocean.
Dwina, Arctic Ocean.
Ebro, Mediterranean Sea.
Elbe, North Sea.
Garonne, Atlantic Ocean.
Gotha, Baltic Sea.
Guadiana, Atlantic Ocean.
Loire, Atlantic Ocean.
Meuse, North Sea.
Neva, Baltic Sea.
Oder, Baltic Sea.
Onega, Arctic Ocean.
Petchora, Arctic Ocean.
Po, Mediterranean Sea.
Rhine, North Sea.
Rhone, Mediterranean Sea.
Seine, Atlantic Ocean.
Scheldt, North Sea.
Tagus, Atlantic Ocean.
Thames (Brit. Isles), North Sea.
Ural, Caspian Sea.
Vistula, Baltic Sea.
Volga, Caspian Sea.
Weser, North Sea.

LESSONS IN ENGLISH.—XXIII.

GREEK STEMS (*continued*).

LANGUAGES have their distinctive peculiarities which fit them for some special service in the great workshop of humanity. The numerous broad and open vowels of the Italian makes it specially suitable as the language of song. The strength and dignity of the Latin render it a good organ of civil government. The French, as being light and graceful, is unequalled as a medium of conversation. The swell and pomp of the Spanish both represent and symbolise the people by whom it is spoken. Two or three languages possess almost every variety of excellence. Of these, the lowest in the scale is the English, which is distinguished alike for power, expressiveness, delicacy, and music; yet it must, in these high qualities, yield to the German, which, in its turn, is surpassed by the Greek, the nearest approach to perfection to which human language ever attained, except, probably, the Sanscrit, or sacred language of the Brahmins.

As one result of its excellence, the Greek has adapted itself with equal care and precision to the constantly growing demands of science. On its native soil, and while yet spoken in its purity, the Greek tongue had gained the power of expressing the widest generalisations, and the nicest distinctions of thought. Its resources for setting forth the truths of physical science were, in classical times, but very partially put to the test. In the pages of Cicero, however, we learn how much indebted Rome was to the Greek for terms of art and of moral and intellectual disquisition. At the true birth of science, after the revival of letters, the Greek, being cultivated anew, afforded a most appropriate vehicle for the communication and interchange of the new truths which continued to break upon the world in great profusion; and now, by the creation of several sciences wholly unknown of old—such as chemistry, botany, physiology, conchology, magnetism, etc.—our scientific vocabulary, with all its multiplicity, its precision, and conciseness, is found to consist, for the most part, of elements supplied by the Greek language. You have an instance in the first word of the ensuing list, *ακουω* (a-kow'-o), which is the parent of *acoustics*, or the *science of hearing*. The corresponding *science of sight* has also, in *optics*, taken a Greek term. Hence you may infer how important is an exact study of these Greek stems. In some sense, indeed, the learning of a science is the learning of the signification of its vocabulary, or list of words; assuredly he that is familiar with the elementary roots of the Greek, will, in proceeding to study science, find himself in possession of a most powerful auxiliary.

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meanings.*	*Stems.*	*English Words.*
Ακουω	a-kow'-o	*I hear*	*acou*	*acoustics.*
Ανθος	an'-thos	*a flower*	*antho*	*anthology.*
Λογος	log'-os	*a word*, a discourse, a science	*logo*	*logomachy.*
Μαχη	mach'-e or mack'-e	*a fight*	*mach*	*naumachy.*
Ναυς	naus	*a ship*	*nau*	*nautical.*

The word logos (*λογος*) plays a very important part in the world of ancient Greek thought. It is the term by which the *word* of St. John's Gospel is expressed in the original. Logos denotes either intelligence, the unuttered thought; or speech, the uttered thought. From these radical meanings flow the numerous applications of the term. In science, the service which logos renders is very great. In the preceding list, two out of the five examples contain the term. Used in a somewhat remote sense, indeed, logos, as signifying science, enters into the very designation of many of the sciences. Thus we say theology, philology, astrology, demonology, pneumatology, anemology, ouranology, nosology, phrenology, etc.

In naus (*ναυς*) you have a word common to the Teutonic and the Celtic elements of language, for the naus of the Greeks is the navis of the Latins. Meaning *ship*, it appears not only in nautical (Latin, nauta, *a sailor*), but in navigate (Latin, ago, *I drive*, guide), navigation, etc. The student, by combining naus, *a ship*, with mache (*μαχη*, *fight*), learns that naumachy denotes *a sea-fight*.

"Anthology signifies properly a *collection* of flowers, and in particular a collection of flowers or gems of poetry. There is in the Greek *anthology* a remarkable mention here of sneezing in an epigram upon one Proclus."—*Brown, "Vulgar Errors."*

"The contentions of the Eastern and Western churches about this subject are but a mere *logomachy*, or strife about words."—*Bishop Bramhall.*

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meanings.*	*Stems.*	*English Words.*
Ανθρωπος	an-thro'-pos	*a man*	*anthrop*	*misanthropy.*
Μισος	mis'-os	*hatred*	*miso*	*misogamist.*
Γαμος	gam'-os	*marriage*	*gam*	*bigamy.*

Bi (bis) signifies *twice*, so that bigamy is the state of being *twice married*.

"No *bigami*—that is, none that had been twice married, or such as married widows—were capable of the benefit of clergy, because such could not receive orders."—*Burnet, "History of the Reformation."*

"*Bigamy*, according to the canonists (the doctors of the ancient ecclesiastical law), consisted in marrying two virgins successively, one after another, or once marrying a widow."—*Blackstone, "Commentaries."*

Bigamy, as punished by the English law, is the crime of having two wives at the same time.

EXERCISES IN COMPOSITION.

Words with their Prepositions to be formed into sentences.

	F. R.
Allude to,	lud, *play.*
Alteration in, of,	alter, *another.*
Ambition of,	ambit, *a canvassing.*
Amenable to,	amener, *to bring.*
Analogous to, / Analogy to, between,	analog, *similar.*
Angry with a person, / Angry at a thing,	angor, *choking.*
Annex to,	nexa, *a link.*
Animadvert on,	animus, *mind.* / vert, *to turn.*
Antecedent to,	ante, *before.* / ced, *to go.*
Antipathy to, against,	anti, *against.* / path, *feeling.*
Anxious about,	anx, *pain.*
Apologise for,	apo, *from.* / logo, *discourse.*
Appeal to,	appel, *to hurry to.*
Appertain to,	ad, *to.* / per, *through.* / tene, *to hold.*
Applicable to, / Apply to,	plic, *to fold, grasp.*
Apprehension of,	prehend, *to take hold.*
Appropriate to,	propr, *one's own.*
Approve of,	prob, *good.*
Argue with, against,	argue, *proof.*

To improve yourself in simple composition, make a report of the following anecdote:—

INTELLIGENCE OF AN APE.

"A friend of mine," says Dr. Bailly, "a man of understanding and veracity, related to me these two facts, of which he was an eye-witness. He had an intelligent ape, with which he amused himself by giving it walnuts, of which the animal was extremely fond. One day he placed them at such a distance from the ape that the animal, restrained by his chain, could not reach them. After many useless efforts to indulge himself in his favourite delicacy, the ape happened to see a servant pass by with a napkin under his arm; he immediately seized hold of it, whisked it out beyond his arm to bring the nuts within his reach, and so he obtained possession of them. His mode of breaking the walnut was a fresh proof of the animal's inventive powers; he placed the walnut upon the ground, let a great stone fall upon it, and so got at its contents. One day the ground on which he had placed the walnut was so much softer than usual, that, instead of breaking the walnut, the ape only drove it into the earth. What does the animal do? He takes up a tile, places the walnut upon it, and then lets the stone fall while the walnut is in this position."—*Sydney Smith.*

RECREATIVE NATURAL HISTORY.

THE SPIDER.—PART I.

As there are about 1,200 species of known spiders—one genus (*Epeira*) containing above sixty—a large volume would be required even to describe the more remarkable families. We can, therefore, only mention in this and a future paper some of the most important facts connected with the structure, works, and habits of spiders.

These animals are no longer classed with insects, from which they differ in four particulars, having simple eyes instead of compound, eight legs in place of six, no antennæ, and not undergoing the interesting metamorphoses so characteristic of insect life. All the families of spiders and scorpions are grouped together under the term *Arachnida*, derived from the Greek name for a spider, *αραχνη* (a-rak'-ne). The word *Araneidæ* includes under it the true spiders only, and is from *aranea*, the Latin designation of the animal. Our common English name is derived from the old word spinder, a *spinner*. A more ancient descriptive term was *attercop*, signifying poison-head.

We may note, in passing, that all spiders are distributed into two great sections—*Pulmonaria*, or those which breathe by pulmonary cavities; and *Trachearia*, or those which breathe by tracheæ, like insects. They are also sometimes classed according to their habits, as Hunters, Wanderers, Sedentaries, and Divers. The more usual arrangement now is according to the number of eyes, one genus having but two, others six, and the greater number eight.

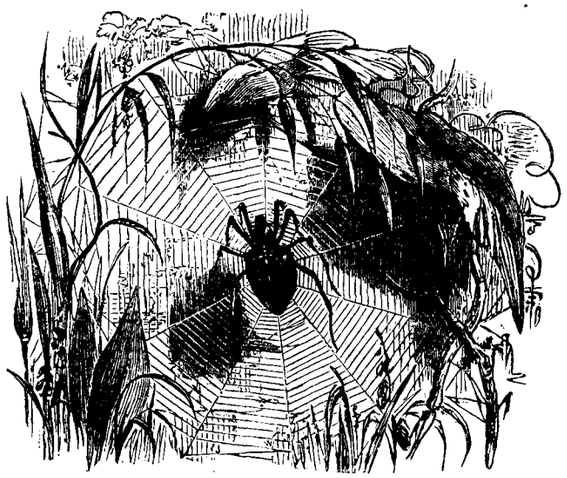
Where do spiders live? Some in little cells, formed of the most delicate tissues; some in holes in the earth, or in wall crevices; many in our wine-cellars; a few in our libraries; hosts high in the air, or in tubes suspended from leaves; and not a small number in the water. The webs of the geometrical spider may be studied in almost every garden. Look at its work. See how beautifully the main threads radiate from the centre, and with what peculiar art the circular lines are secured to the radiating tissue. The repairs of this net demand incessant attention. Once a day the whole is examined, and the torn or loosened threads adjusted. Look closely at a net of the diadem (*Epeira diadema*) garden spider. You will recognise the creature by the gem-like whitish markings on the body, and the dark bands and spines on the legs. Those threads which form the spirals are more glutinous than the fine but stronger lines radiating from the centre, where the diadem takes his sentinel-post. Take a magnifying-glass, and a multitude of fine globules may be traced along the spiral threads. These constitute a series of fastenings by which the circular lines are gummed firmly to the radiating threads. The number of these globules, or web-ties, is surprising, a single net of the "diadem" spider having been found to contain above 87,000. The net of the *Epeira apoclisa*, a species allied to the garden diadem spider, usually consists of twenty-six radiating lines, and twenty-four rows of spirals. A large web of this kind has been calculated to contain 120,000 viscid globules. Besides the radiating and spiral threads, the observer will not fail to notice the main lines which extend beyond the geometrical work, and support the whole. These main threads are fastened at each end to leaves or twigs, and the radiating lines are then firmly secured to these supports. If one of these important lines be suddenly broken, the beautiful geometrical structure will collapse and become a ruin.

The whole of such a net, with all its elaborate tracery of radiating and parallel lines, with its thousands upon thousands of points, is sometimes produced in about forty minutes. A web over a cannon's mouth, or across the opening in the poor-box, is therefore no proof that either has been long disused. The cannon may have been discharged yesterday, and yet a perfect web be over its mouth this morning. The reader will not forget that in this short time the spider not only arranges the fine geometrical lines, but also spins the whole from its own body. Let the reader examine carefully one of the fine threads, and then estimate its diameter. Does it not seem almost impossible to express in the fraction of an inch the thickness of that filmy tissue? But the fine line is not a single one, being composed of no less than 4,000 threads. Some of these wonderfully complex lines are themselves so fine that 4,000,000 twisted together would not exceed the thickness of an ordinary hair from the human head. Yet each one of these 4,000,000 tissues is itself composed of 4,000 single threads. The diameter, therefore, of one simple thread is but one sixteen thousand-millionth ($\frac{1}{16000000000}$) part of the thickness of a human hair. If such a statement seems almost incredible, it is but one of the many mysteries abounding in the lower forms of life.

The spinning machine is a wonder in itself. Under the hinder part of the spider's body a small depression may be seen. Look closer, and, rising from this hollow, there will be noted six small, tube-shaped bodies. Now use a microscope, and the observer may detect a great number of exceedingly fine openings on four of the tube-like bodies, about 1,000 on each. Through each of these 4,000 apertures the spider draws a fine thread, and all the 4,000 tissues, being hardened by the atmosphere, and twisted together, form one of the threads in the web. These four tube-like bodies are called *spinnerets*, the upper pair differing much from the lower in structure. Two kinds of threads are produced by this machine, at least in the case of the geometrical spider. The spirals of the web possess a gluey quality wanting in the radiating lines. But whence does the spider procure the delicate fluid which it draws through the pores of the spinnerets? From six or eight reservoirs behind, in which a glassy substance is formed and stored up till required. A peculiar comb-like apparatus on one or more of the feet is used for twisting, carding, and adjusting the fine tissues as they issue from the pores of the spinnerets. This

wonderful animal-machine, with its system of reservoirs, spinning apparatus, and carding claws, is far more complex and admirable than the Lancashire self-acting "mules," which spin at one time a thousand threads of "twist," each resembling a cable when compared with the spun tissue of the spider.

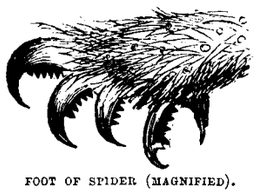
Some spiders never use their webs for nets. Thus the small gossamer spider turns her fine threads into a convenient bridge for passing from one plant to another, or uses them as a fairy-like chariot to bear her aloft in the air. Sometimes a whole army of these minute creatures descends upon the fields, and even rivers, as in 1811, when the Tagus was covered for half a mile with the webs of the gossamers, which floated safely on their silvery rafts. These floating webs and spiders have settled on ships sixty miles from land, as when the rigging of the *Beagle* discovery vessel was covered with a cloud of gossamers in the estuary of the Rio de la Plata.



GEOMETRICAL SPIDER'S WEB.

The building spider uses the soft webs for lining the cell which it has formed in the earth, and also for securing the movable trap-door at the entrance. This door is usually made of about fifteen layers of web, alternating with as many of fine earth. All these walls of web are curiously united to form a self-closing door-hinge.

The water or diving spider (*Argyroneta aquatica**) constructs a bell-shaped house, to which it retires with its captured prey. The residence is made waterproof by a gummy covering, air being carried down to the house by a bag formed of the same gummy substance fastened under the animal's body, where it sparkles, when filled with air, like a crystal globule. This clever spider fastens its home to water-plants by strong web-lines, which act as cables.



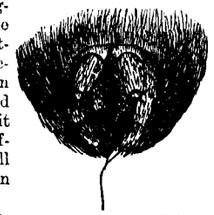
FOOT OF SPIDER (MAGNIFIED).

The diving spider is often found in Cambridgeshire and the adjoining counties, and appears to pass the winter in its aquatic house, which it completely fills with air as the cold season approaches. If by any accident the nest should then be tilted on one side so that the air escapes and water enters, the half-torpid inhabitant perishes. This spider is of a dark-brown colour, the legs armed with spines, and the body silky to the touch. The males of this species are larger than the females; but the contrary is the general law of the spider family. The red and white hairy brook spider of Cambridgeshire (*Dolomedes fimbriatus*) must not be confounded with the above-mentioned diver, though it runs readily over the surface of water. Some of the tube making spiders will even dive under the water, but their cells are never aquatic.

The webs of the common house spider cannot be called beautiful; but the mode in which one layer of tissue is interwoven with another, and the whole kept extended and in shape by the long supporting threads, will repay observation. The construction and arrangement of the cell to which these spiders carry their prey, and where they watch in constant readiness to dart forth, will furnish additional topics of interest.

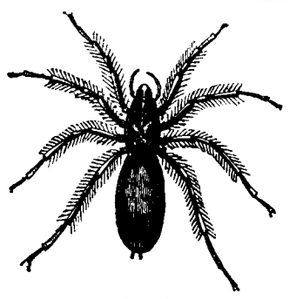
None of our English webs approach in size some of the foreign kinds. The main lines of the Bermuda spider's web are sometimes suspended between trees sixteen yards apart, and "will snare a bird as big as a thrush." These long threads being emitted from the spider's body, are carried by the wind to distant trees, or across rivers, and when one adheres to some substance the animal speedily crosses on the slender bridge, and effectually fastens its first line of suspension. If a web-spinning spider be placed on a twig surrounded by water, it will generally contrive to escape by sending out its threads, and so forming a bridge.

Some spiders are called webless, but the females of these do, nevertheless, spin a substance for the cocoons, in which their eggs are preserved. Some of these also often spin a beautiful silky substance, with which they luxuriously line their cells, formed in old walls or in the earth. Most spiders have very clear notions of making themselves comfortable at home. Spiders, though clever, are not considered capable of much tender emotion. The females will sometimes even kill and eat the males, but often show a high degree of affection for their young. Some carry the cocoons, containing the eggs, about with them on all their journeys; others select a sheltered place on which the cradle can be safely slung during the winter. The careful manner in which the "egg-cup" is covered over to protect the contents from the cold, is itself a witness to the spider's motherly forethought. These cocoons may often be seen on the inner walls of sheds and out-houses. A few spiders really wait upon and feed their young. The wolf-spider, fierce as her name sounds, will fight to the death with the ant-lion in defence of her egg-cocoon.



SPINNERET OF SPIDER (MAGNIFIED).

In one peculiar respect spiders resemble crabs, being compelled repeatedly to change their coats. The first of these moults must be undergone by the young spider before it can even move. The creature is at first bound up like a mummy in a tight covering, confining all the limbs. Some house-spiders obtain nine changes of raiment in a life-time. It is at these seasons that the spider has its only chance of recovering the lost limbs which it often parts with so easily. The loss of a leg is not a trivial matter, as the want of the combing-claw may prevent the proper spinning of the web-threads. Sir Joseph Banks caught a spider having but three legs; he kept it for examination, and in about a month saw the old skin cast off, when the rudiments of five new legs appeared, which in three days grew to half the size of the old ones. In twenty-nine days after there was a second casting off the skin, when the five legs became still larger. It seems, therefore, that lost limbs are not completely restored at one moulting. The feet of most spiders exhibit a complex apparatus, fitted for walking on glass, running over water, along a ceiling, or moving over the fine web lines. The animal may indeed be said to take "hold with her hands." These feet should be carefully examined through a microscope to detect the fine brush and hooked arrangement by which, according to Mr. Blackwall, the spider clings to the smoothest surfaces.



THE WATER SPIDER.

* *Argyroneta* signifies a *spinner of silver thread.*

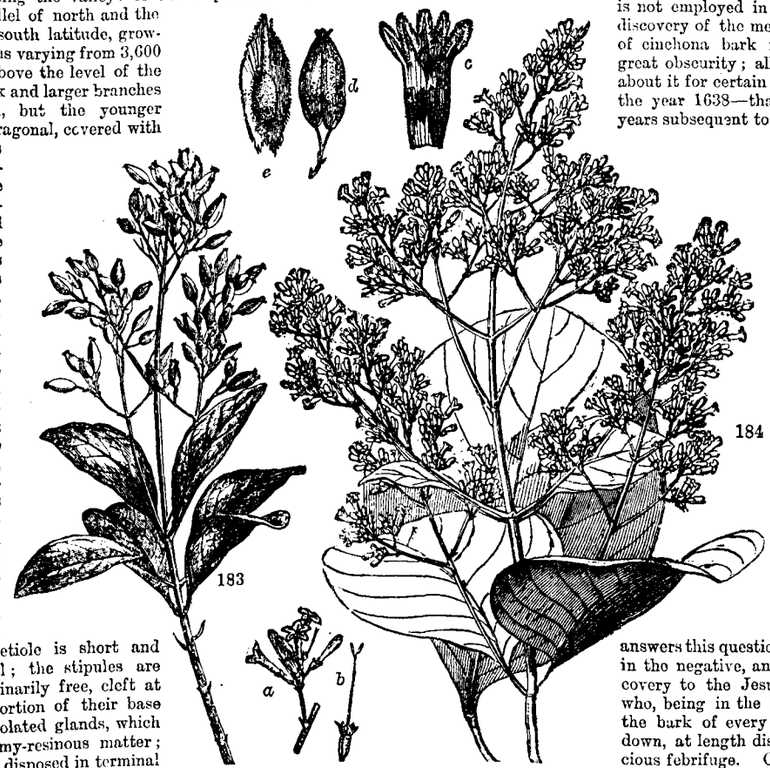
LESSONS IN BOTANY.—XXIII.

SECTION XLIV.—CINCHONACEÆ *(continued).*

VALUABLE though coffee be, we now arrive at the consideration of a genus which is of far greater importance—the genus *Cinchona*. Coffee is only a luxury; were the supply of the article suddenly to fail, we could do without it, and our health would be none the worse; but what would the doctors do without cinchona bark—that precious medicine so valuable in agues and low fevers?

Cinchona bark and the potato tuber are the two most precious donations which America has presented to the world. One secures us against famine, the other is almost a specific in certain febrile diseases.

The various species of cinchonas are all evergreen trees or shrubs, inhabiting the valleys of the tropical Andes, between the tenth parallel of north and the nineteenth of south latitude, growing at elevations varying from 3,600 to 9,800 feet above the level of the sea. The trunk and larger branches are cylindrical, but the younger boughs are tetragonal, covered with the cicatrices which correspond to the presence of former leaves and stipules. The bark, which is bitter, contains two alkaloids, quina or *quinine*, and cinchona or *cinchonine*. The wood is white, becoming yellow with age; the leaves are opposed, entire, veined, petiolate; the cells of their epidermis being in many species swollen by a liquid, giving rise to small conical elevations. The petiole is short and semi-cylindrical; the stipules are caducous, ordinarily free, cleft at the internal portion of their base by small lanceolated glands, which secrete a gummy-resinous matter; the flowers are disposed in terminal panicles; the corolla is white, roseate, or purple, and of a delicate odour; the pedicels are bracteolate at their base.



183. THE YELLOW CINCHONA (CINCHONA CALISAYA):—*a*, ITS FLOWER; *b*, PISTIL; *c*, COROLLA OPENED; *d*, FRUIT; *e*, SECTION OF FRUIT, SHOWING SEED. 184. THE GREY CINCHONA (CINCHONA CONDAMINEA OR MICRANTHA).

In commerce the varieties of cinchona bark are very numerous. They are all comprehended, however, under the four general heads of yellow, grey, white, and red bark.

The tree which yields the *Cinchona Calisaya* (Fig. 183), or royal yellow bark, bears oblong, lanceolate, ovoid leaves, obtuse at their points, tapering off towards their base, marked with clefts at the bifurcation of the veins; filaments considerably shorter than the anther; capsule ovoid, scarcely equal in length to the flowers. The bark of this species is preferred to that of all others, on account of its containing more quina and less cinchona, the latter alkali not being so valuable as the former.

The grey cinchona of Losca (*Cinchona Condaminea* of Humboldt and Bonpland) has lanceolate, oval, or pointed leaves, glabrous and shining above, marked with furrows inferiorly corresponding with the bifurcation of the veins. The indentations of the calyx are triangularly pointed or lanceolate; filaments equalling or even exceeding the length of the anthers; capsule oblong or lanceolated, much longer than the flowers; seeds elliptic, indented on the margins. It is this species which was first observed and described by the botanist Condamine. It is the same plant that was formerly described under the name of *Cinchona micrantha*, also cinchona of Lima (Fig. 184).

Red cinchona (*Cinchona nitida* of Riuz and Pavon) has obovate lanceolate leaves, tapering off towards the base, glabrous on both sides, shining above, covered with a slight down below, not marked with furrows at the axillary juncture of the nerves; capsule lanceolate, twice as long as it is wide; seeds imperfectly denticulated. The bark of this species is greyish-white externally; its chemical composition is said to differ from that of the preceding in the circumstance that besides cinchona and quina there exists in it a third alkali resembling these in general qualities, but containing more oxygen; it is termed *aricina*. White cinchona bark is not employed in medicine. The discovery of the medical properties of cinchona bark is enveloped in great obscurity; all that we know about it for certain is this:—Before the year 1638—that is to say, 150 years subsequent to the discovery of America—not even the Spaniards were acquainted with the febrifugo qualities of cinchona bark; but in this year, or thereabouts, the Countess del Chinchon, the wife of the Spanish viceroy of Peru, was cured of a violent intermittent fever by drinking an infusion of the bark, and this led to its introduction into Europe. Were the natives themselves acquainted with it? Humboldt answers this question very positively in the negative, and refers the discovery to the Jesuit missionaries, who, being in the habit of tasting the bark of every tree they hewed down, at length discovered the precious febrifuge. Other authors of repute contend that the virtues of cinchona bark were known to the Indians long before the advent of the Spaniards; but the question again arises, how they first became acquainted with its properties? To account for this the ridiculous tale has been invented, that certain animals, while labouring under fever, happened to gnaw the bark of one of the cinchona trees, and were cured forthwith. Far more probable is it that some cinchona trees having been laid prostrate by tempests in a pool of water, and the latter becoming charged with the medicinal principle, some person labouring under fever drank of this water, was cured, and published the result. But however this may be, it is certain that the remedy first became popularised in Europe through the agency of the Count del Chinchon, viceroy of Peru, whose wife, as we have said, was cured of intermittent fever by its administration.

The new remedy, however, was badly received in France and Italy. The faculty set their faces against it. Physicians who dared to prescribe its use were persecuted, and it was only the patronage of Louis XIV. which ultimately rendered it popular

in France. This monarch, suffering from intermittent fever, was cured by an English empiric named Talbot, by means of a secret remedy. This was no other than cinchona bark. Louis XIV. purchased the secret for the sum of 48,000 livres, and bestowed yearly a pension of 2,000 livres on the Englishman, besides giving him letters of nobility. Three years subsequently the remedy was published; it was a highly concentrated vinous tincture of cinchona bark. Cinchona trees grow in the densest forests of Peru. The task of discovering them, removing their bark, and conveying the latter to the place of export, is troublesome, difficult, and dangerous. In these forests there are no roads. Frightful precipices intersect the path of the cascarillero, or bark-gatherer, across which it is difficult to pass, even whilst unembarrassed by a load. So soon as the treasure of bark has been secured, these difficulties and dangers proportionately increase, so that the comparatively low price at which cinchona bark may be procured is in itself a matter of surprise.

READING AND ELOCUTION.—XXIII.

EXERCISES ON EXPRESSIVE TONE—*continued*.

THE next piece is designed as an exercise for cultivating the "orotund quality," or *full, round,* and *forcible* voice, which belongs to energetic and declamatory expression. A *loud, clear, ringing tone* should prevail throughout the reading or recitation of such pieces.

X. OLD IRONSIDES.

[*oro.q.*]

Ay, tear her tattered ensign down!
Long has it waved on high;
And many an eye has danced to see
That banner in the sky;
Beneath it rung the battle shout,
And burst the cannon's roar;
The meteor of the ocean air
Shall sweep the clouds no more!

Her deck,—once red with hero's blood,
Where knelt the vanquished foe,
When winds were hurrying o'er the flood,
And waves were white below,—
No more shall feel the victor's tread,
Or know the conquered knee;
The harpies of the shore shall pluck
The eagle of the sea!

Oh! better that her shattered hulk
Should sink beneath the wave;
Her thunders shook the mighty deep,
And there should be her grave:
Nail to the mast her holy flag,
Set every threadbare sail;
And give her to the god of storms,
The lightning and the gale!—*Holmes.*

The following piece is designed for practice in the "slow" utterance which characterises the tones of *sublimity* and *awe*. The "rate" of voice is not altogether so slow as will be required in some pieces; yet it retains much of that effect which cannot be given without slowness of movement and full pauses. The note, in the style of this lesson, continues *low*, although *not* so remarkably *deep* as in the preceding. The principal object of practice, in this instance, is to secure that degree of "slowness" which marks the tones of *wonder* and *astonishment*.

XI. NIAGARA.

Flow on for ever, in thy glorious robe
Of terror and of beauty! Yea, flow on
Unfathomed and resistless! God hath set
His rainbow on thy forehead: and the cloud
Mantled around thy feet. And he doth give
Thy voice of thunder, power to speak of Him
Eternally,—bidding the lip of man
Keep silence, and upon thy rocky altar pour
Incense of awe-struck praise.

Ah! who can dare
To lift the insect-trump of earthly hope,
Or love or sorrow, 'mid the peal sublime
Of thy tremendous hymn? E'en Ocean shrinks
Back from thy brotherhood; and all his waves
Retire abashed. For he doth sometimes seem
To sleep like a spent labourer, and recall
His wearied billows from their vexing play,
And lull them to a cradle calm; but thou
With everlasting, undecaying tide,
Doth rest not, night or day. The morning stars,
When first they sang o'er young creation's birth,
Heard thy deep anthem; and those wrecking fires
That wait the archangel's signal to dissolve
This solid earth, shall find Jehovah's name
Graven as with a thousand diamond spears,
On thine unending volume.

Ev'ry leaf,
That lifts itself within thy wide domain,
Doth gather greenness from thy living spray,
Yet tremble at the baptism. Lo!—yon birds
Do boldly venture near, and bathe their wing
Amid thy mist and foam. 'Tis meet for them
To touch thy garment's hem, and lightly stir
The snowy leaflets of thy vapour wreath,
For they may sport unharmed amid the cloud,
Or listen at the echoing gate of heaven,
Without reproof. But, as for us, it seems
Scarce lawful, with our broken tones, to speak
Familiarly of thee. Methinks to tint
Thy glorious features with our pencil's point,
Or woo thee to a tablet of a song,
Were profanation.

Thou dost make the soul
A wondering witness of thy majesty;
But as it presses with delirious joy
To pierce thy vestibule, dost chain its step,
And tame its rapture with the humbling view
Of its own nothingness; bidding it stand
In the dread presence of the Invisible,
As if to answer to its God through thee.—*Sigourney.*

The following specimen of *descriptive humour* requires the "lively movement" in its rate of utterance. The voice is, in this instance, *accelerated beyond the rate of serious communication* in any form, although it does *not* possess the *rapidity* which belongs to the excited style of lyric or dramatic poetry, in the most vivid style of humorous expression. This lesson combines, also, an exemplification of "moderate" force and "middle" pitch. The object in view in the practice of such exercises as this is to gain *animation* and *briskness* in utterance. A lagging or drawling tone is utterly incompatible with humorous delineation. *Mere rapidity*, however, will *not* succeed in imparting *liveliness* to style: the utterance must be *slow enough* to be *distinct* and *spirited*.

XII. WOUTER VAN TWILLER.

The renowned Wouter (or Walter) Van Twiller was descended from a long line of Dutch burgomasters, who had successively dozed away their lives and grown fat upon the bench of magistracy in Rotterdam, and who had comported themselves with such singular wisdom and propriety, that they were never either heard or talked of—which, next to being universally applauded, should be the object of ambition of all ages, magistrates, and rulers.

His surname, Twiller, is said to be a corruption of the original *Twijfler*,* which, in English, means *Doubter*—a name admirably descriptive of his deliberative habits. For, though he was a man shut up within himself, like an oyster, and of such a profoundly reflective turn, that he scarcely ever spoke except in monosyllables, yet did he never make up his mind on any doubtful point. This was clearly accounted for by his adherents, who affirmed that he always conceived every object on so comprehensive a scale, that he had not room in his head to turn it over, and examine both sides of it; so that he always remained in doubt, merely in consequence of the astonishing magnitude of his ideas!

There are two opposite ways by which some men get into notice—one by talking a vast deal and thinking a little, and the other by holding their tongues and not thinking at all. By the first, many a vapouring, superficial pretender acquires the reputation of a man of quick parts; by the other, many a vacant dunderpate, like the owl, the stupidest of birds, comes to be complimented by a discerning world with all the attributes of wisdom. This, by the way, is a mere casual remark, which I would not for the universe have it thought I apply to Governor Van Twiller. On the contrary, he was a very wise Dutchman, for he never said a foolish thing; and of such invincible gravity, that he was never known to laugh, or even to smile, through the course of a long and prosperous life. Certain, however, it is, there never was a matter proposed, however simple, and on which your common, narrow-minded mortals would rashly determine at the first glance, but what the renowned Wouter put on a mighty mysterious, vacant kind of look, shook his capacious head, and having smoked for four or five minutes with redoubled earnestness, sagely observed that "he had his doubts about the matter"—which in process of time gained him the character of a man slow in belief, and not easily imposed on.

* Pronounced *Twesfler*.

The person of this illustrious old gentleman was as regularly formed and nobly proportioned as though it had been moulded by the hands of some cunning Dutch statuary, as a model of majesty and lordly grandeur. He was exactly five feet six inches in height, and six feet five inches in circumference. His head was a perfect sphere, and of such stupendous dimensions, that dame Nature, with all her sex's ingenuity, would have been puzzled to construct a neck capable of supporting it; wherefore she wisely declined the attempt, and settled it firmly on the top of his backbone, just between the shoulders. His body was of an oblong form, particularly capacious at bottom; which was wisely ordered by Providence, seeing that he was a man of sedentary habits, and very averse to the idle labour of walking. His legs, though exceeding short, were sturdy in proportion to the weight they had to sustain; so that, when erect, he had not a little the appearance of a robustious beer-barrel standing on skids. His face, that infallible index of the mind, presented a vast expanse, perfectly unfurrowed or deformed by any of those lines and angles which disfigure the human countenance with what is termed expression. Two small grey eyes twinkled feebly in the midst, like two stars of lesser magnitude in the hazy firmament; and his full-fed cheeks, which seemed to have taken toll of everything that went into his mouth, were curiously mottled and streaked with dusky red, like a Spitzenberg apple.

His habits were as regular as his person. He daily took his four stated meals, appropriating exactly an hour to each; he smoked and doubted eight hours; and he slept the remaining twelve of the four-and-twenty. Such was the renowned Wouter Van Twiller—a true philosopher; for his mind was either elevated above or tranquilly settled below the cares and perplexities of this world. He had lived in it for years without feeling the least curiosity to know whether the sun revolved round it, or it round the sun; and he had watched for at least half a century the smoke curling from his pipe to the ceiling, without once troubling his head with any of those numerous theories by which the philosopher would have perplexed his brain, in accounting for its rising above the surrounding atmosphere.—*Washington Irving.*

XIII. THE CHILD OF THE TOMB: A STORY OF NEW BURYPORT.

[The following fact is found in Knapp's "Life of Lord Dexter."]

Where WHITEFIELD sleeps, remembered, in the dust,
The lowly vault held once a double trust;
And PARSONS, reverend name, that quiet tomb
Possessed,—to wait the day of weal and doom.
Another servant of the living God,
PRINCE, who (bereft of sight) his way had trod,
Unerringly and safe, life's journey through,
Now sought admittance to these slumberers too.
As earth receded, and the mansions blest
Rose on his vision,—"Let my body rest
With Whitefield's"—said he, yielding up his breath,
In life beloved, and not disjoined in death.
Obedient to his wish, in order then
Were all things done; the tomb was oped to ken
Of curious eyes,—made ready to enclose
Another tenant in its hushed repose:
And, lighted with a single lamp, whose ray
Fell dimly down upon the mouldering clay,
Was left, prepared, to silence as of night,
Till hour appointed for the funeral rite.

It chanced the plodding teacher of a school,—
A man of whim, bold, reckless, yet no fool,—
Deemed this an opportunity to test
How far the fears of spirits might infest
The bosom of a child. A "likely" boy,
The choicest of his flock, a mother's joy,
He took, unscrupulous of means, if he
His ends might gain, and solve the mystery.

Both stood within the mansion of the dead,
And while the stripling mused, the teacher fled,
Leaving the child, where the dull cresset shone,
With the dumb relics and his God alone.
As the trap-door fell suddenly, the stroke,
Sullen and harsh, his solemn reverie broke.
Where is he?—Barred within the dreadful womb
Of the cold earth—the living in the tomb!
The opened coffins showed Death's doings, sad,—
The awful dust in damps and grave-mould clad,
Though near the haunt of busy, cheerful day,
He, to drear night and solitude the prey!
Must he be watcher with these corpses!—Who
Can tell what sights may rise? Will reason then be true?
Must he,—a blooming, laughter-loving child,—
Be mated thus?—The thought was cruel, wild!
His knees together smote, as first, in fear,
He gazed around his prison;—then a tear
Sprang to his eyes in kind relief; and said
The little boy, "*I will not be afraid.*
Was ever spirit of the good man known
To injure children whom it found alone?"
And straight he taxed his memory, to supply
Stories and texts, to show he *might* rely
Most safely, humbly, on his Father's care,
Who hears a child's as well as prelate's prayer.
And thus he stood,—on Whitefield's form his glance
In reverence fixed,—and hoped deliverance.

Meanwhile, the regreant teacher,—where was he?
Gone in effrontery to take his tea
With the lad's mother!—Supper done, he told
The feat that should display her son as bold.
With eye indignant, and with words of flame,
How showers that mother's scorn, rebuke, and shame,
And bids him haste! and hastes herself, to bring
Him from Death's realm, who knew not yet its sting:
And yet believed,—so well her son she knew,—
The noble boy would to himself be true:
He would sustain himself, and she would find
Him patient and possessed, she trusted well his mind.
The boy yet lives, and from that distant hour
Dates much of truth that on his heart hath power;
And chiefly this,—whate'er of wit is wed
To word of his,—*to reverence the dead.*

XIV. FOUNDATION OF NATIONAL CHARACTER.

[To be marked for *Inflections* by the student.]

Mental energy has been equally diffused by sterner levellers than ever marched in the van of a revolution,—the nature of man and the providence of God. Native character, strength, and quickness of mind are not of the number of distinctions and accomplishments that human institutions can monopolise within a city's walls. In quiet times they remain and perish in the obscurity to which a false organisation of society consigns them. In dangerous, convulsed, and trying times, they spring up in the fields, in the village hamlets, and on the mountain tops, and teach the surprised favourites of human law, that bright eyes, skilful hands, quick perceptions, firm purpose, and brave hearts, are not the exclusive *appanage* of courts.

Our popular institutions are favourable to intellectual improvement, because their foundation is in dear nature. They do not consign the greater portion of the social frame to torpidity and mortification. They send out a vital nerve to every member of the community, by which its talent and power, great or small, are brought into living conjunction and strong sympathy with the kindred intellect of the nation; and every impression on every part vibrates, with electric rapidity, through the whole. They encourage nature to perfect her work; they make education, the soul's nutriment, cheap; they bring up remote and shrinking talent into the cheerful field of competition: in a thousand ways they provide an audience for lips which nature has touched with persuasion; they put a lyre into the hands of genius; they bestow on all who deserve it, or seek it, the only patronage worth having, the only patronage that ever struck out a spark of "celestial fire,"—the patronage of fair opportunity.

This is a day of improved education; new systems of teaching are devised; modes of instruction, choice of studies, adaptation of text-books, the whole machinery of means, have been brought, in our day, under severe revision. But were I to attempt to point out the most efficacious and comprehensive improvement in education—the engine by which the greatest portion of mind could be brought and kept under cultivation, the discipline which would reach furthest, sink deepest, and cause the word of instruction not to spread over the surface, like an artificial hue, carefully laid on, but to penetrate to the heart and soul of its objects—it would be popular institutions. Give the people an object in promoting education, and the best methods will infallibly be suggested by that instinctive ingenuity of our nature, which provides means of great and precious ends. Give the people an object in promoting education, and the worn hand of labour will be opened to the last farthing, that its children may enjoy means denied to itself.—*E. Everett.*

LESSONS IN GEOMETRY.—XXIII.

THE PARABOLA—THE HYPERBOLA.

PROBLEM LXIII.—*To describe a parabola by fixing a number of points through which the curve may be traced, the abscissa and ordinate of any point in the curve being given.*

Let P (Fig. 91) be any point in the required parabola, and let A represent its ordinate, and B its abscissa. Through P draw the

straight line PX of indefinite length towards X, and along PX from P set off PC, CD, each equal to A. Through C draw CY of unlimited length towards Y, and along it from C set off CE equal to B. Through P and D draw PF, DG parallel to CE and equal to it, and through E draw FG parallel and equal to PX. Divide PC, CD into any number of equal parts in the points *a*, *b*, *c*, etc., and divide PF, DG each into the same number of equal parts in the points *m*, *n*, *o*, etc., *s*, *t*, *u*, etc., as each of the straight lines PC, CD have been divided into. Draw straight lines through the points *a*, *b*, *c*, etc., parallel to CE, and from E draw straight lines to the points *m*, *n*, *o*, etc., in PF, and the points *s*, *t*, *u*, etc., in DG. Then through the points 1, 2, 3, etc., formed by the intersection of E *r* with the parallel through *f*, E *q*, with the parallel through *e*, E *p*, with the parallel through *d*, etc., trace the curve EP above the axis EC, and the curve ED below it. The curve PED is the required parabola.

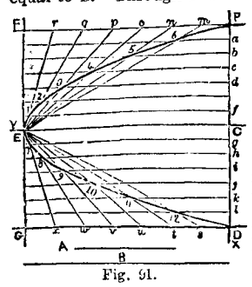


Fig. 91.

PROBLEM LXIV.—*To describe an hyperbola by mechanical means.*

The hyperbola, instead of being considered as a single curve, is frequently represented as consisting of two equal and symmetrical curves, having their vertices opposite each other, and their branches proceeding in contrary directions. The reason of this may be understood from Fig. 92, in which two cones are represented, the one having its apex against the apex of the other, and its base turned in the contrary direction. Such a double cone as this may be generated by the revolution of two equal equiangular and similar right-angled triangles, having their vertices contiguous, and their altitudes in the same straight line as the triangles ABC, ADE, in the figure. We may also conceive the double cone to be generated by the revolution of a straight line, BA F, or DAG, round its central point, A (which is fixed), and inclined at any angle less than a right angle to a perpendicular straight line, EAC, passing through A, which perpendicular becomes the axis of the cone thus generated. Now if we suppose a plane HKML to pass through the axis EC of the double cone, and the double cone to be cut by another plane parallel to the plane HKML, as the plane NOPQ, it is manifest that it will cut each branch of the cone in NOR, PSQ, which form two equal symmetrical and opposite curves, and which are considered as each forming a branch of the complete hyperbola.

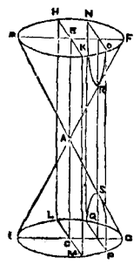


Fig. 92.

Our readers will now more readily comprehend the method of describing an hyperbola by mechanical means, and when certain data are given; and they will also understand why an hyperbola is said to have two foci, like an ellipse.

In XY (Fig. 93), which represents any straight line of indefinite length, let two points, A and B, be selected as the foci of the hyperbola to be described. Take a flat, narrow ruler, CD, with a hole in it near one end, through which a pin may be inserted to fasten the ruler to the paper or board on which the hyperbola is to be traced, the ruler working freely round the pin. Suppose F, in AB, be selected as the vertex of the hyperbola that is to be traced. Take another point, E in AB, so that AF is equal to FB; then E will be the vertex of the opposite branch of the hyperbola, and EF the major axis of the curve. Let a string be fastened at the end, D, of the ruler CD, and let the string be of unlimited length, or, what is as well, of the same length as the ruler. Set off along the ruler from the point A, in the direction AD, a straight line AG, equal to EF, and holding the string tightly to the edge of the ruler, mark it at the point opposite to the point G in the ruler; then thrust a pin through the string at the point thus marked, and fasten it down at the point B. Keeping the cord stretched to its utmost tension with a pencil-point, and having the edge of the ruler applied to the straight line XY, move it slowly upwards round the pivot A. Before starting, when the edge of the ruler is contiguous to XY, the point G will be at H, the pencil-point at F, and the string in the position BF, FK. As the ruler moves upwards, the pencil-point traces out the curve FLNP, the point G describing or moving in the path of the arc HM, and the end of the ruler D in the path of the arc KO. The point Q, where AB is bisected at right angles by the perpendicular RS, is the centre of the hyperbola. By reversing the ruler, and repeating the operation below XY, the lower part, FT, of the curve PFT may be traced; and by fixing the ruler so that the point represented in the figure at A may be at B, and the end of the string fastened at A, the opposite branch of the hyperbola passing through E may be described. The straight line VBU, passing through the focus B, is called the latus rectum of the hyperbola; FB the abscissa, and BV the ordinate of the point V; FZ the abscissa, and PZ, TZ the ordinates of the points P and T. The chief peculiarity of the parabola is, that the distance of every point in the curve, as the ruler passes from one position to another from the focus, is equal to its distance from the point marked G in the ruler. Thus, when the ruler is in the position AK, and G is at H, FH is equal to FB; in the position AD, LB is equal to LG; in the position AO, NM is equal to NB; while in the position AP, PW is equal to PB. The distances, AF, FB; AL, LB; AN, NB; AP, PB, are called the focal distances of the points F, L, N, P respectively, and the difference between the greater and the lesser of any of these pairs of distances from the foci of the hyperbola is equal to EF, the major axis of the hyperbola; and this is true for every point in the curve. For this reason, in the commencement of the problem, AG was made equal to EF.

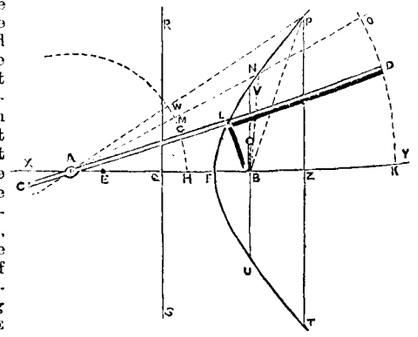


Fig. 93.

PROBLEM LXV.—*To describe an hyperbola by fixing a number of points through which the curve may be traced, the major axis, and the abscissa and ordinate of any point in the curve being given.*

In Fig. 94 let any indefinite straight line, XY, be the axis of the required hyperbola; the portion intercepted between the points A and B being set off equal to P, the given major axis; and Q, R being the given abscissa and ordinate of a point in the curve. From B, set off along XY, in the direction of Y, BC equal to Q, and through C draw the straight line DE of indefinite length, at right angles to XY; and from C along DE, in the directions of D and E, set off CF, CG, each equal to R. The points F and G are points in the required curve. Through F and G draw FH, GK parallel to XY, and through B draw HK parallel to DE. Divide CF, CG each into five equal parts in

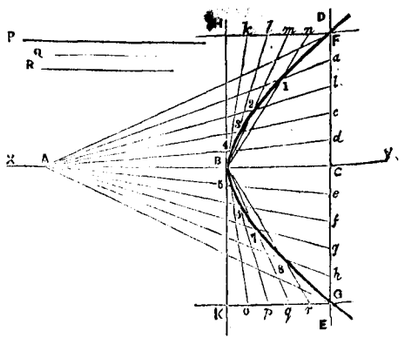


Fig. 94.

the points *a*, *b*, etc., *c*, *f*, etc., and divide HF, KG also into five equal parts in the points *k*, *l*, etc., *o*, *p*, etc. Of course, when the curve is large, the greater the number of parts into which the double ordinate, FG, and the parallels, HF, KG, are divided, the more accurately the curve can be traced, care being taken to divide the parallels into the same number of equal parts as each half of the double ordinate, FG, is divided into. From the point A draw straight lines through the points F, *a*, *b*, etc., and from B draw straight lines through the points *k*, *l*, etc., *o*, *p*, etc., and through the points of intersection of the lines A*a*, B*n*, A*b*, B*m*, etc., numbered 1, 2, etc., and the points F, B, and G, trace the curve FBG. This curve is the hyperbola required.

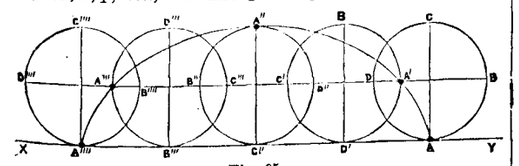


Fig. 95.

Lest some of our readers may be tempted to inquire of what practical use it may be to be acquainted with the method of tracing parabolas and hyperbolas of different degrees of curvature, we may remind them that the parabola sometimes is used in forming an arch, while such articles as tazzas and wine-glasses, and other pieces of useful and ornamental china-ware, may be formed by the revolution of an hyperbola about its axis, as may be seen by copying the curve in Fig. 94, so that the vertex, B, points downwards, and then adding a slender stem and foot to form a wine-glass.

PROBLEM LXVI.—*To describe the curve called the cycloid.*

The term *cycloid*, derived from the Greek κυκλοειδης (ku-klo-i'-dees), *like a circle*, is a name given to the curve traced by any point in the circumference of a circle during the complete revolution of the circle while rolling along a straight line. For example, as a carriage is drawn along on a road or railroad, the end of any spoke in one of its wheels, or a nail in the tire, describes a succession of curves, similar to the curve resembling half of an ellipse in Fig. 95. That the reader may understand how the curve is traced, let ABCD represent a circle, having two diameters, AC, BD, intersecting each other at right angles, and let the circle be standing on a straight line, XY, of indefinite length, so that the diameter AC is at right angles to XY, which is a tangent to the circle ABCD, the circle touching it only in the point A. Suppose the circle to roll slowly along the straight line XY, in the direction of X, and pass into the position A′ B′ C′ D′. It has now performed a quarter of a complete revolution, and the point A in ascending into the position A′ has traced a path represented by the curve AA′. In the next quarter of a revolution the point A is brought to the top in the position A″, and when a complete revolution of the circle has been made it has passed from A″ to A‴ and A⁗, having traced in its passage from A to A⁗ the curve AA′A″A‴A⁗. Practically, the cycloid may be traced by causing a thin disc of metal, ivory, or even cardboard, having a slight nick in its circumference to receive a pencil point, to travel slowly along the edge of a ruler until a

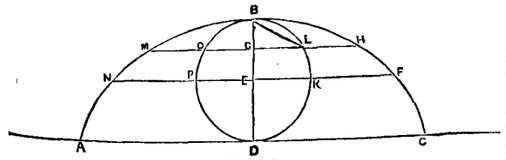


Fig. 96.

complete revolution has been made. At the commencement of the revolution the pencil-point must be on the line along which the disc is to revolve, as A, in the straight line XY, in Fig. 95 above.

Like the ellipse, parabola, and hyperbola, the cycloid has certain properties peculiar to itself. Suppose the circle BKD (Fig. 96) revolving along the straight line AC, to have traced out the cycloid ABC by the passage of the point B from A to C during the revolution. It is evident that, as every point of the circumference of the circle in succession touches the straight line AC during the revolution, AC, which we may call the base of the cycloid, is equal in length to the circumference of the circle BKD. If the circle be caused to return to its position in the centre of the cycloid when B is at its highest position, as in the figure, and straight lines, such as MH, NF, be drawn through the circle parallel to the base and terminating both ways in the curve of the cycloid, these straight lines pass through opposite points in the circumference of the circle BKD, at equal distances from the diameter BD, which is perpendicular to the base, GL being equal to GO, and EK to EP. It will be found that LH is equal to the arc BL, and that the arc BH is equal to twice the chord BL, and so on for the other points, M, N, F, in the curve of the cycloid, through which straight lines have been drawn parallel to the base. The arc BC will therefore be equal to twice BD, the diameter of the generating circle, and the whole curve ABC consequently equal to four times BD. This curve is said to have been discovered and its properties first investigated by Galileo.

PROBLEM LXVII.—*To describe a spiral.*

Take any point, A (Fig. 97), as the centre of the spiral to be drawn. Draw a horizontal straight line, XY, of indefinite length through A, and from A as centre, with any distance, AB, describe the semicircle BDC. Then from the point B as centre, with the distance BC, describe the semicircle CEF on the opposite side of AB. Next, from A as centre, with the distance AF, describe the semicircle FGH, and then from B and A, in alternation as centres, at the distances BH, AL, etc. etc., describe as many semicircles in succession as may be required. A spiral of any given number of turns may be described on a given straight line by dividing the given straight line into as many equal parts as there are turns required, and bisecting the central division if the number of turns be odd, or the division on the right or left of the centre of the line if the number of turns be even. The centres to be fixed in describing the semicircles must be the point of bisection, and either of the points of division immediately contiguous to it if the number of turns be odd, or the point of bisection and the centre of the divided line if the number of turns be even. Thus, in Fig. 97, if it be required to describe a spiral of eight turns or semicircles on the given straight line RT, divide RT into eight equal parts, in the points N, H, C, B, F, L, P, and bisect BC, or BF, in A for the centre of the spiral. Then from the points A and B, in alternation, describe the semicircles BDC, CEF, etc. etc.

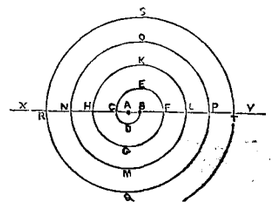


Fig. 97.

PROBLEM LXVIII.—*Any two straight lines being given, to determine a curve by which they shall be connected.*

Let AB, CD (Fig. 98) be any two straight lines which it is required to connect by a curve. Produce AB, CD in the direction of B and C, until they meet in E. Bisect the angle BEC by the straight line EF. From the extremities B and C of the straight lines AB, CD, draw BF, CF perpendicular to AB and CE respectively, and intersecting each other and the straight line EF in the point F. From F as centre, with the distance FB or FC, describe the arc BC. This arc connects the straight lines AB, CD. The same process is followed when the given straight lines are at right angles to each other, as AB, GH, which are connected by a curve, BG, struck from K as centre, the point of

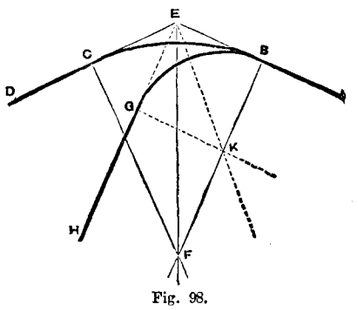


Fig. 98.

intersection of the perpendiculars B K, G K, drawn, as before, at right angles to the extremities, B and G, of the given straight lines A B, G H.

Next, let the given straight lines A B, C D be parallel to one another. Through B and C (Fig. 99) draw F B X, C E, perpendicular to A B, C D respectively. Join B C, and having taken a point, K, in B F, so that B K shall be less than B C, draw K L through K, parallel to B C, and cutting C E in L; from L as centre, with the distance L C, which is equal to B K, describe the arc C M, meeting B C in M. Join L M, and produce it in the same straight line towards M, to meet F X in N. From N as centre, with the distance N B or N M, describe the arc B M. The given straight lines A B, C D are connected by the curve B M C.

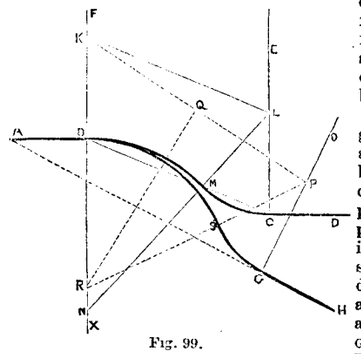


Fig. 99.

If, however, the given straight lines are not parallel, but would meet if one or both were produced, as G H produced meets B A in A, forming the small angle H A B, draw, as before, F X and G O at right angles to A B and G H respectively. Take any point, K, in B F; make G P equal to B K, and join K P. Bisect K P in Q, and draw Q R perpendicular to K P, meeting F X in R. Join R P, and from P as centre, at the distance P G, describe the arc G S, meeting R P in S. Then from the centre R, at the distance R B or R S, describe the arc B S, completing the curve B S G, by which the given straight lines A B, G H are connected.

This problem exhibits a mode of construction useful to engineers in laying out the curves of a railway; to landscape gardeners, in laying out walks and roads; and to carpenters, in forming curves to connect the straight edges of a piece of wood by a curve, when they are either parallel to one another, or inclined to each other at a greater or less angle.

At this point we bring to a conclusion our Lessons in Geometry, in which we have explained, as clearly and as fully as possible, the leading principles of the science on which all the constructive arts are based. Of the practical value of geometry to the artisan and mechanic we have already given many proofs. It will not be too much to say that any one who has studied these lessons carefully, and understands them thoroughly, has not only rendered himself a scientific workman, but has advanced far on his way to become an architect or civil engineer, or to enter any profession in which a knowledge of geometry is an essential requisite. From these lessons the student will find it of the greatest advantage to turn to "Euclid's Elements of Geometry," in which he will find a conclusive proof of almost every construction that has been brought under his notice in the preceding problems.

LESSONS IN LATIN.—XXIII.

REGULAR VERBS.—THE FIRST CONJUGATION.

ACTIVE VOICE.

Example.—Amo, *I love.* *Chief Parts:* amo, amāvi, amātum, amāre. Characteristic letter, ā.

PARTS WITH THE CORRESPONDING ENGLISH.

	Ind. Pres.	*Sub. Pres.*	*Ind. Imp.*	*Sub. Imp.*
Latin.	Amo,	Amem,	Amābam,	**Amārem,**
English.	*I love, I do love, or I am loving.*	*I may love.*	*I did love, or I was loving.*	***I might love.***

	1 *Fut.*	2 *Fut.*
Latin.	Amābo,	Amāvero,
English.	*I shall or will love.*	***I shall have loved.***

	Ind. Perf.	*Sub. Perf.*	*Ind. Pluperf.*	*Sub. Pluperf.*
Latin.	Amāvi,	Amāverim,	Amāveram,	**Amavissem,**
English.	*I have loved.*	*I may have loved.*	*I had loved.*	***I might have loved.***

	Inf. Pres.	*Inf. Perf.*	*Inf. Fut.*
Latin.	**Amāre,**	Amāvisse,	Amatūrum esse,
English.	*to love.*	*to have loved.*	*to be about to love.*

	Imp.
Latin.	Ama,
English.	*love thou.*

	1 *Sup.*	2 *Sup.*	*Pres. Part.*	*Fut. Part. Act.*
Latin.	Amātum,	Amātu,	Amāns,	Amatūrus,
English.	*to love.*	*to be loved.*	*loving.*	*about to love.*

	Ger.	*Ger.*	*Ger.*	*Ger.*
Latin.	Amandi,	Amando,	Amandum,	Amando,
English.	*of loving.*	*to loving.*	*loving.*	*by loving.*

Before I proceed, I will explain these contractions:—

Contractions.	*Explanation.*
Ind. Pres.	Indicative Mood, Present Tense.
Sub. Pres.	Subjunctive Mood, Present Tense.
Ind. Imp.	Indicative Mood, Imperfect Tense.
Sub. Imp.	Subjunctive Mood, Imperfect Tense.
1 Fut.	First Future Tense.
2 Fut.	Second Future Tense.
Ind. Perf.	Indicative Mood, Perfect Tense.
Sub. Perf.	Subjunctive Mood, Perfect Tense.
Ind. Pluperf.	Indicative Mood, Pluperfect Tense.
Sub. Pluperf.	Subjunctive Mood, Pluperfect Tense.
Inf. Pres.	Infinitive Mood, Present Tense.
Inf. Perf.	Infinitive Mood, Perfect Tense.
Inf. Fut.	Infinitive Mood, Future Tense.
Imp.	Imperative Mood.
1 Sup.	First Supine.
2 Sup.	Second Supine.
Pres. Part.	Present Participle.
Fut. Part. Act.	Future Participle, Active Voice.
Ger.	The Gerund.

Having in the above corresponding parts given the Latin as well as the English of several members of the verb, I need not repeat them. I supply in full what remains. As I write for young men and women rather than for children, I omit adding the English in all the details of the persons; for when you know what is the first person, you will readily supply the rest: thus, if the English of amaveram, the first person, is *I had loved*, you know that the English of amaveras, the second person, is *thou hadst loved;* and of amaverat, the third person, *he had loved;* so also in the plural.

Instead of *I might have loved*, the sub. pluperf. may sometimes be rendered (put into English) by *I would, I should,* or *I could have loved.*

In the corresponding English words, I have given the nearest approach to the several Latin parts. The student will do well to adhere strictly to these meanings at first, though, as the correspondence between the several Latin and the several English parts is not entirely complete and constant, he will find occasions when his English will appear scarcely idiomatic, or strictly proper. He cannot, however, learn too soon, that in few particulars are any two languages exactly correspondent. Accordingly, for amo, I have set down what may be termed three meanings—namely, *I love, I do love,* and *I am loving.* Here it is obvious that the English is more rich than the Latin, inasmuch as it has three forms of the present tense indicative mood, while the Latin has but one form. Having but one form, the Latin cannot by a form indicate the variations of the English present tense. Consequently, here is a want of strict correspondence; and here also is a source of doubt; for we may ask, what is the English equivalent of amo? is it, *I love,* or *I do* love, or I *am loving?*

After these remarks the student will know that it is with some latitude that he is to take these

CORRESPONDING LATIN AND ENGLISH SIGNS.

	Ind. Pres.	*Sub. Pres.*	*Ind. Imp.*	*Sub. Imp.*	1 *Fut.*	2 *Fut.*
Latin.	-o,	-em,	-bam,	-rem,	-bo,	-ero,
English.	*do.*	*may.*	*did.*	*might.*	*will.*	*will have.*

	Ind. Perf.	*Sub. Perf.*	*Ind. Pluperf.*	*Sub. Pluperf.*	*Inf. Pres.*
Latin.	-i,	-erim,	-eram,	-issem,	-are,
English.	*have.*	*may have.*	*had.*	*might have.*	*to.*

Inf. Perf.—Latin, -isse; English, *to have.*

	Inf. Fut.	*Imp.*	1 *Sup.*	2 *Sup.*	*Part. Pres.*	*Fut. Part Act.*
Latin.	-rum esse,	ama,	-um,	-u,	-ans,	-rus,
English.	*about to.*	*do.*	*in order to.*	*to.*	*-ing.*	*on the point of.*

Give yourself a thorough practice in these signs. Again and again ask until you are perfect, what is the English sign of the indicative mood present tense? what the Latin sign? what is the Latin sign of the sub. pluperf.? what the English sign of the same? So go through all the parts.

I hope you understand what I mean by these signs. Your understanding of them is the more important, because they pertain not merely to the verb amo, or to the first conjugation, but to all the verbs; and because, when you are perfect in your knowledge of them as just given, you will easily put Latin into English and English into Latin. On account of this importance, I will subjoin a few explanations.

These signs, then, might be called a set of equivalents, and I might have indicated them after this manner:—

-i	=	have.
-bo	=	will.
-erim	=	may have.

These signs or equivalents are, you see, without any verb. They are so given because they are applicable to all verbs. Thus to -i you prefix the stem amav, and make amavi; so to *have* you add *I* and *loved*, and make the corresponding English, that is, the English equivalent of amavi—namely, *I have loved.*

In some instances the English sign is arbitrary, or the best we can get; in the ind. pres. *love* is chosen as the E. S. (English sign) for the want of a better. Scarcely less arbitrary is the E. S. of the imp.—namely, *did.*

These departures from exact correspondence, precision, and uniformity are certainly drawbacks; but notwithstanding these drawbacks, great aid may be derived from a careful and systematic attention to the system here set forth.

I have said that these signs are applicable to all verbs. If so, they need not be repeated. And in general the statement is correct. You will, however, bear in mind what you have previously learnt as to the tense-endings, and the mood-endings; and then you will remember that instead of -bo, -am (es, etc.) is the ending, and as the ending so the sign of the first future of the third and the fourth conjugations. One or two other deviations will occur to you.

MOODS, TENSES, ETC., of AMO, *I love.*

PRESENT TENSE.

	Indicative.	*Subjunctive.*	*Imperative.*	*Infinitive.*	*Participle.*
Sing.	Amo.	Ame-*m.*		Amā-*re.*	Ama-*ns.*
	Ama-*s.*	Ame-*s.*	Ama or amā-*to.*		
	Ama-*t.*	Ame-*t.*	Amā-*to.*		
Plu.	Amā-*mus.*	Amē-*mus.*			
	Amā-*tis.*	Amē-*tis.*	Amā-*te* or ama-		
	Ama-*nt.*	Ame-*nt.*	Ama-*nto.* [*tote.*		

IMPERFECT TENSE.

Sing.	Amā-*bam.*	Amā-*rem.*
	Amā-*bas.*	Amā-*res.*
	Amā-*bat.*	Amā-*ret.*
Plu.	Ama-*bāmus.*	Ama-*rēmus.*
	Ama-*bātis.*	Ama-*rētis.*
	Ama-*bant.*	Ama-*rent.*

FUTURE TENSE.

Sing.	Amā-*bo.*		Ama-*tūrum.*
	Amā-*bis.*		[*esse.* Ama-*tūrus.*
	Amā-*bit.*		
Plu.	Amā-*bimus.*		
	Amā-*bitis.*		
	Ama-*bunt.*		

PERFECT TENSE.

Sing.	Amā-*vi.*	Amā-(*ve*)*rim.*	Ama-(*vi*)*sse.*
	Amā-(*vi*)*sti.**	Amā-(*ve*)*ris.*	
	Amā-*vit.*	Amā-(*ve*)*rit.*	
Plu.	Amā-*vimus.*	Ama-(*ve*)*rimus.*	
	Ama-(*vi*)*stis.*	Ama-(*ve*)*ritis.*	
	Ama-(*vē*)*runt.*	Amā(*ve*)*rint.*	

PLUPERFECT TENSE.

Sing.	Amā-(*ve*)*ram.*	Ama-(*vi*)*ssem.*
	Amā-(*ve*)*ras.*	Ama-(*vi*)*sses.*
	Amā-(*ve*)*rat.*	Ama-(*vi*)*sset.*
Plu.	Ama-(*ve*)*rāmus.*	Ama-(*vi*)*ssēmus.*
	Ama-(*ve*)*rātis.*	Ama-(*vi*)*ssētis.*
	Ama-(*ve*)*rant.*	Ama-(*vi*)*ssent.*

SECOND FUTURE TENSE.

Sing.	Amā-(*ve*)*ro.*	
	Amā-(*ve*)*ris.*	
	Amā-(*ve*)*rit.*	
Plu.	Amā-(*ve*)*rimus.*	
	Amā-(*ve*)*ritis.*	
	Amā-(*vē*)*rint.*	

* Ama(*vi*)*sti*, pronounced amavísti, as one word; the *vi* is put in brackets to denote that it may, by syncopation (*shortening*), be omitted.

	GERUNDS.	SUPINES.
Nom.	Ama-*ndi.*	1. Ama-*tum.*
Dat.	Ama-*ndo.*	2. Ama-*tu.*
Acc.	Ama-*ndum.*	
Abl.	Ama-*ndo.*	

EXAMPLES.—Like this model, conjugate laudo, 1, *I praise;* curo, 1, *I take care of;* voco, 1, *I call.*

Compare together the 2 Fut. with the Sub. Perf. You will find that the endings are the same, except in the first person, which in the former is *-ro*, in the latter *-rim.* In other words, the Latin language has no distinctive form beyond the first person for one or the other of these tenses. A distinction is attempted with the aid of the accent or the quantity. Thus, the first person plural of the second future is pronounced long, as amaverimus, while the first person plural of the subjunctive perfect is pronounced short, as amaverĭmus; and consequently you find the sign of the long vowel over the *i* in the former tense, and the sign of the short vowel over the *i* in the latter tense, showing that, although the words are spelt alike, they are not pronounced in the same way.

There is a difference between the first future, amabo, and the future formed with the aid of the future participle, thus, amaturus sum. Amabo means *I will* or *shall love*, simply indicating a future act, without determining when, or the precise point in the future when the act will take place. Amaturus sum signifies *I am about to love*, that is, *I shall shortly love;* intimating that the action signified in the verb is near at hand, and in the immediate future.

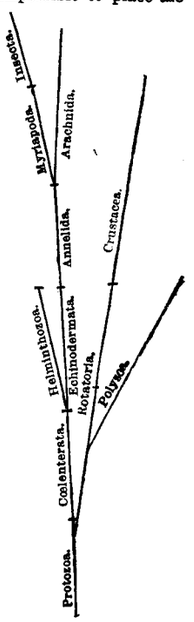
Of the first future there is properly no subjunctive tense; the import, however, is expressed by combination, thus, amaturus sim (sis, sit, etc.), *I may be about to love;* amaturus essem, *I might be about to love.* The second future also is without a subjunctive mood.

EXERCISES.—Form according to the model now given, that is, write them out in full, with all the parts in both Latin and English, these verbs—laudo, 1, *I praise;* vigilo, 1, *I watch;* compăro, 1, *I procure.*

COMPARATIVE ANATOMY.—IX.

ROTATORIA—MYRIAPODA.

PERHAPS it is better to notice at this stage a class of animals whose relations to other classes are difficult to express. As we have before stated that it is quite impossible to place the whole array of animals in a single line according to their grades of structure, the reader will not be surprised that we have to break off in the midst of the description of a definite and well-sustained series of animals to treat of a class which cannot well be inserted into that series. The class referred to is called Rotatoria. The animals which compose it are decidedly inferior in complexity of structure to the animals we shall have to describe as coming in the next order to the Annelids, and in many respects also inferior to the Annelids themselves, and yet they lead up to a class of animals called Crustacea, which are as decidedly of a higher type than the worms. In many respects, these are also superior to the Myriapoda, which directly succeed to the worms, and of which we shall write in the subsequent part of this lesson. The difficulties under which a constructor of a system of classification labours may be best illustrated by the annexed diagram, in which the lines branching upward from the single stem marked Protozoa represent the relations of the divisions of the animal kingdom to one another. These relations are so complicated, and have occasioned so much diversity of opinion among naturalists, that it would be presumptuous to assume that the diagram gives the relations exactly as they



exist, and there are, moreover, cross relations which it is impossible to represent by such a diagram; but the reader may gather from it some idea of the nature of the relations, and how impossible it is to follow them in a continuous description of the animal kingdom.

Obviously, if a writer were to pursue any one of the lines indicated, describing in order the animals which successively come under his notice on that line, he would be led further and further from the other lines, and he must pursue his course until he has arrived at the highest animal of the branch which he has been ascending; and then, like an Alpine traveller who has gained the summit of a peak, he will have to look around at similar elevations, between which and his own position there is no stepping-stone. Thus he must, of necessity, retrace his steps to the lower level, from which another ascending path takes its rise.

Another course, the one we have adopted, is to break off whenever a gap in the series occurs, and look around to see that we are not leaving behind us any group of animals of a similar or lower grade of structure, and if we are in danger of doing so, to return at once to the description of the neglected group. We are the more reconciled to this method of procedure, because the relations of the classes to one another are so far from being determined, that each independent author has a different arrangement.

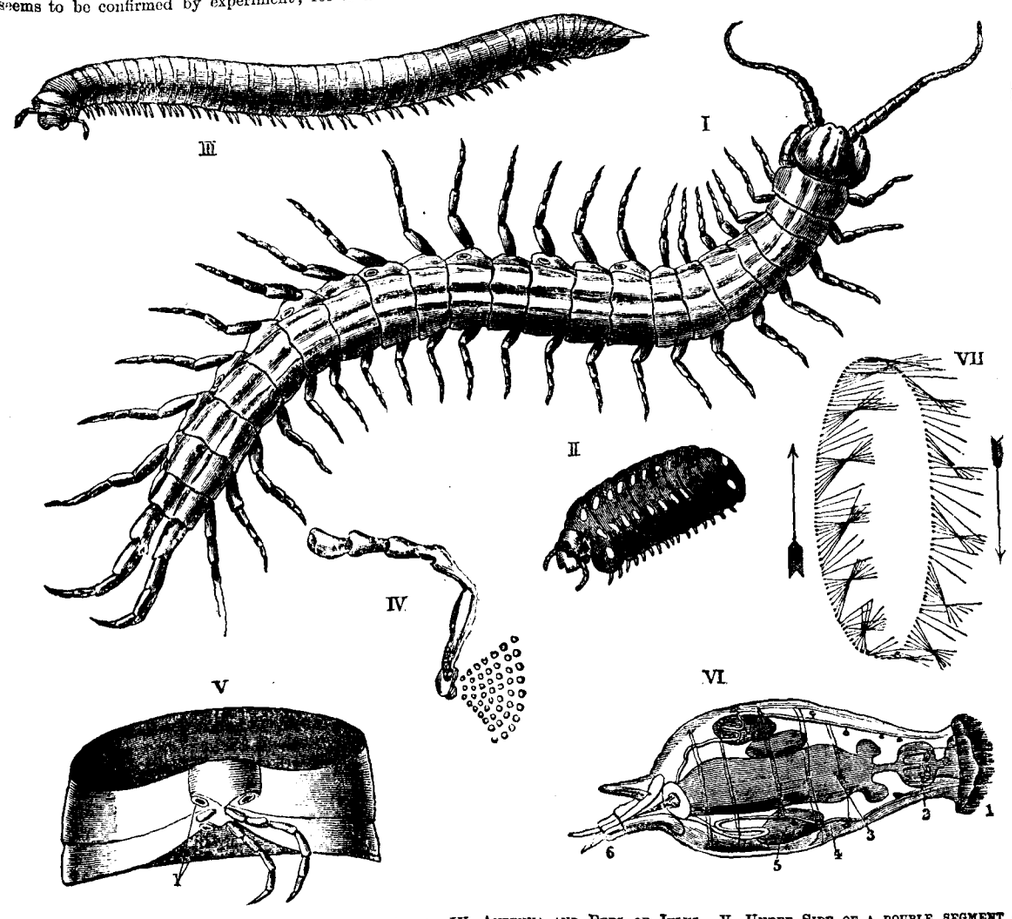
It will be seen by the diagram that, while the classes Cœlenterata, Echinodermata, Annelida, and Myriapoda seem to follow one another in a natural succession, leading up to the Insecta—that order which, of all others in the articulate sub-kingdom, is perhaps the highest and most wonderfully constituted—the Rotatoria seem to start in a rather loose relationship with the Protozoa, and to lead up towards the Crustacea, a class which, as represented by its higher orders, is almost as complicated in structure as the Insecta, but whose lower orders are very much less organised. It would seem also as though the great sub-kingdom of the Mollusca is connected to the Articulates through their lowest class, the Polyzoa, and the class which we now have to describe.

The Rotatoria were first classed with the Infusoria by Ehrenberg. This classification was not to be wondered at, as all the rotary animals are microscopic, and they are obtained from infusions of vegetable or animal substances in water. Their outward appearance is also not unlike the higher orders of the Protozoa, and they move about by the same means as many of these do—that is, by means of the vibrations of closely-set, fine, short, delicate hairs, called cilia. These cilia are so named from the Latin *cilium*, "an eye-lash." As these are the very minute organs of animals of less than $\frac{1}{1000}$th of an inch in length, it may be well conceived that the name cilia has relation to the form, and not to the size of the organs. The cilia in the Rotatoria, instead of being scattered all over the surface of the animal, as in Paramecium (a Protozoon), or in the Turbellaria, are confined to flat, convex lobes, situated round or near the mouth, whose edges they fringe. When the animal fixes itself, the motion of these lashes brings food to its mouth by causing currents of water to pass towards it; and when it relaxes its hold, then the same motion causes it to progress through the water much in the same way as a screw-steamer is propelled. Some of these animals have the lobes all united into one circular disc, and as the motion of the cilia is so ordered as to cause the appearance of a number of successive waves, following one another round and round the circle, it was once thought that the disc was a kind of cogged wheel whirling rapidly about a fixed axle. Hence the name Rotifera, or wheel-bearing animals, was given to them. If this had been the right explanation of the motion, it would have furnished an instance of a locomotive apparatus met with nowhere else in the whole animal kingdom. A little reflection concerning this contrivance led some naturalists to doubt whether it really existed. Of course it is essential to the mechanical device which we call a wheel that it should be entirely disconnected with the axle upon which it plays, otherwise it could not revolve; and yet it is essential that all animal structures, especially to those employed in locomotive actions, that there should be an organic communication between them and the organs of nutrition, by means of which liquids can be sent to supply the waste caused by vital actions. This liquid must also be sent in such a way as not to be lost or wasted in the transit. It would seem, then, that the mechanism of the wheel is inconsistent with animal organism. This consideration led to a fresh study of the so-called wheel-animalcules. It is almost needless to remark that the separate cilia were too small for their motions to be distinctly traced, otherwise the mistake could never have occurred. It is now supposed that the successive action of the cilia gives rise to an optical illusion, by which the appearance of rotation is maintained, while the organ on which the cilia is situated remains stationary. This supposition is rendered almost a certainty by observing the same motion in those nearly-allied creatures, members of the same class, whose discs are not circular, but divided into lobes. In these species it could be seen that the lobes did not participate in the revolutions. The way in which this optical illusion is effected will be best seen by reference to the illustration (Fig. VII.). From this it may be seen that if the cilia are deflected from the perpendicular only in one direction, and that a number of these act together, so as to cross one another while the down-stroke is given, it will give rise to a number of dark points where the crossing occurs, which points, by the successive action of each cilium in the series, will seem to pass rapidly round the disc, while, since each returns to its erect position separately and slowly, the eye cannot trace their motion. This method of explanation is rendered more probable by the fact that these aquatic creatures are usually examined under the microscope by means of transmitted light, and hence anything which cuts off the rays of light at a particular point will catch the eye and be followed by it.

These cilia are found so very generally throughout the range of the animal series—they are placed on such different parts of animals, and applied to such different purposes—that it is as well to give some little time to the consideration of them. We have already had occasion to mention them as covering the body of some Infusoria, and being applied to locomotion. They are also found on the inner (as well as the outer) wall of the Cœlenterata, and there cause a circulation of the fluid in the stomach. They are set on the combs of the Ctenophora, or bands on the larvæ of the Echinodermata, and in these situations are swimming organs. We mentioned them also as set on the tufts of vessels called gills in the Annelids, and we shall find them again on the plate-like gills of Lamellibranchiata, and in these positions they cause a change in the external water, and so subserve the function of respiration. In the human subject they cover the membrane of the nasal chambers, the trachea, and the tubes leading to the lungs, and are continually employed to bring up the mucous which would else choke the passages. In all these cases, and in a thousand more which might be mentioned, their action, though applied to different purposes, is essentially the same. Their motion always creates an appearance of waves moving along in one definite direction, and never returning. It is very easy to attribute motion to ciliary action, and, of course, if the action be capable of driving liquid over the surface, it is also able to move the surface upon which the cilia are set, and the animal with it when that animal floats in liquid; but it is not an easy thing to explain the method of this action. When we say that the circulation in sponges is maintained by the ciliated chambers, the cilia of which whip the water in one direction, we are repeating what a multitude of writers have said before us, but we by no means explain the motion. If a switch be passed violently backwards and forwards through air or water, it creates a commotion, but it has no tendency to move the air or water, or the hand which holds it, in any definite direction. How, then, do these minute switches effect their purpose? Why does not the effect of the motion in one direction exactly counterbalance the effect of the motion in the other? The writer conceives the following to be the explanation, for which the reader will be in some measure prepared by the remarks already made on the ciliary action in the Rotatoria. Suppose we conceive of a number of upright rods set on a membrane in a line corresponding to the line of the resulting waves, and moving in a direction at right angles to this, or in the direction of the waves caused by them. If one cilium or rod act alone, being rapidly brought down, the liquid will be thrown off from its sides to the right and left, the more obliquely in proportion to the rapidity of its motion. It will make its way by splitting the fluid, which, being thrown off laterally, will finally unite behind it. But suppose the rods on each side of this single rod are in motion in a parallel direction at the same time, then it comes in contact, not with stagnant water, but with the conjoined stream thrown off by these, which furnishes a

greater resistance than if it acted alone. The water thus impinging on the central rod will be prevented from readily uniting behind the other two; so that the vacuum will be filled up, not by the water which has passed through the interstices of the line of rods, but by fresh water which flows in from behind. In other words, when the cilium acts alone, the resistance it meets with is in proportion to the section of the rod itself; but when it acts with its neighbours, the resistance is little short of being proportional, not to the section of the several rods, but to them and the whole space which lies between them. This speculation seems to be confirmed by experiment; for if a sheet of wire gauze be passed rapidly enough through the water, it is resisted with almost as great force as if it were not perforated. When fine sand is thrown out of a balloon in rapid descent, it appears to fly violently upward, although the resistance opposed by the atmosphere to each particle in relation to its weight is small as compared to that offered by the balloon in proportion to its weight. According to this theory, then, a number of cilia are depressed in concert and so create a wave, and only rise slowly and separately after the wave has passed on, and so assume an erect posture ready to propel a fresh wave at a considerable distance from the one which preceded it. This conforms well to the appearance created by the cilia both when they are used to pass liquid over their surface, and when they are employed as locomotive organs. This partial explanation leaves entirely untouched the problem of how the cilia themselves are set in motion. The cilia of the Rotatoria seem to differ from those of most other animals in being under the control of the will of the animal.

When a better appreciation of the action of the ciliary fringes of these animals was attained, the name Rotifera (*Wheel-bearing animalcules*) was changed into Rotatoria, or rotary animals. Under this name they have been examined, and other details of their structure show them to be much more highly organised than the simple Protozoa, which inhabit the same waters, feed upon similar food, and are moved by a like agency. They have a definite alimentary canal, complete from end to end, and in some this canal is of very complex structure. The animals are transparent, and admit of the examination of their internal organs while alive; and to aid in this examination, Ehrenberg placed some indigo, in an extremely fine state of division, into the water where they were. He had the satisfaction of seeing the little opaque particles moved by the ciliary currents, swallowed, and pass through the whole length of the alimentary canal, and thus make it more distinct. Immediately below the gullet, in some (as in the Notomata of our illustration), is an enlarged chamber, furnished with a tooth apparatus, which from its internal position is called a gizzard. In the Notomata the dental apparatus consists of two teeth, one situated on each side of a central fixed tooth, and playing upon it as the hammers



I. Scolopendra Morsitans. II. Glomeris. III. Julus. IV. Antenna and Eyes of Julus. V. Under Side of a double segment of Julus, showing the legs on one side. VI. Notomata Centrura. VII. Scheme showing the nature of the Rotary Illusion.
Refs. to Nos. in Figs.—V. 1, spiracle. VI. 1, ciliated disc; 2, gizzard; 3, stomach; 4, water-vascular system; 5, ovum; 6, forceps.

of two blacksmiths fall on an anvil. Below the gizzard is a globular or elongated stomach, which is succeeded in some species by a narrow intestine, but in the one before us ends at once in a cloaca, from which the exit is at the forked tail end of the animal. Round glands, supposed to represent the liver, empty themselves into the fore-part of the stomach. From the cloaca two winding ducts pass up, one on each side of these, and doubtless represent the water-vascular system which introduces aërated water from the outside. On these ducts, fastened by short stalks, are some little button-like organs, which are kept in rapid vibration; but their use is not known. The outer wall of the animal is often of an inflexible or little flexible material, which may be called a shell. This preserves the flask-shaped body in its ordinary dimensions, and gives origin to muscles which run to, and can retract into the shell, the disc at one end of the body, and also the forceps by which the animal attaches itself at the other end. The hind-part of these creatures is usually divided into rings, which, together with the structure of the stomach, show an approach to the Crustacean type.

We must content ourselves with this short notice of the Rotatoria, and leaving them, return to the next class, which follows directly to the Annelids in the upward direction. If we wished to give to a sea-worm the powers of living in the air, and walking on the earth with as little change in its outward form as possible, we must, in the first place, replace its tufts of bristles by limbs which are directed downwards towards the earth. These limbs must have a hard point, to strike against and lay hold upon the unevennesses of the ground; and in order that the hold might be maintained while the body is being moved over the point of support, the limb must be jointed. Inflexible levers, with fixed points of application, necessitate fixed solid and resisting fulcra and firm structure, from whence the muscles which wield them may originate. Now the class Myriapoda, the members of which live in the air, differs from that of the Annelids, as far as their outward appearance and appendages are concerned, just in the way which these requirements indicate. The outer wall of the body is of a hard, horny substance, which, though not quite so inflexible as the mail in which the insect is encased, is still vastly harder than the integument of the worm. The limbs, also, are jointed levers. Besides these advances in structure, the organs of perception are better developed. The feelers stretch in front of the head, and are long and jointed. The eyes differ from those of insects in being simple instead of compound; but there are many of them gathered into two clusters on each side of the head. It might well be predicted that life in the air would require differences in the organs of respiration quite as marked as those in the organs of relation. The tufts of vessels which served as gills to the worms, could not be floated out in the air so as to expose the contained fluid to its oxygen, and they would be liable to be torn or bruised. Hence respiration is carried on upon an entirely different plan, the air being introduced into the body, there to act on its fluid, instead of the fluids being taken to it. In the illustration, we have taken pains to exhibit the openings in the sides or under the animal, by which the air is received into the body; but we intend to leave the full description of these, and of the great system of air-vessels which is called the tracheal system, to be described when we write of the class Insecta, in which it is more largely developed.

Another marked difference between the Myriapoda and the Annelids is exhibited in the circulatory or blood system. This system, instead of being an advance upon that of the worms, seems to be a degradation from it; for instead of a closed circuit of vessels which convey the blood in a definite direction, and never permit it to escape from their bounds, we have only a heart stretching along the back of the animal, divided into a longitudinal series of compartments by valves which allow the blood to pass towards the head only, while it is received from the general cavity of the body by slits in the sides of these compartments. Only a few vessels are given off from the front part of the heart to run to the head organs, and the blood is left to find its way back to the heart, not by vessels, but by soaking through spaces left between the viscera.

The class Myriapoda has been divided into two orders, each of which is typically represented in the engraving. The type of the lower order is the Julus. Its body is an almost perfect cylinder. Each ring of which it is composed bears on its under surface two pairs of feeble legs, which are so small as to be invisible when one is looking down on to the back of the animal. The generative organs open on the under side of the fore-part of the body, and it feeds on decaying wood.

The other order has the Scolopendra for its type. The transverse section of this animal is of oblong form, and exhibits a flattened structure; the broad, horny back and belly plates being joined to one another on each side by leathery side-pieces, on which the limbs are set, and the breathing-holes open. The jaws of this creature are most formidable, and a poison-bag within the body sends a very noxious secretion by a duct to the end of the fang. These creatures are carnivorous, and rapid in their movements, and their generative organs open at the end of the body, being in this respect, as in all others, more like the insects than the *Julidæ*.

LESSONS IN GERMAN.—XXXIII.

SECTION LXIV.—VARIOUS IDIOMS (*continued*).

Umhin (around there) is used only in connection with können, as:—Ich konnte nicht umhin, es ihm zu sagen, I could not (get) *around*, *i.e.*, I could not help, or avoid, telling it to him. Ich habe nicht umhin gekonnt, es zu thun, I could not help doing it, I could not but do it.

1. Spazieren (to take a walk, to take an airing) signifies, in union with gehen, fahren, reiten, führen, to take a walk, to take the air in a coach, to ride out, or take the air on horseback, to lead about, or on a walk; as:—Eine Stunde des Tages ausgenommen, in welcher er seine Schwester spazieren führt, sitzt er beinahe immer an seinem Schreibtische und studirt, während sein jüngerer Bruder lieber spazieren geht, spazieren reitet, oder in Gesellschaft einiger Freunde spazieren fährt, one hour of the day excepted, in which he takes his sister for a walk, he is almost always sitting at his writing-desk and studying, while his younger brother prefers to go for a walk, to ride on horseback, or to take a drive in company with a few friends.

2. Thun (to do) is in some phrases used impersonally, as:—Es thut nichts, it does or effects nothing, *i.e.*, it is no matter. Es thut Noth, it is necessary.

3. Behüte and bewahre, or Gott behüte, Gott bewahre, are often used, especially in conversation, to denote aversion, abhorrence, fear, etc., and may commonly be rendered, "God forbid."

VOCABULARY.

Arg, bad.
Ausbildung, *f.* cultivation, education.
Behandlung, *f.* treatment.
Beleidigen, to offend.
Bemerken, to observe.
Beweisen, to prove.
Bewerben (sich), to sue for.
Blick, *m.* look, glance.
Brüsten (sich), to be proud, to show airs
Curgast, *m.* guest (under cure).
Danken, to thank.
Entfliehen, to flee.
Entwenden, to purloin
Groß thun, to boast, brag.
Hinwenden (sich), to turn to.
Indem', in that, while.
Italien, *n.* Italy.
Kenntniß, *f.* knowledge.
Niedersinken, to sink down.
Ohnmächtig, weak, swooning, fainting
Panzern, to arm with a coat of mail.
Platte, *f.* plate, crown (top).
Rennthier, *n.* reindeer.
Schlitten, *m* sledge.
Schnelligkeit, *f.* rapidity.
Tadel, *m.* blame, censure.
Tannusgebirge, *n.* the Taunus mountains, a mountain range near the Rhine.
Umhin'können. (See above.)
Unglaublich, incredible.
Verjagen, to refuse.
Vorsätzlich, intentionally. [room.
Want, *f.* wall (of a
Wenden, to turn.
Wissenschaftlich, scientifically.
Zubringen, to spend, pass away.
Zuträglich, advantageous, conducive to.

RÉSUMÉ OF EXAMPLES.

Es ist eine vortreffliche Sache, keine Bedürfnisse zu haben; oder wenn man nun einmal nicht umhin kann, einige zu haben, doch wenigstens nicht mehr zu haben, als man schlechterdings haben muß.
It is an excellent affair to have no necessities; or, if one cannot by any means avoid having some, nevertheless, at least, not to have more than one is absolutely obliged to have.

Es thut freilich für den Augenblick wehe, eine Züchtigung zu erhalten, die wir nicht verdient haben; aber indem wir uns unsrer Unschuld erinnern, lernen wir schnell das Erlittene vergessen.
It causes pain, indeed, for the moment, to receive a correction that we have not merited; but while we remember our innocence, we soon learn to forget what we have suffered.

Indem er aber also gedachte, siehe, da erschien ihm ein Engel.
While he thus thought, however, behold there appeared an angel unto him.

EXERCISE 122.

1. Diejenigen, welche zu viel spazieren gehen, gewöhnen sich endlich an den Müßiggang. 2. Eine halbe Stunde nach dem Essen spazieren gehen ist der Gesundheit sehr zuträglich. 3. In Italien fahren Viele mit Maulthieren spazieren. 4. Man sieht gewöhnlich mehr Herren spazieren gehen, als spazieren reiten. 5. Die Curgäste in Wiesbaden reiten oft auf Maulthieren auf die Platte des Taunusgebirges. 6. Reisen zu Fuß sind oft angenehmer, als zu Wagen oder zu Pferd. 7. Die Lappländer fahren auf Schlitten, und bedienen sich der Rennthiere anstatt der Pferde. 8. Er verwandte beinahe kein Auge von seinen Verwandten, die er in so langer Zeit nicht gesehen hatte, und freute sich ihrer Erzählungen. 9. Für diesen jungen Soldaten haben sich die meisten Officiere bei dem General verwendet. 10. Ich wandte mich in meiner Noth an meine Freunde; allein, wo ich mich hinwandte, sah ich nur gleichgültige Blicke. 11. Er entwandte mir (§ 129. *Obs.*) meine Uhr und einige andere Gegenstände, ohne daß ich es bemerkte. 12. Derjenige, welcher mit seinen Kenntnissen groß thut, beweist damit, daß er weniger weiß, als er sich brüstet und andere glauben machen will. 13. Sie werden doch nicht (Sect. XLIII. 4) glauben, daß ich Sie vorsätzlich beleidigt hätte? 14. Gott behüte! ich habe nie so etwas Arges (Sect. XIV. 4) von Ihnen geglaubt und glauben wollen. 15. Sie werden bei diesem schönen Wetter doch nicht zu Hause bleiben wollen? 16. O bewahre, ich habe nicht Lust, einen so schönen Tag zwischen den vier Wänden meiner Stube zuzubringen. 17. Es haben sich mehrere um dieses Amt beworben, und zwar (Sect. XLIII. 4) folgende. 18. Ich kann nicht umhin, Ihnen zu sagen, daß mir diese Behandlung nicht gefällt. 19. Ich kann nicht umhin, Ihnen recht herzlich zu danken. 20. Als ich auf den Wolf schießen wollte, versagte* mir die Flinte.

EXERCISE 123.

1. He could not help expressing his censure. 2. Preserve us, O Lord, from sin. 3. I could not help forgiving the wrongs which I had endured. 4. While he said this he sank down fainting. 5. We shall ride slowly to the park. 6. The queen took an airing on horseback yesterday. 7. This merchant boasts of his riches. 8. The Arabian rides on horseback with incredible rapidity. 9. When the knights of olden times rode to war, their horses were armed with a coat of mail. 10. Kings and princes are accustomed to take a drive with six horses. 11. When he could have escaped, his strength failed him. 12. The wood is used for building. 13. He has devoted the greatest part of his youth to scientific pursuits. 14. Journeys through the Rhine valley are more agreeable on foot than on horseback. 15. John leads his sister about the park, while her father rides on horseback.

Der Zufriedene braucht nur ganz wenig, um glücklich zu sein.	The contented (man) needs but very little in order to be happy.
Nach Abzug aller Kosten blieb ihm nichts übrig, als einige Groschen.	After deduction of all costs, there remained for him nothing but a few groats.
Man wird das Geld schneller los, als man es verdient'.	One gets rid of money faster than one earns it.

SECTION LXV.—VARIOUS IDIOMS—(*continued*).

Los (*loose*, *apart*, etc.), when combined with verbs, has a variety of significations. Its exact force in any given place is best determined by the context, as:—Losbinden, to unbind; losgehen, to break out, to go off; losreißen, to tear asunder. Ein Gewehr losbrennen, to fire (off) a gun. Das Gewehr ist losgegangen, the gun (went off) discharged (accidentally). Der Streit geht wieder los, the contest is beginning again.

VOCABULARY.

Aufmerksamkeit, *f.* attention. [borrow.
Borgen, to lend, to
Emilie, *f.* Emily.
Erregen, to excite, raise.
Gepäck', *n.* baggage, luggage.
Habe, *f.* property.
Heer, *n.* host, army.
Kalk, *m.* lime.
Losgehen. (See los above.)
Loswerden, to free, disengage one's self.
Möglich, possible.
Spaß, *m.* sport, joke.
Traurig, mournful, sorrowful.
Uebrig, over, remaining.
Uebrigbleiben, to be left, to remain.
Unbeschäftigt, unemployed.
Ziehen, to draw.

RÉSUMÉ OF EXAMPLES.

Der Drang, frei und selbstständig zu sein, ist einem jeden Menschen angeboren, und ein Jeder bestrebt sich, diesen Drang, so viel wie möglich zu befriedigen.
The desire to be free and independent is innate in every human being; and this desire every one endeavours as much as possible to satisfy.

In despotischen Ländern bleibt freisinnigen Männern nichts Anderes übrig, als entweder ihre Gesinnungen zu verbergen und ihre Gefühle zu unterdrücken, oder die Wahl zwischen Ketten und Flucht.
In despotic countries there remains to free-minded men nothing else, than either to conceal their sentiments and suppress their feelings, or the choice between chains and flight.

* Would not go off, *i.e.*, missed fire.

EXERCISE 124.

1. Der Arzt hat mir gerathen, so wenig wie möglich auszugehen. 2. Emilie arbeitet so wenig wie möglich, um die Feinheit ihrer Hände zu erhalten. 3. Die Kinder sollten jeder Zeit so wenig wie möglich unbeschäftigt sein. 4. Er spricht so wenig, um keine Aufmerksamkeit zu erregen. 5. Ferdinand ist jetzt sehr wenig zu Hause. 6. Auf der letzten Reise hatte ich ganz wenig Gepäck bei mir. 7. Wollen Sie etwas Fleisch haben? 8. Ja, aber nur ganz wenig. 9. Es bleibt ihm nichts übrig, als zu betteln, oder zu arbeiten. 10. Es bleibt nicht Anderes übrig, Sie müssen jetzt handeln. 11. Von all seiner Habe blieb ihm nichts übrig, als ein Stück Land. 12. Diese Rose blieb allein von allen Blumen übrig. 13. Er blieb allein von dem ganzen Regimente übrig. 14. Ich kann diese traurigen Gedanken nicht los werden. 15. Um seine falschen Freunde los zu werden, muß man ihnen Geld borgen. 16. Gewähren Sie ihm seine Bitte, damit Sie ihn los werden. 17. Jetzt ging der Spaß von Neuem los. 18. Der Kalk an der Mauer geht los. 19. Als der Krieg wieder losging, zog er mit einem großen Heere in das Feld. 20. Das Gewehr ging los, als er es ergreifen wollte.

EXERCISE 125.

1. The physician advised my sister to stay at home as much as possible. 2. A teacher should always keep his scholars unemployed as little as possible. 3. The orator spoke with great enthusiasm, in order to raise the attention of his auditors. 4. Most travellers take with them as little luggage as possible. 5. Will you have some apples? 6. Thank you, Sir, I have quite enough. 7. Augustus is now very much at home, hence we may go to him. 8. There is nothing left for him but submission to his destiny. 9. I had no other resource left me than to fly from the enemy. 10. Of all his property, nothing was left but a garden. 11. I cannot get rid of my cold. 12. Grant the request of this false friend, then you will get rid of him. 13. Who broke the foot of the table? 14. The servant broke it off, when she cleaned the room. 15. Frederick the Great marched at the head of his army to the war. 16. The gun went off accidentally, or he would have shot the hare.

KEY TO EXERCISES IN LESSONS IN GERMAN.

EXERCISE 42 (Vol. I., page 239).

1. On this intelligence, the riders urged their horses to greater speed. 2. The beautiful greenfinch has flown away from the boy. 3. The prospect of a rich reward incited them to rescue the rich nobleman's child. 4. The peasant has collected his field-produce, thrashed and stored it up. 5. The revengeful man is fond of using the adage, "Deferred is not revoked." 6. The hermit lives in his cell, separated from the people. 7. The war has destroyed many people, but the plague still more. 8. The sun has set. 9. On the termination of the war, the king discharged many soldiers. 10. The loadstone attracts iron and lightning. 11. The magnetic needle shows the pilot the North and the South. 12. The threatenings, as well as the promises, in the Bible, indicate the love of God. 13. The copper kettle has attracted verdigris. 14. The miller has disposed of his flour. 15. The father has confined the dog in his room. 16. The merchant praises the cloth to his customers. 17. Prayer elevates an afflicted heart. 18. The moon ascends behind the chain of mountains, and fills the earth with her mild light. 19. I get into the wagon, you get out of the wagon, and he mounts the horse. 20. The tired riders dismount their horses. 21. Will you take me with you when you go to Germany? 22. I do not think you are willing to go with me.

EXERCISE 43 (Vol. I., page 239).

1. Nach Beendigung des Krieges werden die Soldaten abbezahlt werden. 2. Ich werde mit Ihrem Bruder zu dem Eremiten gehen, der abgesondert von der Welt lebt. 3. Der Landmann hat die Früchte des Feldes eingesammelt. 4. Die Bürger sind von dem Feinde in der Stadt eingeschlossen. 5. Der Krieg und die Pest haben sehr viele Menschen umgebracht. 6. Der müde Reiter steigt von seinem Pferde ab. 7. Der Kaufmann hat seinen Vorrath abgesetzt. 8. Die Sonne geht im Osten auf. 9. Die Sonne geht zwanzig Minuten nach fünf Uhr auf, und geht um halb sieben Uhr unter 10. Sie müssen Ihre Schüler anspornen fleißiger zu sein. 11. Wollen Sie Ihren Besuch für Morgen aufschieben? 12. Die Magnetnadel zeigt nach dem Norden. 13. Der Schüler hat seine Aufgaben abgeschrieben.

LESSONS IN ENGLISH.—XXIV.

GREEK STEMS (*continued*).

THE learning of a new language is like the acquisition of a new sense. This is true, if only because a new language affords a new set of means for the expression of our ideas. The capacity of the human mind is greater than is the power of expression possessed by any vocabulary. That greater capacity finds a new channel, and a new outlet, in a new language. Besides, language is a medium for conveying ideas to a recipient, as well as an instrument for the expression of ideas already entertained. With words, then, you gain ideas. The increase of a man's vocabulary is the augmentation of his mental treasures. New knowledge must run into the old moulds. If it be true that no idea no word, equally is it true that no word no idea. You may, indeed, make a word contain more than it does contain. You may transmute brass into silver, and silver into gold; but out of nothing comes nothing. There are, then, two ways by which I may impart knowledge; I may give a new idea by giving a new word, and I may increase the value of the word you have. Equally may I aid the development of your mind, and augment at once its knowledge and its power, by supplying you with a fresh term, or a fresh series of terms, as a means for the expression of your thoughts and feelings.

These remarks find verification in the study even of the remnants of Greek which form part of our English speech. If ours is a rich language, if ours is an expressive language, we owe a large debt of gratitude to the Greek. By the aid which it affords, we express thoughts which we could not otherwise have expressed; and we acquire ideas, and modifications of ideas, the sources of which are found only in its literature. In exemplification, it suffices to refer to the single domain of theology. The creed of Christendom wears the shape and the hue which it received from the Greek language, in which the Gospel was promulgated to the world, and by which it was planted in the mind of all the most civilised nations.

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meanings.*	*Stems.*	*English Words.*
Αρχη	ar'-che or ar'-ke	*beginning, chief*	*arch*	archbishop.
Επισκοπος	e-pis'-kop-os	*an overseer*	*episcop*	bishop.
Αριθμος	a-rith'-mos	*a number*	*arithm*	arithmetic.
Αστρον	as'-tron	*a star*	*astro*	astronomy.
Νομος	nom'-os	*a law*	*nom*	anomaly.
Ατμος	at'-mos	*vapour*	*atmo*	atmosphere.
Σφαιρα	sphai'-ra or sphi'-ra	*a ball or sphere*	*spher*	spherical.
Αυτος	au'-tos or or'-tos	*self*	*auto*	autograph.
Γραφη	graph'-e or graf'-fe	*writing*	*graph*	calligraphy.
Καλος	kal'-os	*beautiful*	*kal*	kaleidoscope.
Ειδος	ei'-dos	*a form*	*eido*	eidograph.
Βαπτω	bap'-to	*I dip*	*bapt*	baptism.
Βαρος	bar'-os	*weight*	*baro*	barometer.
Μετρον	met-ron	*a measure*	*metr*	metrical.
Γη	ghee (*g* hard)	*the earth*	*ge*	geometry
Θερμος	ther'-mos	*heat*	*thermo*	thermometer.
Βιβλιον	bib'-li-on	*a book*	*biblio*	bibliography.
Γραφη	graph'-e	*a description*	*graph*	graphical.
Βιος	bi'-os	*feli*	*bio*	biography.
Χειρ	keir or kire	*the hand*	*chir*	chirography.
Χολη	kol'-e	*bile*	*cholé*	choleric.
Χρονος	kron'-os	*time*	*chron*	chronometer.
Χρυσος	kru'-sos	*gold*	*chryso*	chrysolite.
Λιθος	lith'-os	*a stone*	*litho*	lithography.
Δεκα	dek'-a	*ten*	*deca*	decalogue.
Δενδρον	den'-dron	*a tree*	*dendron*	rhododendron.
Ῥοδος	rhod'-os	*a rose*	*rhodo*	*rhododendron.*
Δοξη	dox'-e	*dogma, opinion*	*dox, dog*	orthodox, dogma.
Ορθος	or'-thos	*straight, right*	*ortho*	orthography [tise.
Δρομος	drom'-os	*a running*	*drom*	dromedary.
Ἱππος	hip'-pos	*a horse*	*hippo*	hippodrome.

Graphé (γραφη), in its modern application, means *printing* as well as what is strictly *writing*; it signifies, indeed, a description or representation in general, and so may mean a representation by strokes of the pen, or a representation by means of the press. Hence you see the application of the term to *lithography*.

Observe now an instance of the use of the Greek. I had, I remember, when I was young, some difficulty in ascertaining, and when ascertained in remembering, the exact difference between the *bar*ometer and the *therm*ometer. My little Greek came to my aid, and showing me that the former was a measure of weight, and the latter a measure of heat, gave me definite and clear ideas which I have never forgotten.

Biblion (βιβλιον) enters into combination with several words. With *graphe*, *biblion*, forming *bibliography*, originates a term which signifies the science of books. With the aid of *latria* (λατρεια, la-tri'-a, *worship*) we have *bibliolatry*, a word sanctioned by Coleridge, which may be Englished by *book-worship*, or *word-worship*. *Bibliomania*, or *book-madness*, is made up of *biblion*, a book, and *mania* (μανια), the Greek for madness. United to poleo (πωλεω), *I sell*, it forms *bibliopolist*, *a bookseller*; and with *theca* (θηκα), the Greek for *a repository*, it gives rise to the French bibliothèque, *a repository for books*—that is, *a library*. Let it also be distinctly mentioned that the Greek *biblion* is the source whence we get the name of the book of books—namely, *the Bible*.

Language is in one view a record of human errors. The fact is illustrated in the names of some of what are still, by courtesy, called sciences, such as *astrology*, *phrenology*, etc. It is also exemplified in particular words, as, *e.g.*, *choleric*, coming from χολη (kol'-e), *bile*. The term *choleric* shows that formerly men regarded the bile as the source of anger and passion.

> "When *choler* overflows, then dreams are bred
> Of flames, and all the family of *red*;
> Red dragons and red beasts in sleep we view,
> For humours are distinguished by their hue."—*Dryden.*

Accordingly, dejection or habitual sadness was termed *melancholy*, or *black*-bile.

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meanings.*	*Stems.*	*English Words.*
Επος	ep'-os	*a word*	*ep*	orthoepy, epic.
Ερημος	er-e'-mos	*a desert*	*erem*	eremite (hermit).
Εργον	er'-gon	*a work*	*erg (urg)*	energetic.
Μεταλλον	met-al'-lon	*metal*	*metall*	metallurgy.
Ἠθος	eth'-os	*a custom*	*eth*	ethics.
Ευ	eu *or* you	*well*	*eu* / *ev*	eulogy. / evangelist.
Αγγελος	an'-gel-os*	*a messenger*	*angel*	angel.
Γαστηρ	gas'-teer	*the belly*	*gastr*	gastric.
Γενναειν	gen-na'-ine	*to produce*	*gen*	genesis.
Οξυς	ox'-use	*sharp*	*oxy*	oxygen.
Ὑδωρ	hu'-dor	*water*	*hydro*	hydrogen.
Γενος	gen'-os	*kind*	*gen*	heterogeneous.
Ἑτερος	het'-er-os	*another's*	*hetero*	heterodox.
Γλωσσα / Γλωττα	glow'-sa / glow'-ta	*a tongue*	*gloss* / *glott*	glossary. / polyglot.
Πολυς	pol'-use	*many*	*poly*	polygon.
Γωνια	go'-ni-a	*an angle*	*gon*	goniometry.
Ἑξ	hex	*six*	*hexa*	hexagon.
Γραμμα	gram'-ma	*a letter*	*gram*	grammar.
Επι	ep'-i	*upon*	*epi*	epigram.
Θαλαμος	thal'-a-mos	*a bridechamber*	*thalam*	epithalamium.
Γραφειν	graph'-ine	*to write*	*graph*	autograph.

The aid which the Greek language affords to the student in making exact verbal distinctions is illustrated in orthoepy, which is, by its derivation, seen to designate *right speaking*, as orthography is *right writing*; the first, therefore, refers to *pronunciation*, the second to *spelling*.

> "The epic poem is a discourse invented by art to form the manners by such instructions as are disguised under the allegories of some one important action, which is related in verse after a probable, diverting, and surprising manner."—*Pope.*

The three great *epics* are Homer's "Iliad," Virgil's "Æneid," and Milton's "Paradise Lost." Such is the perfection of these poems that they form a class by themselves.

> "Three poets, in three distant ages born,
> Greece, Italy, and England did adorn."

The formation of our *hermit*, from the Greek ερημιτης (e-re'-mi-tees), illustrates the change which words undergo in passing from one language to another.

Metallurgy, an incomprehensible term to the ordinary English student, discloses its meaning by its own act to those who know the import of its component parts. Metallurgy is, in general,

* In Greek, when two *g*'s come together, the first is sounded like *n*.

the art of *working metals*—that is, the extraction of metal from the ore.

Ethics is the science of morals—that is, of right feeling and right doing. The word *ethics* resembles the word *morals* in origin. They both signify *customs*, and they intimate that with the ancient Greeks and Romans, what *is customary* was what *is right*. At the bottom of such a notion there must have been a low standard of morality. Thus does a knowledge of language open to our eyes the character of nations. The termination of ethics, like *physics*, mathematics, etc., denotes a science. *Ethics* is the science of *morals*.

Evangelist is, according to the derivation, *the bearer of good news*. The Greek word for *gospel*—namely, ευαγγελιον (eu-an-gel'-i-on)—means *good news*. (Luke ii. 10.)

"The *gastric* juice, or the liquor which digests the food in the stomach of animals, is of all menstrua the most active, the most universal."—*Paley*, "*Natural Theology*."

"*Oxygen* is a principle existing in the air, of which it forms the respirable part, and which is also necessary to combustion. *Oxygen*, by combining with bodies, makes them acid, whence its name, signifying *generator of acids*."—*Todd's Johnson.*

Hydrogen is *water-producer*. *Hudor* (ὑδωρ), in its form *hydro*, is found also in *hydro*cephalous (Greek, κεφαλη, keph'-a-le, *the head*), having water in the head (the brain) · and in *hydro*phobia (Greek φοβος, phob-os, *fear*), *water-madness*. *Hydropsy*, *water-sickness*, is shortened into our *dropsy*.

> "Soft, swollen, and pale, here lay the *hydropsy*,
> Unwieldly man, with belly monstrous round."
> Thomson, "*Castle of Indolence.*"

Hydrography is properly the opposite of *geography*; for as the latter, considered in its component parts, is a *description of the land*, so the former is a *description of the water*. By usage these significations are modified, so that *geography*, signifying a description of the surface of the earth, comprises *hydrography*, which describes, by maps, charts, etc., the surface of the water, and especially the sea-coast, with its rocks, islands, and shoals.

"Christopher Columbus, the first great discoverer of America, was a man that earned his living by making and selling *hydrographical* maps."—*Chambers.*

HISTORIC SKETCHES.—XXIII.

WILKES AND LIBERTY.

ON the 3rd of December, 1763, the Royal Exchange was the scene of a serious disturbance. The people tried, and to a great extent succeeded, to prevent the execution of an order of the House of Commons. Londoners of the better sort encouraged the people, and the sheriffs had much difficulty in carrying out their duty.

The occasion was a curious one. Certain papers were to be solemnly burnt in public by the common hangman. But the people objected to the process, and hence the riot. The sheriffs' folk had lighted the fire in which the condemned papers were to be destroyed, when the populace thrust them aside, and substituted for the papers a jack-boot and a woman's petticoat, which were burnt amid loud acclamations. "Wilkes and liberty for ever!" shouted the people, who, content with having carried their point in respect of the boot and the petticoat, suffered the sheriffs to perform the harmless pastime of burning some files of a newspaper in the bonfire.

The paper thus destroyed was No. 45 of the *North Briton*, a newspaper which was written and published by the bitterest enemies of the existing Government, the Government of which Lord Bute was the head. Started originally as the organ of these ministers, it had on several occasions exceeded itself in the tone and sting of its abuse, and had commended itself, therefore, to the general public, who were heartily obnoxious to the persons libelled. A belief had taken hold of the public mind that the king intended to rule through his "friends," as the trusted statesmen called themselves, that is, through those who aimed at exalting the royal authority far above the authority derived from the people; and they feared for the abuses to which such a system of government is liable. They objected also personally to the chief instrument employed by His Majesty. At that time, there was an unreasoning and violent hatred on the part of Englishmen towards the Scotch as a nation; Lord Bute was a Scotchman, and vulgar prejudice did not fail to impute that fact to him as a disqualification, if not as a crime. But apart from this reason, which was no reason, there were other causes which conspired to kindle animosity against the earl. He was not an eloquent man, not an able man, either as diplomatist or politician—not a man who, by any act of his own, had given warrant for the confidence which was reposed in him—and it was scarcely concealed that the motives which induced the king so to confide in him sprang only from considerations of private friendship. With Lord Bute, however, it is possible the people might have put up, so long as he did not interfere dangerously with the important principles of the Constitution; but he was suspected to be under the influence and dominion of one whom the people wholly distrusted—the Princess Dowager of Wales, the mother of the king. The princess had many times shown herself to be anything but friendly to popular rights, and though her son had been but three years on the throne, the people fancied they detected in his conduct proofs not only of the school in which he had been brought up, but of a continuance of the tutorship. Lord Bute had been under the authority of the princess, the future king's guide and elder companion up to the very moment of his mounting the throne, and had been appointed to the supreme command of public business immediately on his pupil's accession. The views of the princess and of Lord Bute were known to coincide in every particular, and it was said, probably with truth, that the lady took frequent occasion to exhort her friend to continue in their common political faith. The king was believed to be almost wholly under their influence, and when he acted independently it was said that, clearly enough, the seed, sown by the mother and watered by the tutor, had taken deep root.

Lord Bute had many times been burned in effigy, and whenever opportunity offered for a burning but no effigy was available, the people acted the gross pun of burning a jack-boot (for John, Earl of Bute) as the unpopular minister's representative. More often than not, a petticoat was added, as typifying the princess, who was equally disliked. On the occasion mentioned at the beginning of this article, both the boot and the petticoat were destroyed, to the cry, repeated again and again, of "Wilkes and liberty!" But why Wilkes?

John Wilkes was the author of the articles in the *North Briton* which had excited so much attention, and drawn down the anger of the Houses of Parliament. He had ever since the paper started been one of the most constant contributors, and it was pretty well known that all the fiercest denunciation, all the most malignant writing, all the most scurrilous abuse which appeared in the paper was from his pen. At the present day we are accustomed to the greatest freedom in the public press; names are mentioned readily and without reserve, whatever the position of their owners may be, and an editor feels no more compunction in quoting the names of high personages in connection with what he is writing about than he has in naming the most obscure man in the kingdom. But in 1763 things were different. It was uncertain how far the law would hold an editor or publisher harmless who should criticise too freely the conduct of public men; and it was certain, according to the principle of a law which had among its maxims the monstrous proposition that the truth of a libel was the reverse of a justification for uttering it, that, unless the defendant could show he was directly benefiting the public by his publication, he would be severely punished in damages. Writing, such as we see every day in the newspapers, about public men and public affairs was at that time an unheard-of thing except in Grub Street, or when it issued from some secret printing-press that dared not let its whereabouts be known.

John Wilkes was the first journalist who wrote plainly and at full length the names of the persons of whom he was writing. Before he did so, the practice was to allude to and not mention a public man, and various expedients were resorted to—some ingenious, others coarse and vulgar—for making the allusions sufficiently pertinent to identify the person signified. In the *North Briton*, not only were the names of Lord Bute, the Duke of Grafton, George Grenville, and other ministers set forth plainly, but even the name of His Majesty was used with a freedom quite unprecedented, and the novelty of this personal style of writing made it only the more stinging. On a calm review of the *North Briton* articles, at the present day, we might consider them tame, abusive and irritating though they were, beside much that we now read daily as a matter of course; but a hundred years ago the leaders of our party political organs

would have been looked upon as simply libellous and intolerable, not to say in many cases treasonable.

No. 45 of the *North Briton*, published on the 23rd of April, 1763, came out immediately after the king had closed, with a speech from his own lips, the parliamentary session of April, 1763. Referring to the peace lately concluded with France and Spain—a peace, the terms of which, considering the important successes of the British arms, had created the profoundest disgust in England, and for agreeing to which Lord Bute was vehemently accused, and even charged with having received bribes from the nation's enemies—the king said it had been concluded on terms "so honourable to my crown, and so beneficial to my people." The words fell coldly on the ears of the members of Parliament, and excited great anger in the breasts of most of their representatives. The *North Briton* expressed the feelings of the advanced Liberals of the day, though in terms that were then at least considered scurrilous in the extreme. The king's words were commented upon with merciless severity, but they were designated as part of the "minister's" speech, the writer carefully distinguishing, in accordance with constitutional practice, between the king, who can do no wrong, and the minister, who can.

The article was received with satisfaction by those who disliked the Government, and who looked upon the *North Briton* as the champion, rough and ill-bred, perhaps, but still the champion of public liberty; but by the ministers it was regarded as a wilful and impardonable insult to the king. Unwisely they determined to notice it, and Lord Halifax, Secretary of State, issued his warrant for the arrest of "the authors, printers, and publishers" of the obnoxious article. Wilkes was arrested on the 30th of April, and after examination before Lords Halifax and Egremont, was sent a prisoner to the Tower. His private papers were also seized. Before giving an account of the proceedings taken upon his arrest, and of those further measures which flowed as a consequence out of them, it will be well to give some account of Wilkes himself, and to show how he came to be identified with popular liberty, an event which his connection with the *North Briton* would scarcely have brought about.

John Wilkes was born in 1727, the son of a distiller, who left him with a good business and ample means for carrying it on; but the young man disliked occupation, and, like others who do so, got into mischief. He relinquished the business, squandered his patrimony in riotous living, and became known as a wit of the coarser kind, a fast liver, and an adventurer. For a time he was steadied by his marriage, an event by which he acquired a fortune; but he grew tired of his wife, and spent her money, and then went into Parliament to retrieve his position. He was returned for Aylesbury in 1757, and sat as member for some time; but he was not a successful man in the House of Commons, where his peculiar talents were not appreciated, and his style of oratory was out of place. He was more at home in taverns and behind the scenes at theatres; and, in company with Sir Francis Dashwood, Lord Sandwich, and other men of pleasure, he became notorious as one of the licentious inmates of Medmenham Abbey, near Maidenhead, where revels of the most ungodly kind were carried on, and where morality and religion were alike ostentatiously set at nought.

Ruined by his extravagance and by the expenses of his elections, for he had to fight for his seat at Aylesbury both in 1757 and 1761, Wilkes cast about for some employment under the Government, by which he might at all events live comfortably. Lord Temple, the friend and relative of Pitt, had favoured him in politics, seeing many good points in him, and deeming that his abilities under good guidance might be useful in the contest which was inevitably coming on between the Crown and the Parliament. To Lord Temple Wilkes applied, in hope of getting an appointment as ambassador, or as colonial governor; but the lieutenant-colonelcy of the Bucks Militia was all that he could get; and when, in 1761, Lord Temple seceded from the Government, Wilkes' chances disappeared altogether, for from Lord Bute, to whose adverse influence he ascribed his disappointment hitherto, he could expect nothing. Wilkes then betook himself to political writing against the Government, wrote a pamphlet full of hostile criticism on the lately-concluded peace, and in June, 1762, started the *North Briton* in conjunction with Churchill, a spirit more wicked than himself. In this paper were published from time to time most violent attacks on the conduct of the ministers, whose names were printed at length in order to prevent the possibility of mistake, and in order to make the attack more felt.

The articles were always written from the popular side, and were calculated to make political capital for the writer, especially when they were upon those topics—as the cider tax, and the peace—which the people had particularly at heart. Wilkes appealed, in writing them, to the popular passions, but succeeded in steering clear of expressions which could properly be construed into treason.

The *North Briton* was no respecter of persons, even Sir Francis Dashwood, Wilkes' former boon companion, being severely handled in it as soon as he became Chancellor of the Exchequer. No one was secure from the bite of the literary mosquito, and Wilkes, being known as the principal purveyor of its sting, was subjected on several occasions to the resentment of those he libelled. Lord Talbot fought a duel with him on Bagshot Heath, and there were other persons who took more questionable means to be revenged on him. It is more than likely that Wilkes would have gone on with the *North Briton*, either until he had been quieted by a good Government appointment, or until the accession of more popular ministers had left him without employment as a political writer, but for the proceedings which the ministers commenced against him. As soon as he was arrested on account of the articles in which he had given expression, albeit savagely, to the popular opinion, he was looked upon as a political martyr, and his writings in the *North Briton* were magnified into a series of sustained, patriotic efforts on behalf of the popular cause.

No time was lost in serving out a writ of Habeas Corpus. Wilkes was, on the 3rd of May, brought before Lord Chief Justice Pratt in the Court of Common Pleas, where arguments were heard on both sides as to the propriety of the prisoner's commitment, the question being, not whether the general warrant under which he had been arrested was valid or not, but whether, as a member of Parliament, he was not protected by the privilege of that assembly. There is a privilege attaching to the dignity of representative of the people which exempts the person of the holder from arrest on civil process, and absolutely from arrest except on a charge of treason, felony, or breach of the peace. The crown lawyers contended that a libel was a breach of the peace, and they cited the opinions of the judges who committed the Seven Bishops, in support of their view—a precedent which, the circumstances considered, they were rather unfortunate in using. The court took time to consider their judgment, and the prisoner, highly elated by the reception he had met with on his way to Westminster, and in Westminster Hall, was led back to the Tower, amid the acclamations of the multitude. On the fourth day afterwards the court gave judgment in favour of the prisoner. "We are all of opinion," said Chief Justice Pratt (afterwards Lord Camden), "that a libel is not a breach of the peace; it tends to a breach of the peace, and that is the utmost. But that which only tends to a breach of the peace cannot be an actual breach of it. In the case of the Seven Bishops, Judge Powell, the only honest man of the four judges, dissented, and I am bound to be of his opinion, and to say that case is not law. . . . Let Mr. Wilkes be discharged from his imprisonment."

Released from prison, Wilkes began to make reprisals. He brought actions against the Secretary of State and his messengers for having taken his papers; he threatened Lord Egremont with a challenge, and he set up a private printing-press in his house, from which he could issue squibs and pamphlets under his own immediate direction. The rejoicings in London and the provinces at the triumph of what was considered to be the popular cause, were general and demonstrative; Wilkes became the hero of the hour, and his name was associated with the sacred name of liberty, in the rallying cry of the people.

On the 15th of November, 1763, Parliament met after the recess, and to the surprise of every one, Lord Sandwich, who had been an associate of Wilkes in his profligate career, and whose morals were certainly no better than his companion's, rose in his place in the House of Lords, and on the very first day of the session, denounced as a scandalous, obscene, and impious libel, a performance of Wilkes called "An Essay on Woman." The poem was a burlesque on Pope's "Essay on Man," and was dedicated to Lord Sandwich, having been written by Wilkes several years before in the days of Modmenham Abbey. It contained scurrilous references to various public men, among others the Bishop of Gloucester (Warburton), and Lord Sandwich himself. It was on the point of insult to the bishop, however, that the Earl of Sandwich denounced the work as a breach of privilege. Only fourteen copies had been printed at Wilkes' private press, but of this number the Government got hold of one, and this was the copy to which the attention of the House of Lords was invited. In the same book was a lewd paraphrase of the "Veni Creator," and the House of Lords, after some discussion, voted both the poems to be blasphemous and breaches of privilege, but adjourned the further consideration of them for forty-eight hours, in order to give Wilkes time to defend himself.

In the House of Commons, at the same time that the Lords were coming to this vote, Wilkes rose to complain of the breach of privilege which had been committed in arresting him; whereupon Lord North, one of the ministers, and the Attorney-General, Sir Fletcher Norton, caused the depositions of the printers who had confessed that Wilkes wrote No. 45 of the *North Briton*, to be read, and asked the House to authorise proceedings at law. After some discussion the House voted No. 45 to be a false, scandalous, and seditious libel, tending to traitorous insurrections, and ordered it to be burnt by the common hangman.

One result of the debate was a duel between Wilkes and Mr. Samuel Martin, a member who had spoken of the writer, whoever he might be, of certain other personal articles in the *North Briton*, as "a cowardly, malignant, and infamous scoundrel." Wilkes sent Martin a letter repeating the accusations made in the *North Briton*, and avowing the authorship of them. At the meeting, Wilkes was badly wounded in the body, but as soon as he could be moved he went to France, to hide himself from the storm which he saw was about to burst upon him. The House of Commons expelled him from their body, the House of Peers asked the Crown to prosecute him for his "Essay on Woman," and when, after some time, he failed to appear in answer to the indictments which were preferred against him, the courts of law pronounced sentence of outlawry against him. Then resolutions, with reference to the late decision of the Chief Justice, were passed through both Houses of Parliament, to the effect "that privilege of Parliament does not extend to the case of writing and publishing seditious libels." Even the Earl of Chatham, while objecting to the words and form of the resolutions, was careful not to speak in favour of the subject of them, whom he described as unworthy "to be ranked among the human species; he is the blasphemer of his God, and the libeller of his king."

For five years Wilkes lived abroad, afraid of the outlawry, and seeing no chance, in the state of politics which existed during that time, of making his peace with the Government. In 1768, an attempt which he made towards that end failed, and Wilkes resolved to make a bold dash upon the popular favour as the means of his getting back again. He came over at the dissolution of Parliament in the same year, and put up for the representation of London, but not succeeding in the city, he went to the county, and beat the Government candidates in the contest for Middlesex.

As soon as Parliament assembled, a question was raised whether Mr. Wilkes, being an outlaw, could sit; and when, on Wilkes surrendering, as he had promised to do, at the court of King's Bench, the outlawry was declared null and void on technical grounds, a further question arose upon the judgments to which he submitted himself, on account of his "Essay on Woman" and No. 45. Wilkes was fined £1,000, and sentenced to two years' imprisonment; the mob rescued him, and swore he should be at liberty, but he evaded their kindness, and surrendered at the King's Bench prison. Riots followed in St. George's Fields on account of "Wilkes and Liberty," and the troops having been called out, several persons were shot.

In prison, Wilkes, who was looked upon as a man persecuted for political conscience' sake, was visited by many of the leading liberal politicians, and continued to write fervid letters to his friends on public affairs. Having in one of these commented on Lord Weymouth's letter to the Lambeth magistrates, warning them of an apprehended riot, and advising them to apply for troops, he described the advice as "a hellish project," tending to "a horrid massacre." For this he was brought in custody to the bar of the House, where his letter was condemned as an "insolent libel;" and on the 3rd of February, 1769, Lord Barrington, after recapitulating Wilkes' offences, and the judgment against him, carried by a large majority a vote expelling him the House.

By a majority of 800 votes, the Middlesex electors immediately returned him again, but the House of Commons declared that he could not sit, and that Colonel Luttrell, who had not polled more than 300 votes, was duly returned. The Middlesex men were furious; Lord Chatham warmly reprehended the vote of the House of Commons, and Lord Camden resigned the Great Seal rather than continue in a Government which upheld that vote.

In April, 1770, Wilkes was released from prison, and having been, while still in durance, elected alderman of Farringdon Ward Without, was sworn in, and forthwith threw himself once more into politics. But eight years had wrought a change in public affairs; Wilkes' old occupation was to a great extent gone; and he himself, made wiser by experience, was anxious to exchange the part of a mere agitator for some more staple position. Though he continued to be a staunch Liberal, he was less noisy in ventilating his opinions; and, as a magistrate, he conducted himself with great propriety, and increased his reputation with the better class of citizens. In 1775 he was chosen Lord Mayor, and having been once more returned to Parliament for the county of Middlesex, was allowed to sit without question. In the end he became city chamberlain, an office which he filled with ability and success; and so little did this old demagogue habit survive in him, that when, in 1782, he moved in the House of Commons that the resolutions respecting his own expulsion should be expunged, there was not found any enemy to gainsay him.

Accident made Wilkes a political hero, accident bound him up in the affections of the people with the cause of public liberty, but it does not seem that on the whole he was unworthy of his position; and while we cannot fail utterly to condemn the immorality by which his earlier life was marked, to condemn, also, the tone in which he vindicated the principles he professed, we cannot refuse some share of admiration for the popular favourite, nor can we fail to see the meaning of those who identified him with the cause that was symbolised by the cry of "Wilkes and Liberty!"

LESSONS IN ARCHITECTURE.—VIII.

EXPLANATION OF SOME OF THE TERMS USED IN ARCHITECTURE.

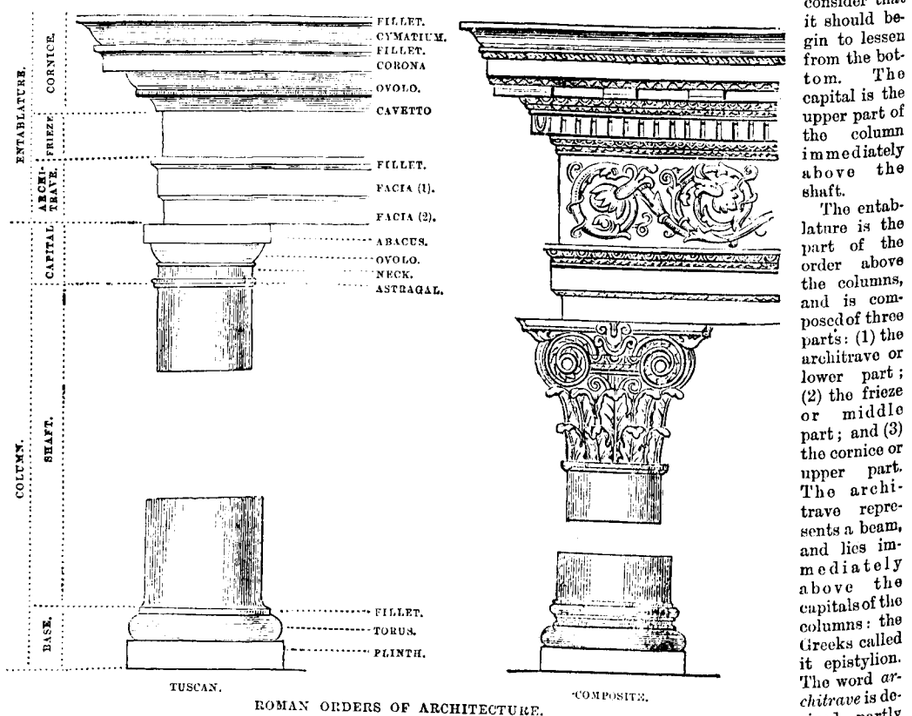
It is now time to give an explanation of the terms used in speaking of the different orders of architecture. Among the Greeks, an order was composed of columns and an entablature. The Romans added pedestals under the columns of various orders, to increase their height. The column is generally a round pillar, constructed either to support or to adorn an edifice.

Besides columns, the Greeks employed human figures to support the entablature. Vitruvius informs us that when male figures were employed, they were called Persians, to indicate the contempt in which that nation was held; and they represented these figures, accordingly, in the most suffering posture, and loading them, as it were, with the heaviest entablature, that of the Doric order; and when female figures were used, they were called Caryatides, to signify their contempt for the Carians, whose wives had been taken away captive in their wars with the Athenians. Some critics doubt the truth of these stories of Vitruvius, and endeavour to account for the origin of the figures and their names in a different manner. Whether the Greeks were the inventors of this mode of supporting entablatures, or copied it from the ancient Egyptian edifices, or from the tombs and temples of India and Persia, it is needless to inquire. Fragments of male figures, apparently employed for the same purposes, have been found among the ancient Roman monumental remains.

The pilaster is a square pillar used for the same purpose as the column. Instead of standing isolated like the column, it is generally inserted in the wall of an edifice, showing only a fourth or a fifth of its thickness. Pilasters have their bases, capitals, and entablatures with the same parts, heights, and projections as columns have; and they are distinguished, like them, by the names of the five orders of architecture—Doric, Ionic, Corinthian, Tuscan, and Composite. They are supposed

to be of Roman origin, as they only appear in the later periods of Greek architecture, and they are much more numerous in the Roman monuments. Vitruvius calls them *parastatæ*, from the Greek παρα (par'a), *near* or *by*, and ἱστημι (his-tee'-mi), *I stand*, because of their *standing close* to a building, or forming part of it. The Greeks, though they did use pilasters in their designs, had a kind of square pillars at the end of their walls, which they called *antæ*, and which sometimes projected a good way from the principal front. They were also at the entrances to a building.

Attics were a sort of low square pillars with their cornices, which originated in Athens, and were used in buildings to conceal the roof. These were ranged in a continued line, and raised above the rest of the structure, in front of the roof, so as to hide it entirely, presenting a new order, as it were, above that of the building. The Greek attics are not now to be found among the ruins of Athens. Roman attics are seen in the remains of the triumphal arches, and in the piazza of Nerva. In the arch of Constantine, the columns are surmounted with pedestals, as high as the base of the attic, upon which are placed isolated statues. There are various other ancient ruins which exhibit these attics, but they appear to be of different proportions, some being nearly one-half of the height of the order. The moderns make the height of the attics equal to that of the entablature.



ROMAN ORDERS OF ARCHITECTURE.

A series of columns, separate or connected, used in the support of an entablature, is called a colonnade. It receives a specific name from the number of columns employed; as, tetrastyle, when there are four, from the Greek τετρα (tet'-ra), *four*, and στυλος (sty'los), *a column*; hexastyle, when there are six; octostyle, when eight; and decastyle, when ten. The space between the columns is called the intercolumniation. There are five kinds of intercolumniation—namely, the arcostyle, or thinly set, where the columns are at the distance of four diameters of the column; the diastyle, when they are at the distance of three diameters; the eustyle, when at a distance of two and a quarter; the systyle, when at two; and the pycnostyle, or thickly set, when at one diameter and a half. Of these, the eustyle was most generally used by the ancient architects. Other names have been given to the intercolumniation of the Doric order, according to the number of the triglyphs placed over them, as monotriglyph, when there was one; ditriglyph, when there were two, etc. Coupled, grouped, or clustered columns appear not to have been used by the ancients, with some apparent exceptions at Rome.

Every column, except the Doric, to which the Romans give no base, is composed of a base, a shaft, and a capital. The base is that part of the column which is beneath the shaft and upon the pedestal, when a pedestal is used. It has a plinth, a member of a flat and square form like a brick, called in Greek πλινθος (plin'-thos), with mouldings that represent rings, with which the bottoms of pillars were bound, to prevent their cleaving. These rings, when large, are called tori, and when small, astragals. The tori have generally hollow spaces cut round between each torus. This hollow is called a rundel, scotia, or trochilus.

The shaft of the column is the round and even part extending from the base to the capital. This part of the column is narrower at the top than at the bottom. Some architects would give the column a greater breadth at the third part of its height than at the bottom of the shaft. There is no instance of this being practised among the ancients. Others make the shaft a cylinder from the bottom to the third part of its height, and thus lessen it from this to the top; and some consider that it should begin to lessen from the bottom. The capital is the upper part of the column immediately above the shaft.

The entablature is the part of the order above the columns, and is composed of three parts: (1) the architrave or lower part; (2) the frieze or middle part; and (3) the cornice or upper part. The architrave represents a beam, and lies immediately above the capitals of the columns: the Greeks called it epistylion. The word *architrave* is derived partly from the Greek, and partly from the Latin, being compounded of the Greek αρχος (ar'kos), *chief* or *principal*, and the Latin trabs, *a beam*. The frieze is the space between the architrave and the cornice. The cornice is composed of several mouldings, which project over each other and shelter the order from the rain.

The pedestal is cubical in form, and consists of three parts: (1) the base or foot, which stands on the area or pavement; (2) the die or middle part, which rests upon the base; and (3) the cornice or wave, upon which the column is placed. Pedestals appear to have been introduced into architecture after the loss of political independence in Greece. In the early examples of Greek architecture, the columns are generally formed standing on the uppermost of two or three steps. When the Romans elevated the floors of their temples, they were obliged to discontinue the erection of front stairs, because they occupied so much ground around the building, and to adopt the pedestal raised to a level with the top of the stairs, and projecting to the front of the steps which profiled it on all sides. Vitruvius makes no mention of pedestals, in treating of the Doric, Tuscan, and Corinthian orders; and in treating of the Ionic, speaks of the pedestal as a part of the construction, but not of the order.

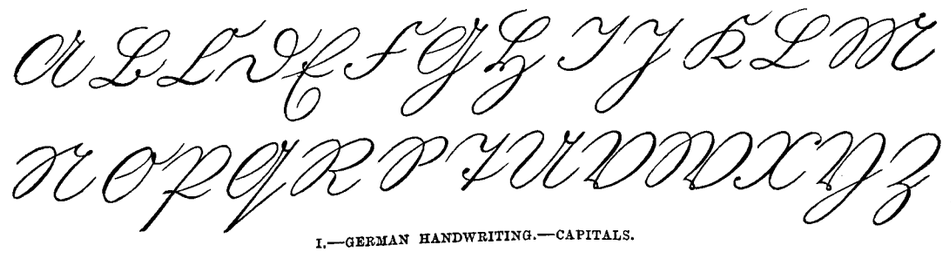
LESSONS IN PENMANSHIP.—XXXIII.

GERMAN HANDWRITING.

In the present lesson in Penmanship we set before our readers examples of the large and small letters of the German written alphabet on a larger scale than that in which are written the specimens of German handwriting given in our Lessons in German, Vol. I., page 37.

In learning these written characters, it will be useful to observe that **m** is the leading letter of the small alphabet, which is written, for the most part, in the *angular style* usually adopted by ladies in our own country, and therefore called Ladies' or Angular Hand. Taking one leg of the **m**, which we shall call the *elementary leg*, we find that it consists of a black middle-stroke, drawn in a slanting direction from right to left, and two hair-strokes, one at the upper end of the thick stroke, slanting downwards to the left, and the other at the lower end of the stroke, slanting upwards to the right. If you make the last hair-stroke curved instead of straight when you bring it up, and add a small turn or loop at the top, you have then made an **o**. If now, as soon as you have made the loop of the **o**, you draw downwards from the very short hair-stroke of the loop another black stroke, and then turn a hair-stroke upwards to the right, you have at last made an **a**. You make a **b** by adding to the **o** a large top-loop, as we do in making our own written **b**. You have learned to make **c** already, as it is the leg of the **m** already described. If you take this same elementary leg, and carry up its second hair-stroke, as we do in one form of our written **d**, making this hair-stroke end in a loop or circlet at top, you have the letter **d** complete.

The letter **e** is peculiar; it is formed of the elementary leg

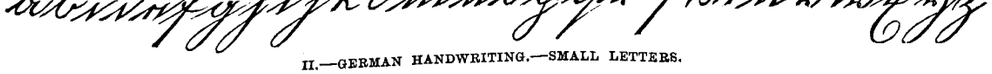


I.—GERMAN HANDWRITING.—CAPITALS.

without the second hair-stroke, to which is joined a shorter elementary leg by a hair-stroke drawn from the former very near the top of the black stroke. The letter **f** is very like our own written **f**; and is made by a long hair-stroke, looped above the line, and terminating below it in a long, straight stroke; the letter is completed by crossing it in the middle by the elementary leg of the **m**, made diagonally downwards from left to right, instead of from right to left. To make the letter **g**, first make an **o**, and then from the short hair-stroke of the loop draw a hair-stroke downwards, making it terminate below the line like our own written **g**. The letter **h** is exactly like the long **s** used in writing by ourselves; it seems to have consisted of the elementary leg with a loop of hair-stroke above and another below. The letter **i** consists of the elementary leg with a dot above it; if you forget the dot, it will be taken for a **c**. The letter **j** is that part added to **o** which makes it a **g**, with a dot above it. The letter **k** is so like our own that it can hardly be mistaken, but it has no loop at the top. The letter **l** is just the letter **b** without the small final loop. The letter **m** has been described; the letter **n** consists of two legs of the letter **m**; the letter **o** has also been described.

The letter **p** is formed of the elementary leg by turning round the second hair-stroke in a larger loop than usual, and terminating it below the line like a **j**; we have no letter like it. The letter **q** is like **g** with this difference, that it is pointed below the line, and the hair-stroke is brought up from this point to the right instead of to the left. The letter **r** is very peculiar, and unlike any of ours. It consists first of an elementary leg; but the second hair-stroke, instead of being brought up, is looped at the bottom contrary to the usual way, and then brought up and made to terminate in an elementary leg to the right, of half the usual size. The letter **s** is very much like the letter **f**, with this difference, that it is hooked above the line like a shepherd's crook, instead of being looped; while the elementary leg, instead of crossing it in the middle, is placed entirely to the left at this point. Another **s**, which is also shown in the examples of the small letters given below, is made by forming a loop at bottom from right to left, and terminating in a hair-stroke above the line, with a hook from left to right, somewhat like our written figure **6** made from the bottom to the top, or contrary to the usual way. The letter **t** is made in the form generally used for this letter in small-hand, terminating at the bottom in a straight, square stroke, instead of being turned upwards with a hair-stroke to the right. It is crossed by a curved stroke from left to right. The letter **u** is exactly like the letter **n**, with a circlet or curve over it for the sake of distinction.

The letter **v** is another peculiarly-formed letter. The first part of it is exactly like the letter **r**, but it terminates in a round black stroke curved towards the right, or hollow towards the first part of the letter, and giving it somewhat the appearance of an inverted **a**. Prefix to the letter **v** the elementary leg so often mentioned, and you have the letter **w**. The letter



II.—GERMAN HANDWRITING.—SMALL LETTERS.

x is formed like the letter **p**, with this difference, that the part below the line is turned to the right instead of to the left, and terminates in a small scroll. The letter **y** is like the letter **v** with its curve to the right extended below the line, and its hair-stroke brought up like a **j**. The last letter, **z**, is very like our own manuscript **z**, and consists of the elementary leg rounded, and the second hair-stroke replaced by a curved part below the line, like the letter **j**. The double consonants given in the examples of letters in Vol. I., page 37, and which it is needless to repeat here in our illustrations, are so manifestly formed of the simple letters which enter into their composition, that it is unnecessary to make this lesson any longer by describing them. It may just be observed that double **s** is a combination of the two different forms of **s** above described; that the double **f** is like the double **s** without the elementary leg behind it, and with a dash or flourish across it; and that in combination **z** is written on the line, instead of below it, and in form resembling our manuscript capital letter **B**.

In the German handwriting, as regards the capital letters, there are three elementary legs, so to speak, from which all the letters may be formed. The *first* is the initial leg of the capital letter **M**, which is not like any of our manuscript capitals, but

rather like that of a small **m** enlarged into a capital with loops at bottom, as employed often by ourselves when writing Mr., or Mrs., or Messrs. It consists of an oval loop commencing with a hair-stroke on the left, becoming thick and curved as it turns round from left to right, and becoming again a hair-stroke in the same direction as before, but lower, in order to form the complete loop. The *second* is the body of the letter **I**, which is the same in German as in English handwriting; and the *third* is like the ordinary pot-hooks of our text-hand, tapered at the commencement of their formation.

The capital letter **A** is formed of the first elementary leg inverted, and the third added to it with a small loop joining the two together. It is, in fact, the small **a** enlarged, with *round* instead of *angular* turns at top and bottom. The capital letter **B** is formed of the second elementary leg, with a loop at top and bottom, the whole being made like our capital writing letter **L**, with a small loop terminating the last hair-stroke exactly like our small writing **b**. The letter **C** is exactly like our letter **L** in writing, with a small hook placed at the top loop. The letter **D** is more like the form ϑ of the Greek letter **th**, or *theta*, than anything we know. It scarcely deserves the name of a letter, being a mere flourish of the pen. The letter **E** is like our manuscript **C** with its lower half written below the line, and crossed by a curve, indicating the separation of the loop and the scroll. The letter **F** is the second elementary leg with a small hook at the top, and crossed in the middle with a fine hair-stroke. The letter **G** is formed of the first elementary leg inverted, with the second attached to it by a small loop at the top, and lengthened below the line like our own **G**. It is, in fact, like the small letter **g** enlarged, with the *angular* turn of its elementary leg *rounded*. The letter **H** is like our capital **G** inverted, with a small loop between the top and bottom parts of it. The letters **I** and **J** are like our own letters of similar name, sound, and position in the alphabet. The letter **K** is like our **R** badly shaped, and having a small hook at the top of the middle stroke. The letter **L** is exactly like our own. The letter **M** consists of the first elementary leg doubled, and the third attached to the second by a small hook at the top. The letter **N** is of the same form, excepting that the first leg is *not* doubled. The letter **O** is the first part of the letter **A**, with a small loop at top.

The letter **P** is very like the **P** used by us in writing the word *per*, in per cent., per pound, etc., only the top is round, and the final loop is more marked. The letter **Q** is like the letter **G**, with the bottom sharpened, and the hair-stroke from it turned the contrary way. It is sometimes made like the letter **O**, with a hook attached to it at the bottom. The letter **R** is very like our own, only its first part consists of the first elementary leg. The letter **S** consists of the first elementary leg, terminating in a small hook or curve at top. The letter **T** consists of the letter **I** terminated squarely at the bottom, and near that point crossed by the elementary leg of the small alphabet from left to right. The letter **U** consists of a double pot-hook, to which is attached the third elementary leg by a small loop at top. The letters **V** and **W** are only the letters of the small alphabet enlarged, with the *angular* turns *rounded* like the first two in the letter **M**. The letter **X** is exactly like our own. The letters **Y** and **Z** are like the small letters **y** and **z** enlarged, with their *angular* turns *rounded*.

LESSONS IN GREEK.—XI.

THE THIRD DECLENSION (*continued*).

I MUST now direct your attention to nouns ending in -ης, -ες; -ως (gen. -ωος), -ως and -ω (gen. -οος), and in -ας (gen. -αος), -ος (gen. -εος). The stem of these words ends in σ; the σ remains at the end and before a consonant, but disappears in the middle between two vowels. In the dative plural one σ disappears; for example, ὁ θως, a jackal, τοις θω-σι.

Of these words, let us consider first those which end in -ης, -ες. The terminations -ης (m. and f.), -ες (n.), belong only to adjectives, and to proper names terminating in adjective forms in -νης, -λης, -γενης, -κρατης, -μηδης, -πειθης, -σθενης, and (-κλεης) -κλῆς. The neuter presents the pure stem.

The words of this class suffer contraction in all the cases, except the nominative and vocative singular, and the dative plural, after dropping the σ. The words ending in -κλεης being contracted into -κλῆς, again undergo contraction in the dative singular. Learn both the contracted and the uncontracted forms I am about to give of ὁ, ἡ σαφης, clear, το σαφες, and ἡ τριηρης, a trireme, or galley with three banks of rowers.

	Singular.		*Plural.*	
Nom.	ὁ, ἡ σαφης,	το σαφες;	(σαφε-ες) σαφεῖς,	(σαφεα) σαφῆ.
Gen.	(σαφεος) σαφοῦς;		(σαφε-ων) σαφῶν.	
Dat.	(σαφε-ϊ) σαφεῖ;		σαφεσι.	
Acc.	(σαφε-α) σαφῆ,	σαφες;	(σαφε-ας) σαφεῖς,	(σαφε-α) σαφῆ.
Voc.	σαφες,	σαφες;	(σαφε-ες) σαφεῖς,	(σαφε-α) σαφῆ.

Dual.

N.A.V.	σαφε-ε, σαφη.
G.D.	σαφε-οιν, σαφοῖν.

	Singular.	*Plural.*
Nom.	ἡ τριηρης,	(τριηρε-ες) τριηρεις.
Gen.	(τριηρε-ος) τριηρους,	τριηρε-ων and τριηρων.
Dat.	(τριηρε-ι) τριηρει,	τριηρε-σι.
Acc.	(τριηρε-α) τριηρη,	(τριηρε-ας) τριηρεις.
Voc.	τριηρες,	(τριηρε-ες) τριηρεις.

Dual.

N.A.V.	τριηρε-ε and τριηρη.
G.D.	τριηρε-οιν and τριηροῖν.

I subjoin the declension of the proper names Σωκρατης, Socrates, and Περικλεης, Pericles; as strictly proper names, they are found only in the singular.

Nom.	Σωκρατης.	(Περικλεης)	Περικλῆς.
Gen.	Σωκρατους.	(Περικλεε-ος)	Περικλεους.
Dat.	Σωκρατει.	(Περικλεε-ϊ)	(Περικλεει) Περικλεῖ.
Acc.	Σωκρατη.	(Περικλεε-α)	Περικλεᾶ.
Voc.	Σωκρατες.	(Περικλεες)	Περικλεις.

Mark the contraction in the dual of τριηρεε into τριηρη, and not into the usual form in -ει.

In adjectives in -ης, -ες, when these terminations are preceded by a vowel, εα is commonly contracted into ᾱ, as in the proper noun Περικλεᾱ, and not into η, as in σαφεα, σαφῆ; for example, ακλεης, unrenowned, makes ακλεεα into ακλεᾱ, in the masculine and feminine accusative singular, and in the neuter nominative, accusative, and vocative; so ὑγιης forms ὑγιᾱ.

Proper names of this termination, as well as Αρης, Mars, in the accusative singular, follow the first as well as the third declension, and are therefore denominated heteroclite, (that is *of different declensions*); accordingly we have both Σωκρατη and Σωκρατην. But in those ending in -κλης, the accusative in -ην is not Attic, and therefore not allowable.

VOCABULARY.

Αισχρος, -α, -ον, shameful.
Ακρατης, -ες, immoderate.
Αληθης, -ες, true, honest.
Αναξαγορας, -ου, ὁ, Anaxagoras.
Ατυχης, -ες, unfortunate.
Αφανης, -ες, unknown, unseen.
Δουλεια, -ας, ἡ, slavery, servitude.
Ελεαιρω, I pity.
Ἑλωδης, -ες, marshy.
Επαμεινωνδας, -ου, ὁ, Epaminodas
Ἡρακλῆς, -ους, ὁ, Hercules.
Ινδικη, ἡ, India.
Καλαμος, -ου, ὁ, a reed.
Ὁμιλια, ἡ, intercourse (with dat.)
Ποταμος, -ου, ὁ, a river.
Σοφιστης, -ου, ὁ, a sophist.
Σοφοκλῆς, -ους, ὁ, Sophocles.
Σωτηρια, -ας, ἡ, salvation.
Τοπος, -ου, ὁ, a place.
Τραγῳδια, -ας, ἡ, tragedy.

EXERCISE 35.—GREEK-ENGLISH.

1. Αἱ Σοφοκλεους τραγῳδιαι καλαι εισιν. 2. Τον Σωκρατη επι τῃ σοφιᾳ θαυμαζομεν. 3. Σωκρατει πολλοι μαθηται εισιν. 4. Ἡ Ινδικη παρα τε τους ποταμους και τους ἑλωδεις τοπους φερει καλαμους πολλους. 5. Λεγε αει τα αληθη, ω παῖ. 6. Αναξαγορος, ὁ σοφιστης, διδασκαλος ην Περικλεους. 7. Ω Ἡρακλεις, τοις ατυχεσι σωτηριαν παρεχε. 8. Επαμεινωνδας πατρος ην αφανοῦς. 9. Ελεαιρε τον ατυχῆ ανθρωπον. 10. Ορεγεσθε, ω νεανια, αληθων λογων. 11. Οἱ ακρατεῖς αισχραν δουλειαν δουλευουσιν.

EXERCISE 36.—ENGLISH-GREEK.

1. Socrates had (in Greek, *to Socrates was*) wonderful wisdom. 2. Pity unfortunate men. 3. We pity unfortunate men. 4. Many youths were disciples of Socrates. 5. Socrates had (in Greek, *to Socrates was*) much wisdom. 6. They admire the wisdom of Socrates. 7. The immoderate (man) serves a shameful servitude. 8. We admire the beautiful tragedies of Sophocles. 9. True words are believed. 10. I pity the life of immoderate men. 11. Have not intercourse with immoderate men.

I next take up words in -ως (gen. -ωος); and in -ως and -ω (gen. -οος = -ους). The terminating σ belongs to the stem. And first -ως (gen. -ωος); for example, ὁ, ἡ θως, a jackal, and ὁ ἡρως, a hero.

	Singular.	*Plural.*	*Singular.*	*Plural.*
Nom.	ὁ, ἡ θως,	θω-ες.	ὁ ἡρως,	ἡρω-ες.
Gen.	θω-ος,	θω-ων.	ἡρω-ος,	ἡρω-ων.
Dat.	θω-ι,	θω-σι.	ἡρω-ι,	ἡρω-σι.
Acc.	θω-α,	θω-ας.	ἡρω-α *and* ἡρω,	ἡρω-ας and ἡρως.
Voc.	θως,	θω-ες.	ἡρως,	ἡρω-ες.

Dual.

N.A.V. θω-ε. G.D. θω-οιν N.A.V. ἡρω-ε. G.D. ἡρω-οιν.

I also give specimens of nouns in -ως and -ω (gen. -οος = -ους). These are all feminine. The ending -ως, in ordinary speech, is preserved only in the substantive αιδως, modesty, sense of shame; the dual and plural are formed according to the termination -ος of the second declension: thus, αιδοι, ηχοι, κ. τ. λ. Here follow the forms of ἡ αιδως, modesty, respect, and ἡ ηχω, echo.

	Singular.	*Plural.*	*Singular.*	*Plural.*
Nom.	ἡ αιδως,	αιδοι.	ἡ ηχω,	ηχοι.
Gen.	(αιδο-ος) αιδοῦς,	αιδων.	(ηχο-ος) ηχοῦς,	ηχων.
Dat.	(αιδο-ϊ) αιδοῖ,	αιδοις.	(ηχο-ϊ) ηχοῖ,	ηχοις.
Acc.	(αιδο-α) αιδῶ,	αιδους.	(ηχο-α) ηχῶ,	ηχους.
Voc.	(αιδο-ϊ) αιδοῖ,	αιδοι.	(ηχο-ϊ) ηχοῖ,	ηχοι.

Dual.

N.A.V. αιδω. G.D. αιδοιν. N.A.V. ηχω. G.D. ηχοιν.

VOCABULARY.

Βλεπω, I see.
Γοργω, ἡ, the Gorgon.
Δμως, ὁ, a slave.
Ερατω, ἡ, Erato, one of the Muses.
Ευεστω, ἡ, good condition.
Ἱστοριογραφος, -ου, ὁ, an historian.
Κηπος, -ου, ὁ, a garden
Κλειω, ἡ, the Muse Clio.
Λυπηρος, -α, -ον, sad.
Λυρικος, -η, -ον, lyric.
Λυσιας, -ου, ὁ, Lysias.
Πατρως, ὁ, an uncle on the father's side.
Πειθω, ἡ, power of persuasion.
Προσβλεπω, I look at.
Προσειμι, I am present, I am near, at, belong to.
Προσωπον, -ου, το, a face, countenance.
Σεβας, το (only with the nom. and acc.), reverence.
Ψευδω, I lie, deceive.

EXERCISE 37.—GREEK-ENGLISH.

1. Ὁμηρος ᾳδει πολλους ἡρωας (or ἡρως). 2. Την των ἡρωων αρετην θαυμαζομεν. 3. Οἱ δμωες βιον λυπηρον αγουσιν. 4. Ὁ του πατρωος κηπος καλος εστιν. 5. Ορεγου, ω παι, τῆς αιδους. 6. Αιδως αγαθοις ανδρασιν ἑπεται. 7. Λυσιαν επι τῃ πειθοῖ και χαριτι θαυμαζομεν. 8. Τῃ αιδοι προσεστι το σεβας. 9. Μη προσβλεπε το Γοργοῦς προσωπον. 10. Ω Ηχοῖ, ψευδεις πολλακις τους ανθρωπους. 11. Παντες ορεγονται ευεστους. 12. Πρεπει παιδι και νεανιᾳ αιδῶ εχειν. 13. Κλειω και Ερατω Μουσαι εισιν.

EXERCISE 38.—ENGLISH-GREEK.

1. Homer sings (of) the hero Achilles. 2. The hero Achilles is sung by Homer. 3. The bravery of the hero is wonderful. 4. We admire the bravery of heroes. 5. Slaves have (say, *to the slaves is*) a sad life. 6. The uncle has (say, *to the uncle is*) a fine garden. 7. All rejoice at their (the) good condition. 8. Admire, O youth, with (μετα and gen.) modesty the deeds of good men. 9. By (dat.) the echo we are often deceived.

Nouns in -ας and -αος are declined as follows. Only a few neuters belong to this head. The terminating σ belongs to the stem: το σελας, splendour; το κρεας, flesh.

	Singular.		
N.A.V.	το σελας.	το κρεας.	
Gen.	σελα-ος.	(κρεα-ος)	κρεως.
Dat.	σελα-ϊ and σελᾳ.	(κρεα-ι)	κρεᾳ.
	Plural.		
N.A.V.	σελα-α and σελᾱ.	(κρεα-α)	κρεα.
Gen.	σελα-ων.	(κρεα-ων)	κρεῶν.
Dat.	σελα-σι.	(κρεα-σι)	
	Dual.		
N.A.V.	σελα-ε.	(κρεα-ε)	κρεα.
G.D.	σελα-οιν.	(κρεα-οιν)	κρεῷν.

After σελας decline το δεπας, a goblet; after κρεας decline το γηρας, old age, and το γερας, a present. With these two last may be connected two nouns whose stem ends in τ—namely, το τερας, a prodigy, and το κερας, a horn, since after dropping the τ they may be contracted in the same manner; κερας follows κρεας throughout, but with the contracted forms. It has also regular forms with τ; thus, κερας, κερατος, and κερως; κερατι and κερᾳ, etc.; τερας, however, has the two forms only in the plural, the contracted are the more common—thus, τερᾱ, τερῶν.

VOCABULARY.

Ανδρεια, -ας, ἡ, bravery.
Διατροφη, -ης, ἡ, nourishment.
Δυσκολος, -ον, dissatisfied, grumbling, hard.
Ελαφος, -ου, ἡ, a stag.
Ευεξια (ευ & εχω), -ας, ἡ, well-being, weal.
Θεμελιον, -ου, το, a foundation.
Πεμπω, I send.
Προβατον, -ου, το, a sheep.
Προτρεπω, I turn towards, exhort, encourage.
Σαλπιγξ, -ιγγος, ἡ, a trumpet.
Σημαινω, I give a sign (σημα, a sign), I signify.
Ὑπαρχω, I exist.
Φαρμακον (whence *pharmacy*), -ου, το, medicine, means of healing.

EXERCISE 39.—GREEK-ENGLISH.

1. Οἱ θεοι τοις ανθρωποις τερα πεμπουσιν. 2. Των εν γηρᾳ κακων φαρμακον ὁ θανατος εστιν. 3. Τα γερα τους στρατιωτας εις ανδρειαν προτρεπει. 4. Εξ αιγων και προβατων γαλα και κρεα ποος διατροφην ὑπαρχει. 5. Κερασι και σαλπιγξιν οἱ στρατιωται σημαινουσιν. 6. Ποικιλων κρεῶν γενομεθα. 7. Καλου γηρως θεμελιον εν παισιν εστιν ἡ του σωματος ευεξια. 8. Αἱ ελαφοι κερα εχουσιν. 9. Δυσκολος ὁ εν γηρα βιος (sc. εστιν).

EXERCISE 40.—ENGLISH-GREEK.

1. Prodigies are sent by (ὑπο with gen.) the gods to men. 2. Soldiers are delighted with horns and trumpets. 3. We taste milk and flesh. 4. Death puts an end to (απολυει) the evils of old age. 5. The king sends presents to the soldiers. 6. Presents encourage soldiers. 7. Soldiers are encouraged by (dat.) presents.

KEY TO EXERCISES IN LESSONS IN GREEK.—X.

EXERCISE 31.—GREEK-ENGLISH.

1. All men have not the same mind. 2. We masticate our food with our teeth. 3. Dolphins are man-loving (animals). 4. It is the part of a good man to bear all evils with courage. 5. Many districts of Lybia abound in ivory. 6. All people hate a loquacious man. 7. Once the giants had a fight with the gods. 8. We rejoice in the rays of the sun. 9. It is the office of the nostrils to smell.

EXERCISE 32.—ENGLISH-GREEK.

1. Ἡμιν εστιν ελεφας. 2. Εν χωραις της Λιβυης ὁ ελεφας γιγνεται. 3. Αἱ του ἡλιου ακτινες τους ποιμενας τερπουσι. 4. Οἱ αδελφοι τε και αἱ αδελφαι χαιρουσιν εν ταις ακτισι του ἡλιου. 5. Ἡ αδελφη εστι χαλη. 6. Θαυμαζομεν τον καλον τον ελεφαντα. 7. Πολλοι ελεφαντες εισιν εν τῃ Λιβυῃ. 8. Οδοντων εστιν εργον λεαινειν το βρωμα. 9. Παντος εστι σεβειν το θεῖον. 10. Τοις θεοις ποτε ην πολεμος προς τους γιγαντας.

EXERCISE 33.—GREEK-ENGLISH.

1. Kings have a care for their subjects. 2. The flock follows its shepherd. 3. Hector is slaughtered by Achilles. 4. The priests sacrifice oxen to the gods. 5. Cyrus was the son of good parents. 6. The ungrateful dishonour their parents. 7. My son, obey your parents. 8. Telemachus was the son of Ulysses. 9. Be willing to honour your parents before everything. 10. The idle tales of old women wear away (weary) the ears. 11. You rule gloriously, O king. 12. Old women are very talkative. 13. Shepherds drive the flock of cattle to pasture. 14. Homer likens the eyes of Juno to those of an ox. 15. Patroclus was the friend of Achilles. 16. We admire Cyrus, the king of the Persians, because of his virtue as well as his wisdom.

EXERCISE 34.—ENGLISH-GREEK.

1. Αἱ αγελαι επονται τῷ νομεῖ. 2. Ὁ αναξ εχει επιμελειαν του πολιτου. 3. Τα ωτα τειρεται ληρῳ των γραων. 4. Ἡ γραυς εστι πολυλογος. 5. Ὁ ποιμην αγει την αγελην των βοων προς την πολιν. 6. Βοες θυονται τοις θεοις ὑπο των ἱερεων. 7. Οἱ γονεις στεργονται ὑπο των τεκνων. 8. Αγαθου εστι ποιμενος εχειν επιμελειαν των αγελων.

LESSONS IN GEOGRAPHY.—XXIV.

EUROPE (*continued*).

IN our present lesson, with a page map of the countries of Southern and Central Europe, we give in a tabular form many useful facts relating to the most important of the independent states of Europe. The first table, as will be seen, exhibits the capitals of these states with the rivers, etc., on which they stand, the area and population of each, and the number of inhabitants to every square mile.



I.—The Chief States of Europe—their Capitals, Area, Population, etc.

States.	Capitals.	Rivers, etc., on which the Capitals stand.	Approximate Area in square miles.	Approximate No. of Population.	No. of Inhabitants to every square mile.
British Isles	London	Thames	121,115	36,000,000	297
Sweden and Norway	Stockholm	Lake Mälar	293,849	6,391,000	21
Russia in Europe	St. Petersburg	Neva	2,074,686	84,852,000	41
Denmark	Copenhagen	The Sound	15,218	2,096,500	138
German Empire	—	—	210,161	45,234,000	215
Including, with other smaller states, Prussia	Berlin	Spree	135,955	27,279,000	200
Saxony	Dresden	Elbe	5,789	2,973,000	513
Mecklenburg-Schwerin	Schwerin	Stor	5,138	577,000	112
Oldenburg	Oldenburg	Hunte	2,470	337,500	136
Bavaria	Munich	Iser	29,292	5,285,000	180
Wurtemberg	Stuttgart	Nesenbach	7,531	1,971,000	261
Baden	Carlsruhe	Rhine	5,821	1,570,000	269
Hesse-Darmstadt	Darmstadt	Darm	2,965	936,500	315
Holland	Amsterdam	Amstel	12,680	4,225,000	333
Belgium	Brussels	Senne	11,373	5,655,000	497
France	Paris	Seine	204,096	37,672,000	184
Switzerland	Berne	Aar	15,991	2,846,000	171
Austria and Hungary	Vienna	Danube	240,940	37,741,000	156
Turkey in Europe (excluding Bulgaria, Bosnia, etc.)	Constantinople	The Bosphorus	80,000	5,275,000	66
Greece (ex. Thessaly and Epirus)	Athens	Gulf of Ægina	19,353	1,980,000	102
Italy	Rome	Tiber	114,406	28,459,500	248
Spain	Madrid	Manzanares	195,775	16,902,500	86
Portugal	Lisbon	Tagus	35,812	4,745,000	132

The remaining states of Europe which as yet preserve a semblance of independence, though the rulers of all of them may be considered as being virtually subordinate to the will of Prussia, are included within the limits of the great central territorial division of Europe called Germany. The new German Empire was constituted by the treaties made at Versailles in 1871, after the close of the Franco-German War, under the Presidentship of the King of Prussia, who bears the title of Emperor of Germany.

We give herewith a list of the states that make up the German Empire, and in every case the names of the states given in Tables I. and II. are printed in italics to distinguish them from the small states that are not included in these tables.

The German Empire.—The Kingdoms of *Prussia*, *Saxony*, *Bavaria*, and *Wurtemberg*; the grand-duchies of *Oldenburg*, *Mecklenburg-Schwerin*, *Baden*, *Hesse-Darmstadt*, Mecklenburg-Strelitz, and Saxe-Weimar; the duchies of Anhalt, Brunswick, Saxe-Altenburg, Saxe-Meiningen, and Saxe-Coburg-Gotha; the principalities of Schwartzburg-Sondershausen, Schwartzburg-Rudolstadt, Waldeck, Reuss-Schleiz, Reuss-Greiz, Schaumburg-Lippe, and Lippe-Detmold; the free cities of Lubeck, Bremen, and Hamburg, and the provinces of Alsace and Lorraine.

II.—The Chief States of Europe—their Rulers, Revenue, National Debt, etc.

States.	Approximate amount of Annual Revenue in pounds sterling.	Approximate amount of National Debt in pounds sterling.	Description of State.	Existing Form of Government.	Present Ruler (1885).	Date of Accession.
British Isles	87,205,000	746,400,000	Kingdom.	Constitutional.	Victoria I.	1837
Sweden and Norway	6,729,000	19,142,000	Kingdom.	Constitutional.	Oscar II.	1872
Russia in Europe	124,563,000	416,500,000	Empire.	Absolute.	Alexander III.	1881
Denmark	2,736,000	12,957,000	Kingdom.	Constitutional.	Christian IX.	1863
Prussia	56,181,000	167,254,000	Kingdom.	Constitutional.	William I. (Emperor of Germany).	1861
Saxony	3,432,000	33,672,000	Kingdom.	Constitutional.	Albert I.	1873
Mecklenburg-Schwerin	—	—	Grand Duchy.	Feudal System.	Frederic Francis III.	1883
Oldenburg	310,000	1,850,000	Grand Duchy.	Constitutional.	Peter I.	1863
Bavaria	11,723,000	67,326,000	Kingdom.	Constitutional.	Louis II.	1864
Wurtemberg	2,701,000	24,376,000	Kingdom.	Constitutional.	Charles I.	1864
Baden	2,058,000	16,399,000	Grand Duchy.	Constitutional.	Frederic I.	1852
Hesse-Darmstadt	861,000	1,593,000	Grand Duchy.	Constitutional.	Louis IV.	1877
Holland	9,358,000	84,235,000	Kingdom.	Constitutional.	William III.	1849
Belgium	12,645,000	67,474,000	Kingdom.	Constitutional.	Leopold II.	1865
France	132,674,000	942,000,000	Republic.	Constitutional.	Francis Paul Jules Grévy (President).	1879
Switzerland	1,735,000	—	Republic.	Federal.	—	—
Austro-Hungarian Empire	76,680,000	452,428,000	Empire.	Constitutional.	Francis Joseph I.	1848
Turkish Empire	14,500,000	107,500,000	Empire.	Absolute.	Abdul Hamid II.	1876
Greece	3,127,000	17,253,000	Kingdom.	Constitutional.	George I.	1863
Italy	62,519,000	400,000,000	Kingdom.	Constitutional.	Humbert I.	1878
Spain	35,213,000	238,000,000	Kingdom.	Constitutional.	Alfonso XII.	1874
Portugal	6,932,000	80,000,000	Kingdom.	Constitutional.	Louis I.	1861

The Emperor of Germany, as president or head of the several states or kingdoms previously enumerated, represents the empire in all cases of international law, and in respect of declaring war, making peace, treaties, &c. Notwithstanding, before any declaration of war can be made by him, he must obtain the consent of the *Bundesrath*, a council of delegates of all the confederate governments. The Emperor is also the commander-in-chief of the whole army and navy in time of war, as he is also in time of peace, except in the cases of the kingdoms of Bavaria and Wurtemburg.

The Ottoman Empire had formerly very extensive territories in Europe, but these have been largely reduced during the present century, and especially since the Russo-Turkish War. Amongst states which have won their independence from Turkey are Montenegro—a small principality of some 1,710 square miles, with a population of about 286,000—and Roumania, with an area of 49,262 square miles, and a population of about 5,110,000. Practically independent of Turkey is Bulgaria—a principality created by the Treaty of Berlin in 1878, with an area of 24,659 square miles, and with 1,859,000 inhabitants. Eastern Roumelia—tributary to Turkey, and like Bulgaria created by the Berlin Treaty—has an area of 13,663 square miles, with 751,000 inhabitants. Under the provisions of the same Treaty Greece has acquired a considerable accession of Turkish territory, an International Commission having awarded to her parts of Thessaly and Epirus.

LESSONS IN ARITHMETIC.—XXXIII.

RULE OF THREE—SINGLE AND DOUBLE (*continued*).

8. In Simple or Single Rule of Three, the method of performing which was explained in the last lesson, it will be found that questions of the following kind often occur:—

EXAMPLE 1.—If 8 men can reap 32 acres in 6 days, how many acres can 12 men reap in 15 days?

Such questions can always be solved in a manner similar to the following:—

Since 8 men can reap 32 acres in 6 days,

1 man ,, $\frac{32}{8}$ acres in 6 days,

And 1 man ,, $\frac{32}{8 \times 6}$ acres in 1 day;

Therefore, 12 men ,, $12 \times \frac{32}{8 \times 6}$ acres in 1 day,

And 12 men ,, $12 \times 15 \times \frac{32}{8 \times 6}$ acres in 15 days.

$$\text{And } 12 \times 15 \times \frac{32}{8 \times 6} = 120 \text{ days, the answer.}$$

EXAMPLE 2.—If the carriage of 6 cwt. 3 qrs. for 124 miles costs £3 4s. 8d., what weight would be carried 93 miles for £1 4s. 3d.?

Since 6 cwt. 3 qrs. is carried 124 miles for £3 4s. 8d., or £$3\frac{7}{30}$,

Therefore, $6\frac{3}{4}$ cwt. ,, 1 mile for £$\frac{3\frac{7}{30}}{124}$,

And 1 cwt. ,, 1 mile for £$\frac{3\frac{7}{30}}{124 \times 6\frac{3}{4}}$.

Therefore, 1 cwt. ,, 93 miles for £$93 \times \frac{3\frac{7}{30}}{124 \times 6\frac{3}{4}}$,

i.e., for £$\frac{97}{270}$.

Hence $\frac{\text{£1 4s. 3d.}}{\text{£}\frac{97}{270}}$ cwts. will be carried 93 miles for £1 4s. 3d.

$$\text{And } \frac{\text{£1 4s. 3d.}}{\text{£}\frac{97}{270}} = \frac{1\frac{51}{240}}{\frac{97}{270}} = \frac{27}{8} = 3\frac{3}{8}.$$

The answer therefore is $3\frac{3}{8}$ cwt., or 3 cwt. 1 qr. 14 lbs.

9. Questions of this kind can always be solved by the method given above—*i.e.*, by finding what quantity of one kind corresponds to one *unit* of each of the other kinds. Thus we have found, in the first example, how many acres can be reaped by *one* man in *one* day. In the second example we have found what is the cost of carrying *one* cwt. *one* mile. After this has been done, the process is easy.

The result, can, however, be always arrived at more simply by means of the following rule, which depends, however, upon an algebraical principle which we cannot explain here.

10. *Double Rule of Three.*

There are five quantities given to find a sixth. Call this sixth quantity x. These six quantities will consist of 3 kinds in pairs. Observe which kind increases with the increase of *both* the other kinds. Then the ratio of the two quantities of this kind will be equal to the ratio (See Lesson XX., Art. 2, Vol. I., page 342) *compounded* of the ratios of the others.

11. We will work out the previous examples by this rule.

EXAMPLE 1.—Here the acres increase if the men increase, and if the days increase.

Hence, the sixth quantity, x, being *days*, we have—

$$\frac{x}{32} = \frac{12 \times 15}{8 \times 6};$$

$$\text{Therefore } x = 32 \times \frac{12 \times 15}{8 \times 6} = 120 \text{ days.}$$

EXAMPLE 2.—Here the *price* increases if the weight increases, and if the distance increases.

Hence, the sixth quantity, x, being *weight*, we have—

$$1\tfrac{51}{240} = \frac{x}{6\frac{3}{4}} \times \frac{93}{124};$$

$$\text{Or } \frac{3}{8} = \frac{x}{9}.$$

Therefore $x = \frac{27}{8}$ cwt. = 3 cwt. 1 qr. 14 lbs.

EXAMPLE 3.—If 27 men can do a piece of work in 14 days of 10 hours each, how many hours a day must 24 boys work, in order to complete the same in 45 days, the work of a boy being half that of a man?

Therefore 27 men do the work in 140 hours;

1 man ,, ,, 27×140 hours;

24 boys or 12 men ,, $\frac{27 \times 140}{12}$ hours;

And therefore $\frac{27 \times 140}{12 \times 45}$ is the number of hours in the days, which are such that 45 contain $\frac{27 \times 140}{12}$ hours,

And $\frac{27 \times 140}{12 \times 45}$ hours = 7 hours, the answer.

EXAMPLE 4.—How long will 20 men take to build a wall 10 feet high, if 11 men require 17 days to build one of the same length, but only $7\frac{1}{2}$ feet high?

This we will work by the rule.

Here the amount of wall built increases if the number of men is increased, and if the time they work is increased.

If x be the time required, we have therefore—

$$\frac{10}{7\frac{1}{2}} = \frac{x}{17} \times \frac{20}{11}$$

$$\text{Therefore } x = \frac{10 \times 2}{15} \times \frac{11 \times 17}{20} = \frac{187}{15} = 12\tfrac{7}{15} \text{ days.}$$

EXERCISE 52.—EXAMPLES IN DOUBLE RULE OF THREE.

1. If 12 horses can plough 11 acres in 5 days, how many horses can plough 33 acres in 10 days?
2. If 40 gallons of water last 20 persons 5 days, how many gallons will 9 persons drink in a year?
3. If 16 labourers earn £15 12s. in 18 days, how many labourers will earn £35 2s. in 24 days?
4. If 24 men can saw 90 loads of wood in 6 days of 9 hours each, how many loads can 8 men saw in 36 days of 12 hours each?
5. If 6 men can make 120 pairs of boots in 20 days of 8 hours each, how many days will it take 12 men to make 360 pairs, working 10 hours a day?
6. If 12 men can build a wall 30 feet long, 6 feet high, and 4 feet thick in 18 days, how long will it take 36 men to build a wall 360 feet long, 8 feet high, and 6 feet thick?
7. If £250 gain £30 in 2 years, how much will £750 gain in 5 years?
8. What will £500 gain in 4 years, if £600 gain £42 in 1 year?
9. If 8 persons spend £200 in 9 months, how much will 18 persons spend in 12 months?
10. If 15 men working 12 hours a day can hoe 60 acres in 20 days, how long will it take 30 boys working 10 hours a day to hoe 96 acres, 3 men being equivalent to 5 boys?
11. If the 8d. loaf weighs 48 oz. when wheat is 54s. a quarter, what is the price of wheat when the 6d. loaf weighs 32 oz. 8 dwt.?
12. If 35 barrels of water last 950 men 7 months, how many men would 1464 barrels last for 1 month?
13. If 13908 men consume 732 barrels of flour in 2 months, in how long will 425 men consume 175 barrels?
14. If 3 men with 4 boys earn £5 16s. in 8 days, and 2 men with 3 boys earn £4 in the same time, in what time will 6 men and 7 boys earn 20 guineas?
15. If 5 men with 7 women earn £7 13s. in 6 days, and 2 men with 3 women earn £3 3s. in the same time, in what time will 6 men with 12 women earn £60?
16. If the penny loaf weigh 6 oz. when wheat is 5s. a bushel, what should be the weight of the shilling loaf when wheat is 7s. 6d. a bushel?
17. If 20 men can perform a piece of work in 12 days, how many men will perform a piece of work half as large again in a fifth part of the time, if they work the same number of hours a day, supposing that 2 of the second set can do as much work in an hour as 3 of the first?
18. If a man, his wife, and child drink a barrel of beer in 14 days, how long would it take 3 couples, each with 3 children, to drink 2 barrels, a man drinking twice as much as a woman, and a woman twice as much as a child?

KEY TO EXERCISE 51, LESSON XXXII. (Vol. II., page 295).

1. £225 15s.
2. £56 16s. $8\frac{300}{641}$d.
3. 2156 lbs.
4. £811 15s. 6d.
5. 7066 dols. 40 cents.
6. £45.
7. £16480.
8. 15s. 9d.
9. $21\frac{1}{12}$ days.
10. 4 men.
11. 4s. $11\frac{111}{500}$d.
12. 15 oz.
13. 7000 grains.
14. 144.
15. £32 14s. $3\frac{1}{16}$d.
16. 66.
17. £3229 15s. $6\frac{42}{223}$d.
18. $46\frac{15}{20}$ sovereigns.
19. £92 5s. $8\frac{4}{9}$d.
20. 7d. in the pound.
21. $4\frac{1}{5}$ days.

GREAT BOOKS.

IX.—THE SPECTATOR.

ENGLISH literature, up to the time of Queen Anne, was confined to large and expensive works, if we except the pamphlets and fly-sheets which were designed to answer merely special and temporary purposes. In April, 1709, however, Richard Steele produced his periodical paper, the *Tatler*, which continued in the form of numbers, issued three times a week, until the beginning of 1711. The essays thus given to the public, and which in their combined form rank among the classics of our tongue, contained a lively picture of existing manners, together with a pleasant vein of moralising. So much success attended them that the chief writers determined on a more ambitious venture. Accordingly, the *Tatler* was followed by the still more celebrated *Spectator*, the first number of which appeared on the 1st of March, 1711. Instead of being issued only three times a week, it came forth daily, and the plan was at once more elaborate and more select. The short paragraphs of news which accompanied the earlier of the *Tatler* essays, and which reach us at the present day like broken echoes from the fields where Marlborough fought, or from the courtly circles where statesmen intrigued, were entirely omitted, as, indeed, they had ultimately been in the first periodical; a larger amount of serious criticism was imported into the work; and the fiction of a club was introduced, which gave a certain unity to the whole production. From the *Tatler* and the *Spectator* we may date the commencement of English periodical literature.

Both these papers were under the conduct of Steele, and it was the pen of that gay and airy writer which furnished the greater number of the essays to the *Tatler*. He had the assistance, however, of Addison, whose contributions to the *Spectator* were so numerous and important that the work is always associated with his name, rather than with that of Steele. Nevertheless, the fiction of a club, whose proceedings and lucubrations form the staple of the series, seems to have been the invention of the latter. Although the existence of the club is noticed in No. 1, which is by Addison, it is not until No. 2, written by Steele, that we have a detailed account of its members. It is then that we are introduced to Sir Roger de Coverley, Sir Andrew Freeport, Will Honeycomb, Captain Sentry, and the others. Still, the principal of these characters —Sir Roger de Coverley—was almost entirely worked out by Addison, and the honour must rest with him. That honour is no mean one. Few better-known or more charming figures exist in the gallery of fictitious portraiture. Sir Roger is a delightful specimen of the old English country gentleman; simple-natured, kindly, pious, and patriotic; a little prejudiced, it must be owned; not very profound or accomplished; but with plenty of good sense and good feeling, exquisitely flavoured with a dash of whimsicality. The other members of the club are also well drawn; but the chief figure, undoubtedly, is the old Worcestershire baronet.

The history of the *Spectator* is somewhat curious. Each number originally appeared as a single leaf of about the same size as its modern namesake, divided into two columns on each page, and issued at a penny. A portion of the space was given up to advertisements, and the literary matter consisted entirely of a single essay. The paper at once became a great success, and in the tenth number it is stated, on the authority of the publisher, that the sale was 3,000 a day—a large total for those times, when readers were far less numerous than they are now. Addison's friend Tickell has recorded that the sale sometimes reached 20,000; but it is difficult to believe this, when we recollect that, in the reign of Queen Anne, hand-printing was the only method of taking impressions that existed, and that the slowness of the process was necessarily opposed to a very large circulation, unless when spread over a great length of time, which would hardly apply to the numbers of a periodical. Whatever the sale may have been, however, it was considerably decreased by the Government imposition of a stamp-duty on papers printed on a half-sheet, which first took effect on the 1st of August, 1712, and was the beginning of the tax on newspapers, which continued until the year 1855. The original stamp-duty was only a halfpenny; but the conductors of the *Spectator* raised the price of each number to twopence, in the hope of making up the loss which they feared would result from adding even a halfpenny to the price. As it was, the sale dropped to less than half, and, although there was afterwards some little recovery, the paper languished on the whole from that time forth, so that it can hardly be doubted that the *Spectator* was eventually killed by a very objectionable tax. Symptoms of dissolution became apparent some time before the actual end was reached. In the autumn of 1712 the several characters began to be dismissed—some by death (as Sir Roger de Coverley himself), and others by various methods of accounting for their secession from the club which was supposed to be the source whence the paper issued. No. 555, dated December 6th, 1712, brought the first series of the *Spectator* to a close with an address from Steele in his own proper person. These 555 numbers form the first seven volumes of the collected edition. The eighth volume consists of certain additional numbers (issued only three times a week) which appeared in 1714, from the 18th of June to December 20th. With No. 635 the work came to a final stop.

In its own day the *Spectator* was read in every coffee-house, in every fashionable circle, in the haunts of wit and gallantry, and in many private families. It was the oracle of taste, the censor of manners, the preacher of a sedate yet cheerful morality. One of its objects was to discourage frivolity, licentiousness, and irreligion, while regulating the habits of the town in such light matters as dress, social conversation, and amusements. Addison alone was thoroughly qualified for either of these offices. You may find him one day bantering some folly with all the gaiety of a wit in a comedy, and the next delivering himself of a sermon which might have been owned by his father, the rector. We at the present day are sometimes a little surprised at the frankness and freedom with which the town life of those times is described and discussed in a periodical which was supposed to be everybody's reading. But the motive was always good, and the *Spectator* was really a reforming influence in a London which still retained not a little of the profligacy encouraged by the wits of Charles II.'s reign. The paper likewise did much towards fixing a more graceful and cultivated style than had before prevailed; and it created a model for a class of literary journals which, like itself, have contributed to the intellectual riches of the English tongue.

LESSONS IN DRAWING.—XXI.

THERE are a few more observations to make upon the proportions of the entire figure, before we introduce those relating to the face and head. We consider this to be necessary, because, when practically employed in drawing the figure, we must determine upon its action and proportions before the details are entered upon. Then the head and face claim our first attention. Some artists design their groups in the nude, and clothe them afterwards, by which means they obtain a more life-like representation than when they proceed by drawing drapery only in conjunction with the extremities—the head, hands, and feet. By this process not only are the proportions better maintained, but the contour of the body and limbs is established also; and, especially when the costumes fit closely, we know of no course of practice more favourable than this for giving expression and character to the whole design.

The unit of proportion employed to regulate the height of the figure is the head, and various have been the opinions and practice of artists as to the number of lengths of the head to

be used. Some have drawn their figures as low as seven heads, others as high as eight and a-half and nine, and occasionally, even more; the heroic cannot be less than eight. But certainly, whichever of these units of measurement we may choose, if the one employed represents the head large in proportion to the body, it is not a distinctive mark of beauty; this defect may be noticed amongst Laplanders, Tartars, and some other nations. Consequently, if we desire to give dignity and beauty to the figure, we must endeavour to avoid littleness of style, which unavoidably belongs to lowness of stature, unless, of course, the character of the subject demands it. The Apollo Belvedere, a celebrated ancient Greek statue, is eight heads and a half high. Rubens, a painter who flourished in the reign of Charles I., occasionally drew his figures eight heads high; but there is generally an appearance of heaviness in most of his figures, which may be partly attributed to their being only seven heads high. Michael Angelo, the Florentine painter and sculptor, who was born in 1474, did not restrict himself to any fixed proportion, but would employ that which he deemed the best for his purpose. Eight heads might have been his lowest standard, but Professor Camper says, "C. Vander Mander has proved that in some of the figures of Michael Angelo, the size is equal to nine, ten, nay twelve heads, in order to communicate more grace to a stooping attitude." It is generally allowed that eight heads is the better proportion for a figure than one of a less number. Men above six feet high, for the most part, reach that standard, some a little more. The reason of lowness of stature in men is, in most cases, attributable to the shortness of their legs; and this leads us to another proportion proper to be observed, namely, that the distance from the top of the head to the *pubis* should be equal to that from the *pubis* to the feet; the face to be one-tenth, and the foot one-sixth of the figure. Therefore, adopting the above standards of proportion, the heights of the figures we draw are determined by the number of the repeated measurements of the head; two figures may be drawn, each on a separate piece of paper, and although the one may not occupy a larger space than the other, yet it is according to the size of the head that we decide which is the tall man, and which the short.

The next consideration connected with this part of our subject relates to the head and face alone, and the proportions of their parts relative to each other; a knowledge of these is as important as those of the body, but there is a difference in the use and application which must not be overlooked. No part of the whole frame is subject to such a variety of change and expression as the face. We look into it for a reflex of the mind; it is stronger than the arm in its power of repelling or attracting those who seek to approach us; and the whole state of the mind, whether as friend or foe, is revealed in the countenance. In short, so keen are our detective powers when reading the signs depicted in the human face, that dissimulation must be a practised art before it can be thoroughly successful. The smile of some men is repulsive because it is not genuine, and we see that it is not; there is a raising of the upper lip and exposure of the teeth along with it, which betrays envy or malice. The kind-hearted man can frown only with his brows, and in spite of himself the generous feelings of his heart will linger about the corners of the mouth, slightly raised by the swelling muscles of the cheeks. Thus, in either case, the character of the individual, which is one of the most difficult things to conceal, will show itself; the most trifling accidental circumstance will serve to reveal it, and he will be esteemed or disliked accordingly. When we reflect that the same features are capable of expressing opposite passions, such as joy and sorrow, love and hatred, compassion and revenge, we have to make the established rules of proportion subservient to the end sought for. There are occasions when these received regulations must be set aside, when some particular passion or emotion is to be expressed. According to the scale of departure from true proportion, in like manner does the ratio of deformity increase. Deformity in the countenance ought only to be employed to express deformity of mind; and therefore, in order to be able to represent the bad passions, the rules of proportion must be learnt, that we may know when and how to break them.

Fig. 128.



When animal expression is associated with the human face, it degenerates into caricature, and although there are brutal passions found amongst men, and they are deeply imprinted on their countenances, yet those countenances must be humanised; for, notwithstanding the similarity of character which exists between the most degraded of mankind and the brute creation, we cannot go so far as to transgress the laws which regulate the human face as a whole, so entirely as to divest it of the higher nature belonging to man, and substitute that of the animal. We select an example from Lavater's "Essays on Physiognomy" to illustrate our observations, "The head of Judas, after Holbein" (Fig. 128). It is the personification of selfishness, deceit, and hypocrisy, combined with other latent and bad qualities that nurture them and contribute to their development. It

was *necessary to employ these features* to represent the *man*, for, however revolting they may be, the painter is justified in the extremity of the means by the intensity of the character to be portrayed. Lavater says of it: "Who can persuade himself that an apostle of Jesus Christ ever had an aspect like this, or that the Saviour could have called such a countenance to the apostleship? And whose feelings will be offended when we pronounce a visage like this base and wicked? Who could place confidence in such a man?" Mr. Charles Bell, in his "Essays on the Anatomy of Expression in Painting," says:—"To brutify a human countenance, we have only to diminish the forehead, bring the eyes nearer, lengthen the jaws, shorten the nose, and depress the mouth. If this be done, no expression of individual features will give elevation to the character. A breadth and squareness in the lower part of the face is quite consistent in a vulgar head with a certain representation of strength and manliness; but if the eyes be diminished and the space between them contracted, the expanse of the human countenance is lost, and there can remain no dignity of expression." We have gone thus far into our subject to show that when the proportions of the figure and face are properly understood and practised, the draughtsman must not rest there; he has only acquired the means of proceeding; afterwards, we repeat, he has to employ them for purposes of a higher kind than those which belong to mere imitation: these refer to the mind, and how he can best express its intentions, knowing the influence it has in controlling the actions of the body. If we examine the practice of the ancient Greeks, we shall find that their proportions were generally arbitrary. They considered the oval to be the most perfect form of the human head; this proportion may be adopted in some cases where the *ideal* is intended, but it is not the rule in nature; such a standard would make the crown of the head too high, and they, in order to relieve this, reduced the length from the front to the back. We will give these proportions, although to employ them invariably would produce a mannerism that would be extremely objectionable, and in portrait painting they would be altogether useless. (See Fig. 129.) Draw a perpendicular line, A B, of the required length of the whole head, and divide it into four equal parts. The first of the several divisions will be seen at the root of the hair; the second at the bridge of the nose; the third at the base of the nose; and the last ending with the chin: thus making the whole head four noses in length. The width of the head is equal to three-fourths of the length. Bisect the second division in E, and with the distance E A describe the circle A D F C, and draw C D through E at right angles to A B. On the third division, with F as centre and F B as radius, describe another circle; then, by drawing the curve upon which the ears are placed between 2 and 3, the oval will be made. Divide the line C D into five equal parts; the eyes will be placed under the second and the fourth divisions. Divide the lowest division from 3 to 4 into two equal parts; the line G will mark the position of the under lip. The distance from line G to the division of the mouth is one-third of the line from 3 to G; the width of the upper lip somewhat smaller; the ears equal to the length of the nose (between the divisions 2 and 3). These proportions may, no doubt, assist us in drawing the head; where nature deviates, we must make the necessary alteration, otherwise we shall fail in representing individual character. The most remarkable point of difference in the shape of the head amongst nations especially, and frequently between individuals of the same nation, is in the *facial angle* (the inclination of the face from the base-line of the skull, rejecting the lower jaw). In the profile of the negro (Fig. 130) we find this angle, A B C, much more acute than that of the European (Fig. 131). In the former it is about 50°, and in the latter about 70°. We give but these two examples as representing the extremes of the human family, between which the various degrees of intellectual capacity exist. We have already remarked that where this angle becomes still more acute, we leave the human and take up the brute creation; on the other hand, where the angle increases, then we approach the ideal conceived and practised by the ancients (Fig. 132). It is very evident that they avoided everything that was deemed characteristic of the brute when they represented their gods or heroes; thus, by enlarging the mean angle common amongst men, they felt that they had increased those distinguishing attributes which marked the difference between the intellectual and the brutal; and then again, when the subject was a satyr or a faun, the sensual was indicated by a decreased angle. No one will question the truth of these principles, since they are founded upon nature.

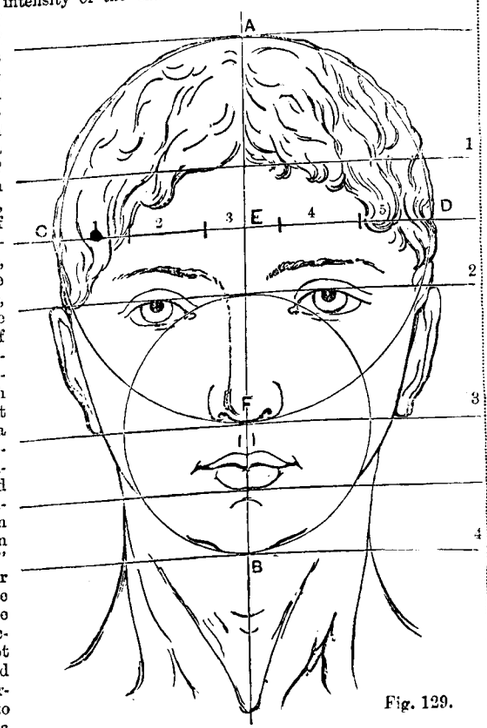


Fig. 129.

Fig. 130.

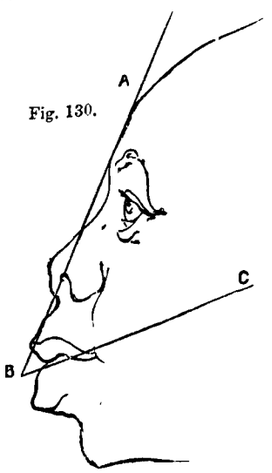


Fig. 131.

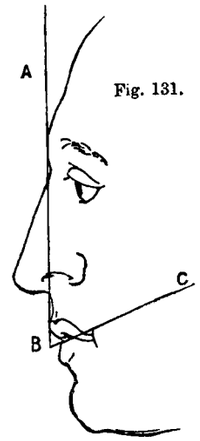
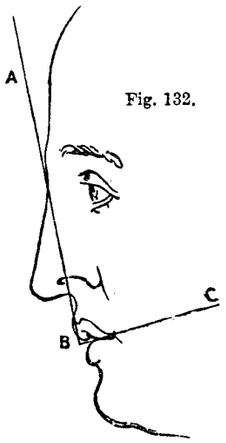


Fig. 132.



LESSONS IN FRENCH.—XXXVIII.

SECTION LXXXIII.—GOVERNMENT OF VERBS.

1. In French, as in other languages, when a verb has two subjects in the singular, it is put in the plural [§ 110 (2)]:—

L'oncle et la tante sont arrivés. *The uncle and aunt are arrived.*

2. When a verb has two or more subjects of different persons, it is put in the first person plural if one of the subjects is of the first person; and in the second person plural if there is no subject of the first. In this case all the subjects may be summed up into one, viz., **nous** or **vous**, which sometimes is only understood:—

Vous et moi irons demain à la chasse.	*You and I will go hunting to-morrow.*
Vous et lui irez demain a l'école.	*You and he will go to school to-morrow.*
Sa mère et moi nous avons écrit cette lettre.	*His mother and I have written that letter.*
Toi, elle et ton frère, vous ne faites que bavarder.	*Thou, she, and thy brother do nothing but talk.*

3. The above examples will show that, when a verb has several subjects, all of them pronouns, or partly pronouns and partly nouns, the words **moi, toi, lui, eux**, are used instead of **je, tu, il, ils.**

4. For further rules on this subject, see § 110 and 111, and also the next section.

5. **Gêner** corresponds in signification to the English *to trouble, to incommode, to disturb, to be in the way, to hurt*, and *to pinch* (*in speaking of shoes and garments*). **Se gêner** means *to constrain*, or *trouble one's self*:—

Est-ce que je vous gêne? *Am I in your way?*

Miscellaneous Examples.

Où irez-vous, ton frère et toi?	*Where will your brother and you go?*
Lui et moi irons en Angleterre.	*He and I will go to England.*
Vous, elle et lui, vous achèterez du blé.	*You, she, and he will buy wheat.*
Eux et moi, nous nous sommes fait mal à la tête.	*They and I have hurt our heads.*
Vous et lui, vous devriez vous prêter aux circonstances.	*You and he should adapt yourselves to circumstances.*
Lui et moi vous gênerons sans doute.	*He and I shall without doubt incommode you.*
Ma cousine et moi, nous craignons de vous gêner.	*My cousin and I fear to be in your way.*
Je ne me gêne jamais chez mes amis.	*I am never under constraint with my friends.*
Ne vous gênez pas; mettez-vous à votre aise.	*Be under no constraint; place yourself comfortably.*
Nous n'aimons pas à gêner les autres.	*We do not like to incommode others.*
Nous n'aimons pas à nous gêner.	*We do not like to incommode ourselves.*

Exercise 161.

À perte, *at a loss.*	Nullement, *by no means.*	Prodigue, *prodigal, lavish.*
À profit, *with a profit.*	Pardon, *excuse me.*	Société, f. *company, society.*
Bras, m. *arm.*	Persist-er, 1. *to persist.*	Tous deux, *both.*
Dérang-er, 1. *to disturb.*	Place, f. *room.*	
Économe, *economical.*		

1. Si nous restions plus longtemps ici, nous craindrions de vous gêner. 2. Vous ne nous gênez nullement; votre société nous est très agréable. 3. N'avez-vous pas été trop prodigues, vous et votre frère? 4. Lui et moi au contraire, nous avons été très économes. 5. N'avez-vous pas tort de gêner ce monsieur? 6. Nous n'avons nullement envie de le gêner. 7. Est-ce que mon bras vous gêne, Monsieur? 8. Non, Monsieur; nous avons assez de place, vous ne me gênez pas. 9. Ne devriez-vous pas vous prêter aux circonstances? 10. Nous faisons, elle et moi, notre possible pour nous y prêter. 11. Ce jeune homme persiste-t-il dans sa résolution? 12. Nous y persistons, lui et moi. 13. Persistez-vous tous deux à rester ici? 14. Nous y persistons tous deux. 15. Cet homme est-il gêné dans ses affaires (*uncomfortably situated, badly off*)? 16. Il était gêné dans ses affaires il y a un an. 17. Ne vous gênez pas, Monsieur. 18. Je ne me gêne jamais, Monsieur. 19. Est-ce que mon frère vous dérange? 20. Non, Monsieur, il ne me dérange pas. 21. Je ne voudrais pas vous déranger. 22. Pardon, si je vous dérange. 23. Vous et votre associé avez vendu vos marchandises à perte. 24. Toi et moi, nous vendons toujours à profit. 25. Votre père, votre frère et moi, nous avons acheté des marchandises.

Exercise 162.

1. Do my brother and I incommode you? 2. No, Sir; you do not incommode us; we are very glad to see you. 3. Are you not afraid to disturb your friend? 4. We are afraid to disturb him; he has much to do. 5. Is my foot in your way, Sir? 6. No, Sir; your foot is not in my way. 7. Will you and your brother go to Germany this year? 8. He and I intend to go there. 9. He, you, and I should write our lessons. 10. Should not you and your friends adapt yourselves to circumstances? 11. We should do so, if it were possible. 12. Do I not disturb you, Sir? 13. You do not disturb me by any means. 14. Does not my little boy disturb you? 15. He does not disturb me. 16. He disturbs nobody. 17. Does not your partner sell his goods at a loss? 18. He never sells at a loss. 19. He and I always sell at a profit. 20. Do you persist in your resolution? 21. Your friend and I persist in our resolution. 22. I never feel under constraint at your house. 23. Be under no constraint (make yourself at home). 24. Are you not wrong to incommode them? 25. I do not intend to incommode them. 26. We do not like to incommode ourselves (to put ourselves out of the way). 27. My little boy and I will, perhaps, be in your way. 28. No, Sir; we are very glad of your company. 29. Do I disturb you? 30. No, Sir; you do not disturb us. 31. Do I disturb your father? 32. No, Sir; you disturb no one. 33. Excuse me, Sir, if I disturb you. 34. Have you not been very lavish? 35. No, Sir; I assure you that your son and I have been very economical.

SECTION LXXXIV.

1. When a verb is preceded by several nouns not connected by **et**, it agrees with the last only, provided the nouns are nearly synonymous, or emphasis is laid on the last:—

Son amour, sa tendresse pour ses enfants est connue de tout le monde.	*His love, his tenderness for his children are known to everybody.*
Vos amis, vos parents, Dieu vous récompensera.	*Your friends, your relatives, God will reward you.*

2. When two or more nouns are connected by the conjunction **ou**, the verb agrees with the last only:—

Charles ou George écrira à votre ami.	*Charles or George will write to your friend.*

3. When a noun and a pronoun, or two or more pronouns (not being all in the third person), are joined by **ou**, the verb is put in the first or in the second person plural according to the rules given in No. 3, Sect. 83:—

Vous ou moi partirons demain.	*You or I will go to-morrow.*
Ta sœur ou toi irez à l'église.	*Your sister or you will go to church.*
Vous ou lui avez pu seuls commettre cettre action.	*You or he alone have probably committed this act.*

4. When two nouns are joined by **ni** repeated, or when **ni l'un ni l'autre** is used as subject of a verb, the verb is put in the plural, if the two nouns, or the two persons represented by **ni l'un ni l'autre**, perform or may perform the action together:—

Ni l'un ni l'autre ne liront.	*Neither the one nor the other will read.*

Even in this case the verb may be put in the singular:—

Ni l'une ni l'autre n'a fait son devoir. (Acad.)	*Neither of them has done her duty.*

5. When, however, only one can perform the action, the verb must be put in the singular:—

Ni l'un ni l'autre ne sera nommé préfet de ce département.	*Neither the one nor the other will be appointed prefect of this department.*

Miscellaneous Examples.

Ni l'un ni l'autre n'ont trouvé le vin bon.	*Neither the one nor the other found the wine good.*
L'un et l'autre ont trouvé le dîner mauvais.	*Both found the dinner bad.*
Comment se trouvent Messieurs vos frères?	*How do your brothers do?*
Ni l'un ni l'autre ne se trouvent bien.	*Neither is well.*

L'un et l'autre se trouvèrent au rendez-vous.	*They both went to the place of meeting.*
Ni l'un ni l'autre ne sera élu président.	*Neither will be elected president.*
L'un ou l'autre y trouvera à redire.	*One or the other will find fault with it.*
Lui ou vous avez trouvé quelque chose à redire à notre conduite.	*He or you have found something to blame in our conduct.*
Ni lui ni moi n'avons trouvé à redire à la conduite de vos enfants.	*Neither he nor I have found any fault with your children's conduct.*

Exercise 163.

Auteur, m. *author.*	Plutôt, *rather.*	Trouv-er, 1. *to find, to like, to fancy.*
Devoir, m. *duty.*	Rempl-ir, 2. *to fulfil.*	Veill-er, 1. *to watch.*
Écriture, f. *writing.*	Rôti, m. *roast meat.*	Vie, f. *life.*
Éli-re, 4. ir. *to elect.*	Secrétaire, m. *secretary.*	
Expos-er, 1. *to expose.*	Se trouv-er, 1. ref. *to find one's self.*	
Intérêt, m. *interest.*		

1. Remplissez-vous bien votre devoir? 2. Nous ne le remplissons ni l'un ni l'autre. 3. Cherchent-ils l'un et l'autre à s'exposer? 4. Ni l'un ni l'autre ne cherchent à exposer leur vie (La Bruyère). 5. M. votre père et Mme votre mère, se trouvent-ils mieux aujourd'hui? 6. Ni l'un ni l'autre ne se trouvent mieux. 7. Avez-vous trouvé à redire à mon écriture ou à celle de mon secrétaire? 8. Je n'ai trouvé à redire ni à l'une ni à l'autre. 9. Cet auteur ne trouve-t-il pas à redire à tout? 10. Il trouve à redire à tous les livres. 11. Y trouvez-vous quelque chose à redire? 12. Ni lui ni moi n'y trouvons rien à redire. 13. Lui ou moi, nous veillerons à vos intérêts. 14. Ni lui ni moi ne cesserons de veiller à la conduite de votre fils. 15. Nous y veillerons plutôt que d'y trouver à redire. 16. Lui et moi nous nous trouvâmes ensemble au rendez-vous. 17. Vous y trouverez-vous l'un ou l'autre? 18. Nous nous y trouverons l'un ou l'autre. 19. L'un ou l'autre sera-t-il élu président? 20. Ni l'un ni l'autre ne sera élu. 21. Comment trouvez-vous ce rôti? 22. Je le trouve excellent. 23. Je trouve ce livre bon. 24. Je ne le trouve pas bon. 25. Je trouve cela bien fait.

Exercise 164.

1. How do you like that book? 2. Neither my sister nor I like it. 3. Did your brothers find the dinner good? 4. Both found it very good. 5. Did the professor find fault with your conduct? 6. He did not find fault with it. 7. Neither he nor my father find fault with my conduct. 8. Do they both watch over your conduct? 9. They both watch over my conduct and over my interests. 10. Have you both fulfilled your duty? 11. We have fulfilled it. 12. Have you not both criticised my writing? 13. Neither has criticised it. 14. Do not your two sisters do better to-day? 15. One is doing better. 16. The other is not so well. 17. Do not those ladies find fault with everything? 18. They find fault with nothing. 19. Will either be elected prefect of the department? 20. Neither will be elected. 21. How do you like this bread? 22. I find it very good. 23. Did your two friends arrive in time at the appointed place? 24. Neither was there in (*à*) time. 25. Do you find fault with that (*cela*)? 26. I do not find fault with it (*y*). 27. Will you both expose yourselves to this danger? 28. We will not expose ourselves to it. 29. Do you find fault with my secretary's conduct? 30. I do not find fault with it. 31. Do you find fault with his writing? 32. I find fault with it; for it is very bad. 33. Will you not watch over my interests? 34. My brother and I will watch over them. 35. We will not cease to watch over your interests.

SECTION LXXXV.

1. A verb, having, as its subject, a general collective noun [§ 111 (§ 3 (6)] preceded by the article, agrees with the noun [§ 111 (1)]:—

La foule des pauvres est grande. *The crowd of the poor is great.*

2. A verb preceded by a partitive collective [§ 3 (6)] takes the number of the noun following the collective, unless attention be particularly directed to the collective itself [§ 111 (2)]:—

Une foule de pauvres reçoivent des secours.	*A crowd of poor people receive assistance.*

3. With the words, **la plupart**, *most*; **un nombre**, *a number*; &c., and the adverbs of quantity, **peu, assez, beaucoup, plus, moins, trop, tant, combien**, the rule (2) given above holds good.

4. **Rester** is often used impersonally in the sense of *to have left*. The adverbial expression **de reste** is often used in the same manner as the English word *left*:—

Il me reste deux francs.	*I have two francs left*—or, literally, *There remains to me two francs.*
Nous avons cent cinquante francs de reste.	*We have one hundred and fifty francs left.*

5. **Devenir** (2. ir.), *to become*, with **être** as an auxiliary, corresponds in signification to the English *to become, to turn*:—

Qu'est deveuu votre frère?	*What has become of your brother?*
Il est en France, et est devenu avocat.	*He is in France, and has turned lawyer.*

Miscellaneous Examples.

La plupart de mes heures sont consacrées au travail.	*Most of my hours are devoted to labour.*
La foule des humains est vouée au malheur.	*The mass of mankind is devoted to misfortune.*
La plus grande partie des voyageurs le disent, et le répètent.	*The greatest number of travellers say it, and repeat it.*
Ne vous reste-t-il que cela?	*Have you only that left?*
Voilà tout ce qu'il me reste.	*That is all that I have left.*
Je ne sais ce qu'ils sont devenus.	*I do not know what has become of them.*
Je ne sais ce que vous deviendrez.	*I do not know what will become of you.*

Exercise 165.

Apprenti, m. *apprentice.*	Désol-er, 1. *to desolate.*	Maigre, *thin, lean.*
Aveugle, *blind.*	Égar-er, 1. *to mislay.*	Naissance, f. *birth.*
Bagatelle, f. *trifle.*	Emplettes, f. p. *purchases.*	Rue, f. *street.*
Boiteux, se, *lame.*	État, m. *trade.*	S'appliqu-er, 1. ref. *to apply one's self.*
Chemin, m. *way, road.*	Habile, *skilful.*	Savant, e, *learned.*

1. La plupart de vos parents ne sont-ils pas venus vous voir? 2. Beaucoup sont venus. 3. Que sont devenus les autres? 4. Je ne saurais vous dire ce qu'ils sont devenus. 5. Que deviendra ce jeune homme s'il ne s'applique pas à l'étude? 6. Je ne sais pas ce qu'il deviendra. 7. Je sais qu'il ne deviendra jamais savant. 8. Combien de tableaux avez-vous de reste? 9. Il ne me reste qu'un franc. 10. Combien vous restera-t-il quand vos aurez fait vos emplettes? 11. Il ne me restera qu'une bagatelle. 12. Cet apprenti est-il devenu habile dans son état? 13. Il y est devenu habile. 14. Ce monsieur est-il aveugle de naissance, ou l'est-il devenu? 15. Il l'est devenu. 16. Savez-vous ce que sont devenus ces jeunes gens? 17. Ils sont devenus médecins. 18. Ne savez-vous pas ce que sont devenus mes livres? 19. Ils sont égarés. 20. Ne deviendrez-vous pas boiteux si vous marchez tant? 21. Je deviendrai boiteux et maigre. 22. La foule ne s'est-elle pas égarée dans ce bois? 23. La foule s'y est égarée, et n'a pu retrouver son chemin. 24. Une nuée de barbares désolèrent le pays. (Acad.) 25. Une foule de citoyens ruinés remplissaient les rues de Stockholm. (Voltaire.)

Exercise 166.

1. Have not most of your friends become rich? 2. Most of them have become poor. 3. Has not that young lady become learned? 4. I think that she will never become learned. 5. Is not the American army (*armée*) very small? 6. The American army is small, but most of the American soldiers are very brave (*braves*). 7. Can you tell me what has become of that gentleman? 8. I cannot tell you what has become of him. 9. Is your brother blind by birth (was your brother born blind)? 10. No, Sir, he has become so. 11. Were you born lame? 12. No, Sir, I became so three years ago (*il y a*). 13. Are not most of your hours devoted to play (*jeu*, m.)? 14. No, Sir, they are devoted to study. 15. How much of your money have you left? 16. I have only twenty-five francs left. 17. Do you know how much I have left? 18. You have only a trifle left. 19. How much shall you have left to-morrow? 20. I shall only have six francs left. 21. I shall only have two francs left when I have made my purchase. 22. What has become of your grammar? 23. I have mislaid it. 24. Do you know what has become of my hat? 25. You have left (*laissé*) it upon the table. 26. Will not that gentleman become blind? 27. He will not become blind, but lame. 28. Has your son

become skilful in his trade? 29. He has not become skilful in it. 30. What has become of him? 31. He has lost his way in the wood. 32. Did the crowd lose its way? 33. Most of the soldiers lost their way. 34. A cloud (*nuée*, f.) of locusts (*sauterelles*) desolated our country.

SECTION LXXXVI.—IDIOMS RELATING TO THE ARTICLE, ETC.

1. The article, the demonstrative and the possessive adjectives, must be repeated, as before said, before every noun or adjective used substantively, which they determine [§ 79, 90, 22].

2. The prepositions **à**, **de**, and **en** are repeated before every word which they govern [§ 137].

3. The verb **quitter**, *to leave (to quit)*, is said of persons and places, and also of things in the sense of *to abandon, to give up*:—

Vous avez quitté vos parents et vos amis.	*You have left your relations and friends.*
Nous avons quitté nos études.	*We have discontinued our studies.*

4. **Laisser**, *to leave, to let*, is generally said of persons and things:—

Vous avez laissé votre livre sur la table.	*You left your book upon the table.*

MISCELLANEOUS EXAMPLES.

N'avez-vous pas quitté votre maison?	*Have you not left your house?*
J'ai quitté mon pays et mes parents.	*I have left my country and relations.*
J'ai laissé ma bibliothèque en Europe.	*I left my library in Europe.*
Ne voulez-vous pas laisser votre fils ici?	*Will you not leave your son here?*
Je n'aime pas à le quitter.	*I do not like to quit him.*
J'ai laissé votre lettre à son domestique.	*I left your letter with his servant.*
Mon père m'a laissé cinquante mille francs.	*My father left me fifty thousand francs.*
Le avez-vous laissés tranquilles?	*Have you let them alone?*
Je leur ai laissé le champ libre.	*I have left them a free choice (free room).*
Ce malade a quitté le lit.	*That sick man has left his bed.*
Votre frère a quitté l barreau.	*Your brother has left the bar.*
Je vous laisserai ce chapeau à ce prix.	*I will let you have that hat at that price.*

EXERCISE 167.

À bon compte, *cheap.*	Mauvais, e, *bad.*	Portier, m. *porter.*
Carte, f. *card.*	Moins, *less.*	Pourquoi, *why.*
Épée, f. *sword; army* (figuratively).	Noyau, m. *fruit-stone.*	Prix, m. *price.*
Habitude, f. *habit.*	Pavie, m. *cling-stone.*	Robe, f. *gown.*
Jude, m. *judge.*	Pension, f. *boarding-school.*	Service, m. *service, army.*

1. Vos oncles, vos cousins, et vos neveux ont-ils quitté le commerce? 2. Ils ont quitté le commerce, et sont devenus médecins. 3. Le capitaine G. n'a-t-il pas quitté le service? 4. Il a quitté la France, mais il n'a pas quitté le service. 5. Où avez-vous laissé votre fils? 6. Je l'ai laissé dans une pension. 7. Est-il trop jeune pour quitter ses études? 8. Il est trop jeune; il n'a que douze ans. 9. A qui avez-vous laissé votre carte de visite? 10. Je l'ai laissée chez le portier. 11. Pourquoi ne le laissiez-vous pas parler? 12. Parce qu'il est temps que nous vous quittions. 13. Me permettez-vous de lui communiquer cela? 14. Je vous laisse le champ libre à cet égard. 15. Ce jeune homme n'a-t-il pas quitté ses mauvaises habitudes? 16. Il les a quittées. 17. M. L. n'a-t-il pas quitté la robe pour l'epée? 18. Oui, Monsieur; il n'est plus juge; il est capitaine. 19. Ces pêches quittent-elles facilement le noyau? 20. Non, Monsieur; ce sont des pavies. 21. Je vous laisse cet habit pour cinquante francs. 22. À quelle priz me le laisserez-vous? 23. Je vous le laisserai pour dix francs. 24. Je vous le laisse à bon compte; je ne saurais vous le laisser à moins.

EXERCISE 168.

1. The son, daughter, and cousin have left Paris. 2. My father, mother, and sister have left me here. 3. Do you like to leave your country? 4. I do not like to leave my friends and country. 5. My parents do not like to leave me here; I am too young. 6. Why does not your brother let his son speak [Sect. 97, 4]? 7. Because he has nothing to say. 8. Have you let him alone? 9. I have let him alone. 10. Why do you not let me alone? 11. I will let them alone. 12. Has your friend left his bed? 13. He has not yet left his bed; he is yet very ill. 14. Has Captain G. left the army? 15. He has not left the army. 16. Has not that gentleman left the army for the bar? 17. He has left the army for the bar. 18. My friend has left the bar. 19. At what price will you let me have this silk? 20. I will let you have it at two francs a yard. 21. Can you not let me have it for less? 22. I let you have it cheap. 23. Will you let me have that book for twenty francs? 24. I will let you have it for twenty-two. 25. I could not let you have it for less. 26. With whom (*à qui*) have you left my book? 27. I left it with your sister. 28. Why did you not leave it with my servant? 29. Because he had left your house. 30. Do you like to leave your friends? 31. I do not like to leave them. 32. Where have you left your book? 33. I left it at my father's. 34. Has that merchant given up commerce? 35. He has not given it up. 36. Those peaches do not part easily from the stone; they are cling-stones.

KEY TO EXERCISES IN LESSONS IN FRENCH.

EXERCISE 54 (Vol. I., page 214).

1. Votre sœur aime-t-elle les fleurs? 2. Ma sœur aime les fleurs et mon frère aime les livres. 3. A-t-il tort d'aimer les livres? 4. Non, Monsieur, il a raison d'aimer les livres et les fleurs. 5. Avez-vous beaucoup de fleurs dans votre jardin? 6. Nous y avons beaucoup de fleurs et beaucoup de fruits. 7. M. votre cousin aime-t-il les framboises? 8. Mon cousin aime les framboises et les fraises. 9. M. le capitaine aime-t-il les louanges? 10. Il n'aime pas les louanges. 11. Le jardinier vous a-t-il apporté des légumes? 12. Il m'a apporté des légumes et du fruit (*des fruits*). 13. A-t-il honte de vous apporter des légumes? 14. Il n'a ni honte ni peur de vendre des légumes. 15. Mme. votre mère est-elle fatiguée? 16. Ma mère n'est pas fatiguée. 17. M. votre frère est-il chez le colonel D.? 18. Il demeure chez M. le colonel D., mais il n'est pas à la maison à présent. 19. Combien de pêches avez-vous? 20. Je n'ai guère de pêches (*pas beaucoup de pêches*), mais j'ai beaucoup de prunes. 21. M. le capitaine B. aime-t-il les pêches? 22. Il aime les pêches, les prunes, les framboises et les fraises. 23. Allez-vous dans le bois de M. votre frère? 24. J'y vais tous les matins. 25. M. le général L. est-il ici? 26. Non, Monsieur, il n'est pas ici, il est chez votre cousin. 27. Votre ami, le général H., demeure-t-il loin d'ici? 28. Il ne demeure pas loin d'ici, il demeure chez son frère. 29. Avez-vous de belles fleurs dans votre jardin? 30. Nous avons de très belles fleurs, nous aimons les fleurs. 31. Les lui donnez-vous? 32. Je vous les donne. 33. Je vous en donne. 34. Je leur en donne. 35. Donnez-nous-en. 36. Ne nous en donnez pas.

EXERCISE 55 (Vol. I., page 215).

1. Do you know that gentleman? 2. Yes, Madam, I know him very well. 3. Do you know from what country he is? 4. He is a Hungarian. 5. Does he speak German? 6. He speaks German, Polish, Russian, Swedish, and Danish. 7. Is he not a physician? 8. No, Sir, before the revolution he was a captain. 9. Have you a wish to learn Russian? 10. I have a wish to learn Russian and modern Greek. 11. Do you know the gentlemen who are speaking to your sister? 12. I do not know them. 13. Do you know where they live? 14. They live at the house of your brother's upholsterer. 15. Have you not the history of Louis the Fourteenth in your library? 16. I have neither that of Louis the Fourteenth, nor that of Henry the Fourth. 17. Are you wrong to learn Chinese? 18. I am not wrong to learn Chinese. 19. Do your companions learn the ancient languages? 20. They know several ancient and modern languages. 21. Do you speak English? 22. I know English, and I speak it. 23. Do you know the Englishman whom we see? 24. I do not know him. 25. He does not know me, and I do not know him.

EXERCISE 56 (Vol. I., page 215).

1. Notre médecin sait-il le français? 2. Il sait le français, l'anglais et l'allemand. 3. Connait-il le médecin français? 4. Il le connait très bien. 5. Connaissez-vous cette dame? 6. Je ne la connais pas. 7. Est-elle allemande ou suédoise? 8. Elle n'est ni allemande ni suédoise,* elle est russe. 9. Avez-vous l'intention de lui parler? 10. J'ai l'intention de lui parler en anglais. 11. Sait-elle l'anglais? 12. Elle sait plusieurs langues; elle parle anglais, danois, suédois et hongrois. 13. Monsieur votre frère est-il colonel? 14. Non, Monsieur, il est capitaine. 15. Votre tapissier est-il danois? 16. Il n'est pas danois, il est suédois. 17. Êtes-vous français? 18. Non, Monsieur, je suis hongrois. 19. Savez-vous le chinois? 20. Je sais le chinois, le russe, et le grec moderne. 21. Avez-vous tort d'apprendre les langues? 22. Je n'ai pas tort d'apprendre les langues. 23. Connaissez-

* The words *allemande, suédoise*, etc., are adjectives.

vous l'Anglais qui demeure chez Monsieur votre frère? 24. Je le connais. 25. Je ne le connais pas. 26. Aimez-vous les livres? 27. J'aime les livres. 28. Avez-vous envie d'apprendre le russe? 29. Je n'ai pas envie d'apprendre le russe. 30. N'avez-vous pas le temps? 31. Je n'ai guère de temps. (*Je n'ai que peu de temps.*) 32. Qu'apprenez-vous? 33. Nous apprenons le latin, le grec, le français et l'allemand. 34. N'apprenez-vous pas l'espagnol? 35. Nous ne l'apprenons pas.

EXERCISE 57 (Vol. I., page 235).

1. Whom do you know? 2. We know the Dutchman of whom you speak to us. 3. What lessons are you learning? 4. We are learning the lessons which you recommend to us. 5. Is what he tells you true? 6. What you tell us is true. 7. Of whom do you speak to us? 8. We speak to you of the Scotchmen who are just arrived. 9. Do you know who is just arrived? 10. I know that the gentleman with whom your brother is acquainted is just arrived. 11. What are your sisters doing? 12. They do almost nothing, they have almost nothing to do. 13. What do you put into your trunk? 14. We (*into it*) put what we have, our clothes and our linen. 15. Do you not (*into it*) put your shoes in? 16. We (*into it*) put in the shoes which we want. 17. What do you want (*need*)? 18. We want what we have. 19. Does that child know what he is doing? 20. He knows what he does and what he says. 21. Will you not tell them of it (*say it to them*)? 22. With much pleasure. 23. Are you doing what the merchant orders (*you*)? 24. We do what he tells us. 25. He speaks of that of which you speak.

EXERCISE 58 (Vol. I., page 235).

1. Avez-vous ce dont* vous avez besoin? 2. Nous avons ce dont nous avons besoin. 3. Le Monsieur que vous connaissez est-il ici? 4. La dame dont vous parlez est ici. 5. Vient-elle d'arriver? 6. Elle vient d'arriver. 7. Connaissez-vous ce Monsieur? 8. Je connais le Monsieur qui parle avec M. votre père. 9. Savez-vous son nom? 10. Je ne sais pas son nom, mais je sais où il demeure. 11. Que faites-vous tous les matins? 12. Nous ne faisons presque rien, nous n'avons presque rien à faire (*que peu de chose à faire*). 13. Le tailleur fait-il vos habillements? 14. Il fait mes habits (*habillements*), ceux de mon frère et ceux de mon cousin. 15. Savez-vous ce que vous dites? 16. Je sais ce que je dis et ce que je fais. 17. Connaissez-vous l'Écossais dont parle M. votre frère (*dont M. votre frère parle*)? 18. Je le connais bien. 19. Que met-il dans son coffre? 20. Il y met ses habillements. 21. Ce que vous dites est-il vrai? 22. Ce que je dis est vrai. 23. Comprenez-vous ce que je vous dis? 24. Je comprends tout ce que vous dites. 25. De qui M. votre frère parle-t-il? 26. Il parle du monsieur dont la sœur est ici. 27. M. votre frère a-t-il tort de faire ce qu'il fait. 28. Il ne peut avoir tort de le faire. 29. Que faites-vous? 30. Je fais ce que vous faites. 31. Où mettez-vous mes livres? 32. Dans le coffre de M. votre frère. 33. M. votre frère est-il ici? 34. Il n'est pas ici. 35. Il est chez mon frère ou chez mon père. 36. Il est arrivé avec mon frère. 37. Qu'a-t-il dit? 38. Je n'ai pu comprendre à qui il parlait; mais il n'a eu que très peu de chose à dire. 39. Ce qu'il a dit était-il vrai? 40. Le tailleur a dit qu'il disait toujours la vérité. 41. Pourquoi votre sœur n'a-t-elle pas été chez sa mère? 41. Elle a été chez sa mère hier.

EXERCISE 59 (Vol. I., page 236).

1. Does General N. put on his uniform? 2. He does not put it on. 3. Why do you not wear your black cloak? 4. I am afraid of spoiling it. 5. Do you put on your satin shoes every morning? 6. I put them on on Sundays only. 7. It is twelve; does the servant lay the cloth? 8. He does not lay it yet, he is going to lay it immediately. 9. Is not dinner ready? 10. Does the servant take away the things? 11. He does not take them away yet, he has no time to take them away. 12. Do you take off your coat when you are warm? 13. I take it off when I am too warm. 14. Have you a cloth coat made? 15. I have a cloth coat and a black satin waistcoat made. 16. Are you not having your velvet slippers mended? 17. Do you not have a cellar dug? 18. I have a large cellar dug. 19. What does the druggist mean? 20. He means that he wants money. 21. Do you know what that means? 22. That means that your brother is angry with you. 23. Have you a wish to put on your cloak? 24. I intend to put it on, for I am very cold. 25. I am going to take it off, for I am warm.

EXERCISE 60 (Vol. I., page 236).

1. Ôtez-vous votre habit? 2. Je n'ôte pas mon habit je le mets. 3. Ôtez-vous votre manteau quand vous avez froid? 4. Quand j'ai froid je le mets. 5. Votre petit garçon ôte-t-il ses souliers et ses bas? 6. Il les ôte, mais il va les remettre. 7. Cette petite fille met-elle le couvert? 8. Elle met le couvert, tous les jours à midi. 9. Ote-t-elle le couvert, après le dîner? 10. Elle ôte le couvert tous les jours. 11. Avez-vous l'intention de vous faire faire un habit? 12. J'ai l'intention de me faire faire un habit et un gilet? 13. Je vais faire faire un habit. 14. M. votre frère fait-il raccommoder ses bottes? 15. Il les fait raccommoder. 16. Que veut dire M. votre fils? (or, *Qu'est-ce que M. votre fils veut dire?*) 17. Je ne sais pas ce qu'il veut dire. 18. Est-il fâché contre moi ou contre mon frère? 19. Il n'est fâché ni contre vous ni contre M. votre frère? 20. A-t-il peur de gâter son habit? 21. Il n'a pas peur de le gâter? 22. Le pharmacien (apothicaire *is rarely used nowadays*) a-t-il besoin d'argent? 23. Il n'a pas besoin d'argent. 24. Mlle. votre sœur a-t-elle ôté mon livre de la table? 25. Elle ne l'a ôté. 26. Pourquoi ôtez-vous vos souliers? 27. Je les ôte parcequ'ils me gênent. 28. Avez-vous l'intention de faire bâtir une maison? 29. J'ai l'intention d'en faire bâtir une. 30. Le tailleur gâte-t-il votre habit? 31. Il ne le gâte pas. 32. Qui gâte vos habillements? 33. Personne ne les gâte.

EXERCISE 61 (Vol. I., page 250).

1. What weather is it to-day? 2. It is very beautiful weather. 3. Is it very fine weather to-day? 4. It is cloudy and damp weather. 5. Does it rain much this morning? 6. It does not rain yet, but it is going to rain. 7. Is it windy or foggy? 8. It is not windy. 9. The fog is very thick. 10. How many persons are there in the assembly? 11. There are more than two hundred persons. 12. Are there not many manuscripts in your library? 13. There are not many, there are only fifty-five. 14. Is it too cold for you in this room? 15. It (*not in it*) is neither too cold nor too warm. 16. Is there much hay in your stable? 17. There is enough for my horse. 18. Do you remain at home when it rains? 19. When it rains, I remain at home; but when it is fine weather, I go to my cousin's. 20. Is there any meat in the market? 21. There (*of it*) is much, there is game also. 22. There is veal, mutton, and poultry. 23. Are there not also vegetables and fruit? 24. There are none. 25. There are some also.

LESSONS IN BOOKKEEPING.—XIV.

COTTON BOOK.

In the *Day-Book*, which was given in our last lesson, all the transactions relating to the *purchase* and *sale* of the different kinds of *Cotton* have been entered as a primary record of these transactions; but if the merchant be desirous of keeping a distinct and separate account of his dealings in Cotton, in order to be able to tell at a glance what is actually in his *Warehouse*, or in *Stock*, as the phrase is, he will have a book similar to the following specially made for the purpose. In this book the transactions can be more clearly and distinctly arranged; for he can have a separate account of each kind of cotton, with columns for the *number* of the bags, the *net weight* in pounds, the *rate* per pound, the *prime cost*, and the *selling price*; and he can appropriate the *one* side of the *folio* for the *purchases*, and the *other* side of the *folio* for the *sales*; so that the difference between them can be found in a moment, if necessary. If any particular kind of Cotton be all sold, then this book will show at once what has been gained or lost by the transactions in this kind; and as the same principle is applicable to all kinds, it follows that if all the Cotton of every kind has been sold, this book will show, both individually and collectively, the gain or loss on each, and the gain or loss on the whole. This is a great advantage where a merchant deals chiefly or wholly in any particular kinds of goods, as he can form an idea of his gain or loss on the principal part or the whole of his business accordingly without consulting his Ledger or striking a general balance.

It is evident that in any trade, business, or mercantile profession, such a book as this for every separate species of goods bought and sold would be of immense advantage, and would certainly be preferable to one book, such as the Day-Book, where all kinds of goods are indiscriminately classed together according to the dates of the different transactions; for the order of dates, though highly important, is not so useful to a merchant as the classification of his transactions; whilst even in that classification this order can be preserved. Hence a merchant may have his Sugar-Book, his Indigo-Book, his Tea-Book, his Coffee-Book, etc., according to the nature of his business; and in keeping books by *Single Entry*, which many persons yet mistakenly follow, such books as these are indispensably necessary, inasmuch as the Ledger kept by Single Entry gives them no information whatever as to the actual state of their Assets and Liabilities. If the book, such as the following, be devoted to one or more classes of goods, and each be kept separate and distinct, so that no confusion be introduced into the different transactions, it may be called legitimately the *Stock* or *Warehouse* Book, as the merchant can always tell his Stock of Goods by consulting it, without actually going to the warehouse and turning over the goods in order to see what he has got in hand.

* Literally, *that of which you have need.*

COTTON BOOK. (1)

SALES.

1881.			£	s.	d.
		BERBICE.			
Feb.	1	To Brown and Smith, London	313	14	5
May	2	„ Lloyd and Co., Manchester	217	18	10
			531	13	3
		GRENADA.			
Feb.	14	To Williams and Co., London	168	2	6
„	21	ditto	192	12	10
			360	5	4
		MARANHAM.			
March	13	To Spencer and Co., London	160	13	7
May	5	„ Powell and Co., Manchester	299	17	2
			460	10	9
		WEST INDIA.			
March	16	To Thompson and Co., London	257	12	1
„	22	„ Althorpe and Co., ditto	141	6	8
April	12	„ Allison and Co., ditto	150	0	8
			548	19	3
		MADRAS.			
April	18	To Thomas Jones, Liverpool	226	11	4
„	20	„ Lloyd and Co., Manchester	223	9	10
„	27	„ Thomas Jones, Liverpool	213	1	0
May	4	ditto ditto	241	3	2
„	27	„ Brown and Smith, London	97	8	0
June	30	Unsold (*Prime Cost*) „	75	1	6
			1076	16	10
		DEMERARA.			
April	30	To Thomas Jones, Liverpool	337	0	8
June	1	„ Powell and Co., Manchester	308	5	0
			645	5	8

PURCHASES.

1881.			£	s.	d.
		BERBICE.			
Jan.	7	Of Osmond and Co., London	288	3	4
April	4	„ ditto	183	4	3
		Gain	60	5	8
			531	13	3
		GRENADA.			
Jan.	12	Of Andrews and Co., London	327	5	0
		Gain	33	0	4
			360	5	4
		MARANHAM.			
Jan.	26	Of Andrews and Co., London	135	18	9
April	7	ditto	238	17	4
		Gain	85	14	8
			460	10	9
		WEST INDIA.			
Feb.	10	Of White and Co., London	199	0	3
„	17	ditto	226	2	4
		Gain	123	16	8
			548	19	3
		MADRAS.			
Feb.	25	Of East India Company (10 Lots)	72	0	0
			71	0	0
			68	17	4
			68	1	4
			66	5	4
			68	4	0
			80	12	6
			78	9	0
			73	1	0
			75	1	6
			355	4	10
			1076	16	10
		DEMERARA.			
March	24	Of Baring, Smith, and Co., London	288	1	3
April	22	„ Ovington and Co., ditto	245	8	0
		Gain	111	16	5
			645	5	8

The following shows the clear gain made by the purchase and sale of Cotton from January to June, as per Cotton-Book :—

		£	s.	d.
Gain on Berbice		60	5	8
„ Grenada		33	0	4
„ Maranham		85	14	8
„ West India		123	16	8
„ Madras		355	4	10
„ Demerara		111	16	5
Whole gain		£769	18	7

LESSONS IN CHEMISTRY.—XI.

CARBON AND ITS OXIDES.

CARBON.—SYMBOL, C; ATOMIC WEIGHT, 12.

No solid plays a more prominent part in the economy of nature than carbon, as it forms well nigh the whole of the wood of vegetation. It is a very remarkable substance, for it appears in three perfectly distinct states—the *diamond*, *graphite*, and *charcoal*.

1. The *diamond* is found in alluvial débris—that is, in water-worn deposits of gravel. It is presumed that the gem was formed by crystallisation when the rock was in a fluid state, and when in after ages it became broken in pieces by the action of water and other geological forces, the hard diamond was delivered from its matrix, and mixed with the débris. The chief diamond mines are those of Golconda and Bundelcund, in India, Borneo, and Brazil.

When found, the stone has the appearance of a piece of white glass; occasionally there is an approach to the crystal form of the octahedron.

It is the hardest of all known bodies, and is capable of dispersing light—that is, of breaking up white light into its coloured component rays—in a greater degree than any other body except chromate of lead. To exhibit this property to its full advantage, the gem must be cut. This was once an operation of the greatest difficulty, and could only be executed by the Dutch diamond-cutters, who fastened two stones in cement, and then rubbed them against each other until a facet was produced. Now, diamond-cutting is much less laborious. The stone is fixed, as before, in a metallic cement, and pressed upon a disc of steel about eight inches in diameter, which revolves horizontally with a great velocity. As with all crystals, there are certain directions in which the diamond is more readily cut. It is the skill of the cutter to place the stone upon the disc in the right position. The steel, were this not done, would itself be cut, instead of making any impression on the diamond. The secret of the disc being enabled to wear down the hard mineral is, that the minute interstices of the metal become filled with dust from the diamond. This is in many instances applied to the plate mixed with olive oil; but when a disc has been some time in work, it is sufficiently impregnated with the dust not to need this addition.

In the Brazil mines is found a dark brown carbonaceous matter, in small pieces, which is as hard, if not harder, than the diamond itself; and it commands as high a price on account of its use in forwarding the cutting of the stones.

The most important use of the diamond is the cutting of glass. This is effected by a natural face of the crystal. If the edge be formed by the intersection of two artificial faces, the cut produced on the glass is not a true cut, but only a scratch with rugged edges. The natural faces of the diamond are frequently curved. The diamond may be heated intensely in an atmosphere of any gas except oxygen, but if it be suspended in a cage of platinum wire, and heated to a bright redness, and then plunged in a jar of that gas, it burns with a steady red light, producing carbonic acid gas (CO_2).

It was reserved for Sir H. Davy to show that this gas was the sole product of the combustion of the diamond, though the fact that it was combustible was known in 1694 to the philosophers at Florence. The combustion, however, is not complete, as there always remains an ash, which is generally in the form of a cellular network—the skeleton, as it were, of the gem, and which consists of silica and the oxide of iron. With this exception the diamond is pure carbon. When submitted to the most intense of heats, that of the voltaic arch, the diamond loses its transparency, begins to swell, and is converted into a black mass resembling coke, the amorphous form of carbon. In this state it is a good conductor of electricity, a property it does not possess in its transparent condition.

2. *Graphite* or *Plumbago*, erroneously called *blacklead*, is all but pure carbon, slight traces of iron generally being present. It is a crystallised body, belonging to the third or Rhombohedral system. The distinction between this and the first or regular system, in which the diamond crystallises, will be explained in a future lesson on crystallisation. It occurs in veins, always in rocks of the earliest formations. The most celebrated mine is that of Borrowdale, in Cumberland. Here it is found in "nests" in trap traversing clay slates. It is a good conductor of electricity, and is as difficult to burn as the diamond. It is chiefly used for manufacturing lead pencils. Being very friable, it leaves its particles on paper when passed across it. The particles themselves, however, are extremely hard, and soon wear out the saws with which the graphite is cut.

Formerly good pencils could only be made from lumps sufficiently large to permit of long pieces being cut. The small masses and dust were cemented together with sulphur, but by this the "marking" quality of the graphite was so injured that only the coarsest pencils could be made of it. But it has been discovered that by submitting this dust to enormous pressure it will cohere, forming plates fit for the manufacture of the best pencils.

Graphite is used for lubricating machinery, and also for making crucibles. For this purpose it is mixed with fire-clay. These crucibles are not so liable to crack as those made of clay only.

3. The third form of carbon has no appearance of crystallisation. It is therefore said to be "amorphous," or without form. This state is shown in *coal*, *charcoal*, *soot*, etc. Of the composition of coal we shall treat in the next lesson. *Charcoal* is got from the "destructive distillation" of wood—that is, the wood is heated in vessels of iron, closed so that no air can cause the carbon in the wood to burn. Of course there is a pipe to carry off the gases liberated by the heat. If blood or bones be submitted to this process, the result is *animal charcoal*.

Wood charcoal is also made by cutting the wood into logs, and arranging them on end, then covering the whole with sods, and setting fire to the heap at some central point. A portion of the wood is consumed, but the heat thus produced converts the remainder into charcoal. Charcoal is a bad conductor of heat and electricity. It is very porous, in virtue of which, like spongy platinum, it absorbs gases, the quantity varying with the nature of the gas. Thus, boxwood charcoal absorbs of

	Volumes.
Hydrochloric acid gas	85·00
Sulphuretted hydrogen	55·00
Carbonic acid gas	35·00
Oxygen	9·25.

When heated or placed in vacuo, these gases are again given off. Whilst in this state of condensation their powers of affinity are greatly increased. Thus sulphuretted hydrogen at common temperature is not altered by contact with oxygen; but if a piece of charcoal which has absorbed the former gas be plunged into a jar of the latter, a detonation ensues from the violence of the combustion, water and sulphuric acid being formed :—

$$SH_2 + 3O = H_2O + SO_2.$$

This power is also shown in what are termed the *antiseptic* properties of charcoal—that is, the power it has of removing offensive smells. If putrefying meat or fish be packed in charcoal, all smell is removed; for the gases which cause the unpleasant effluvia are absorbed by the charcoal; and while in this state the oxygen, previously in its pores, attacks and changes the various gases, or oxidises the volatile organic matter. The process of putrefaction, however, is not arrested, but rather increased. This is often resorted to by unprincipled butchers and fishmongers who present tainted meat or fish for sale, which escapes detection for the moment by its inodorousness. Yet it possesses all the deleterious properties of unwholesome food. Charcoal, especially animal charcoal, clears coloured liquids which are passed through it. This may be well illustrated by shaking a little of it with a few ounces of port wine in a bottle, and then filtering the mixture; the liquid which passes the filter will be colourless.

Sugar is clarified by means of charred bullock's blood. After being in use for some time the charcoal is found to lose its

decolorising power; but this it regains upon being calcined at a low red heat.

These properties render charcoal invaluable in the construction of filters; not only does it "aërate" and decolorise the water, but by oxidising any animal matter it may contain, does much to render it innoxious.

Lampblack is prepared by burning turpentine or resin with a limited supply of air, and condensing the smoke; when mixed with linseed oil and soap, it forms "printers' ink."

The *oxides of carbon* are:—

Carbonic oxide	CO
Carbonic acid	CO_2.

Besides these there are some vegetable acids—one of the simplest, oxalic acid (C_2O_3), is the sour principle in sorrel.

Carbonic Oxide (symbol, CO; atomic weight, 28; density, 14).—This gas is best prepared either by—

1. Depriving carbonic acid of an atom of oxygen, or—
2. By adding to it an atom of carbon.

(1) $CO_2 - O = CO$;
(2) $CO_2 + C = 2CO$.

To perform the first experiment, heat in the iron retort used to prepare oxygen from manganese dioxide, a mixture of zinc or iron filings and well-dried chalk, thus—

$$CaOCO_2 + Zn = CaO + ZnO + CO.$$

For the other method, for zinc substitute carbon, thus—

$$CaOCO_2 + C = CaO + 2CO.$$

The heat drives off carbonic acid from the chalk, and in the first case the zinc is oxidised at the expense of this CO_2, and in the second case the CO takes another atom of carbon.

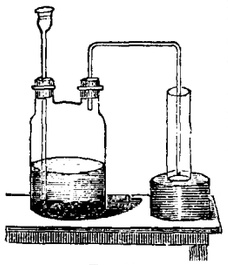


Fig. 36.

In each instance the gas contains a little carbonic acid, and therefore to obtain it pure, it must be collected over water containing potash, which retains the carbonic acid to form potassium carbonate. Another method of preparing it is to digest pulverised ferrocyanide of potassium with seven or eight times its weight of sulphuric acid.

Properties.—The gas is colourless, tasteless, inodorous, poisonous. A taper introduced into it is extinguished; but the gas burns where it meets the oxygen with a blue flame, forming carbonic acid, thus—

$$CO + O = CO_2$$
$$2 + 1 = 2.$$

The numerals refer to the volumes—that is, the carbonic acid formed is of the same volume as the carbonic oxide burnt. This may be proved by mixing in the eudiometer carbonic oxide, and half its volume of oxygen; after the spark has passed, nothing but carbonic acid will remain, whose volume is that of the carbonic oxide. This gas has a great affinity for oxygen, and therefore is a powerful reducing agent; in iron-smelting furnaces the reduction of the ore is chiefly due to its action.

A solution of cuprous chloride (Cu_2Cl_2), in hydrochloric acid absorbs carbonic oxide, as also does melted potassium.

Carbonic Acid (symbol, CO_2; atomic weight, 44; density, 22).—When limestone or chalk, which are both carbonates of lime ($CaOCO_2$), are heated in a kiln, the heat drives off the gas (CO_2), leaving the lime (CaO). The gas, being *half as heavy again* as air, collects in the fire-pit, and in any hollows close by the kiln: and here many a wanderer has slept his last sleep, poisoned by the gas. It is also the chief product of fermentation, and collects at the bottom of vats; its presence is ascertained by lowering a lighted candle, which will be extinguished if the gas be present. The escape of this gas causes the effervescence of wines, the froths of porter, ale, etc., and makes bread "rise."

It is best prepared by pouring dilute hydrochloric acid on chalk, or, what is better, on pieces of marble (Fig. 36). On account of its density it may be collected by displacement, and even may be poured from one jar into another. The reaction is thus expressed:—

$$CaOCO_2 + 2HCl = CaCl_2 + H_2O + CO_2,$$

calcium chloride, water, and carbonic acid being the result. It is better not to use sulphuric acid, as the fragments of marble are then coated with calcium sulphate, which is insoluble, and thus the action is retarded. The gas is unable to support life, and when breathed, spasm of the glottis prevents its entrance into the lungs. If its presence in air exceed four per cent., it acts as a narcotic poison.

It is exhaled from the lungs, which are organs composed of a membrane some 160 square yards in surface, which has the property of absorbing the oxygen from the air inhaled, and thus bringing it in contact with the venous blood beneath. This blue blood owes its colour to the presence of carbon. The oxygen combines with this carbon, forming carbonic acid, which is exhaled.

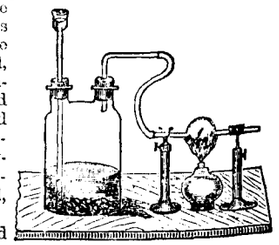


Fig. 37.

This may easily be proved by blowing through a glass tube into some lime water, or barytic water. The calcium, or barium carbonate, is formed, which renders the water milky. This chemical action is not only carried on in the lungs, but over the whole body through the pores of the skin. If the hand be introduced into a jar of oxygen standing over water, in a short time that gas will be found to be converted into carbonic acid. Hence from this simple experiment will be seen the imperative necessity of cleanliness.

This chemical action is the source of animal heat, and is exactly that which goes on more vigorously in a coal fire. In this case the oxygen entering in at the bottom of the grate combines with the coal, forming carbonic acid. As this passes upward through the fire, it takes another atom of carbon, forming, as we have seen, carbonic oxide, which burns again into carbonic acid when it reaches the top of the fire. The blue, flickering flame seen over a cinder fire is carbonic oxide burning into the higher oxide.

To exhibit the presence of carbon in carbonic acid, it is only necessary to pass the gas over a piece of heated potassium. The arrangement is shown in Fig. 37. The metal deprives the gas of its oxygen, and the liberated carbon is deposited on the interior of the bulb.

When submitted to a pressure of 35·4 atmospheres, the gas becomes a liquid. This is the means by which it is accomplished. A and C (Fig. 38) are two wrought-iron vessels. A mixture of water and sodium bicarbonate is introduced into A, and the tube *b*, filled with sulphuric acid, is placed upright in the "generator," A. The top is now fixed, and the tap, S, turned. The vessel is inverted, being placed on stands for that purpose, and the acid is emptied into the solution of sodium bicarbonate. Sodium sulphate is formed, and a vast quantity of carbonic acid gas is liberated. By means of the pipe, *d*, the generator is connected with the "condenser," C, which is packed in ice. So great is the pressure of the gas, that when both the taps are turned the liquid carbonic acid distils over. When the operation is complete, the two vessels are disconnected. A little of the liquid can be received on a piece of wool by turning M, the pressure of the gas in C forcing the liquid up the tube. So rapid is the evaporation, that the liquid on the wool is frozen. When mixed with ether, a paste is formed, which possesses an extremely low temperature, by which mercury is at once solidified.

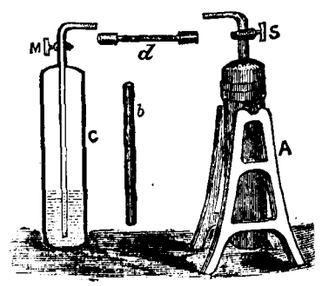


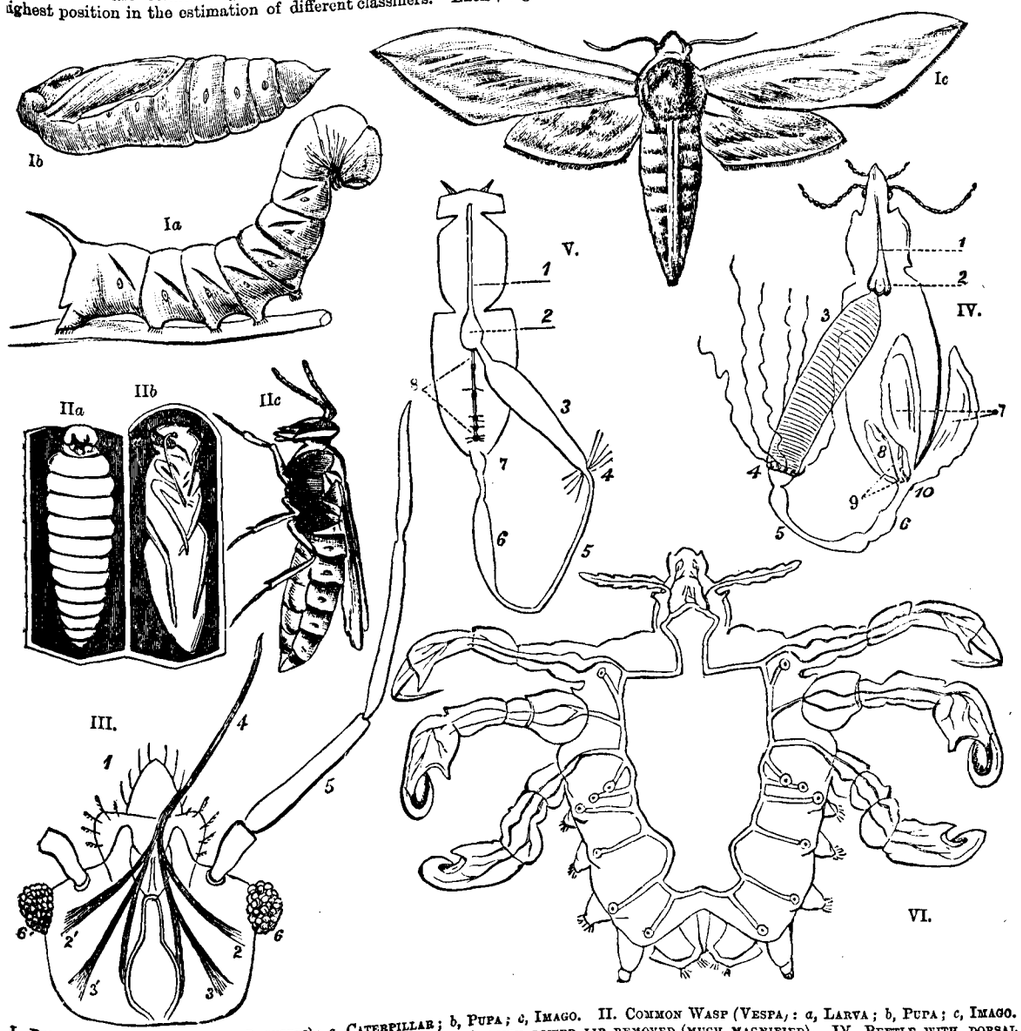
Fig. 38.

Carbonic acid, though a very weak acid, forms a numerous class of "carbonates." All these effervesce with dilute nitric acid.

COMPARATIVE ANATOMY.—X.

INSECTA.

THE remaining three classes of the articulated animals which we have yet to describe—namely, the Crustacea, Arachnida, and Insecta—are collateral groups. Each has occupied the highest position in the estimation of different classifiers. Each claim for the Crustaceans a certain kind of superiority for them; but we find in the class Insecta the greatest development of those peculiar excellences for which the whole articulate branch is noted. The great characteristic of the Articulates is their external skeleton, and the adaptation of this to the purposes of locomotion is, so to speak, the aim of this sub-kingdom. Other organs and systems of organs are elaborated in an unsteady



I. Privet Hawk Moth (Sphinx Ligustri): *a*, Caterpillar; *b*, Pupa; *c*, Imago. II. Common Wasp (Vespa,): *a*, Larva; *b*, Pupa; *c*, Imago. III. Under-side of head of Bed-bug (Cimex Lectularius), with lower lip removed (much magnified). IV. Beetle with dorsal integuments removed to show viscera. V. Bee. VI. Parasitical Insect seen by transmitted light, and highly magnified to show tracheal system.

Refs. to Nos. in Figs.—III. 1, labrum, or upper lip; 2, 2′, roots of the mandibles; 3, 3′, roots of the maxillæ; 4, mandibles and maxillæ combined into a piercer; 5, antennæ; 6, 6′, eyes. IV. 1, œsophagus; 2, gizzard; 3, stomach; 4, entrance of the secreting organs; 5, small intestine; 6, large intestine; 7, ovaries; 8, spermotheca; 9, accessory glands; 10, common cloaca. V. 1, œsophagus; 2, crop; 3, stomach; 4, entrance of the secreting organs; 5, small intestine; 6, large intestine; 7, common cloaca; 8, ganglionic chain.

possesses forms whose simplicity of organism and general inferiority of structure make the comparison of them with the highest members of the other groups, with any idea of rivalry, absurd. Each class, too, culminates in organisms whose varied parts and elaborateness of detail seem to place them at an elevation beyond which it seems impossible to mount. In many respects, as in their respiratory and circulatory systems, the spiders seem to show an advance upon the Insects; while their larger size and the greater complexity of their nutritive organs and fluctuating manner, sometimes appearing to be degraded, or altogether altering their type, as we proceed from one order to another; but the perfection of the external investment, and its better adaptation to the most efficient kind of locomotion, is seen in every upward step we make in our classification. And it is in the class Insecta we find such marvellous finish and efficiency in this part of the organism as to fill not only the naturalist, but even the casual observer, with wonder. The strength and beauty of the elegant body and sculptured limbs—

the delicacy and yet the power of the wings—the splendour of the colours, and elaborateness of pattern, whether expressed in these gorgeous hues, or marking and chasings—are all so exquisite that the class is a general favourite with all. With man, excellency in the execution of any one plan seems to be inconsistent with diversity; but how different is it with the Creator. As if to exhibit how unlimited might be the variety while the ground-plan is the same, we find a greater number of species in this class than in all the rest put together. One order of insects, the Coleoptera, has not less than 80,000 different kinds known to, and already described by naturalists; and yet so imperfectly has the search for these hiding and burrowing insects been carried out, that it would not be a matter of surprise if a few years should double the number of known species. We shall describe the insects first, because they occupy a central position, and follow so closely on to the class Myriapoda, that some naturalists have included these latter in the class. The Myriapods, however, show so marked a difference to the insects in the greater number of rings, in the similarity of these to one another, in the whole of them being furnished with limbs, and in never presenting any traces of wings, that they may be well classed alone; while the name Insecta, or *notched* animals, is confined to the true hexapod (six-legged) order.

The reader must have seen insects so often that it seems superfluous to describe their general form and constant peculiarities; yet we are so often accustomed to see without examining, and to examine without noting, that perhaps the fact that a fly or a gnat has six legs may be new to some persons who have been plagued by these creatures all their summers. The body, then, of a typical insect in its final and perfect state consists of three well-defined divisions, called (beginning from the front) the head, the thorax (chest), and abdomen. So deep is the notch which divides them from one another, and so small is the stalk or connection which unites them in bees and flies, that the divisions of the bodies of these insects cannot have escaped notice. In beetles and butterflies, the divisions, though not quite so marked, are evident enough, but in such insects as crickets and plant-bugs they are traced with some difficulty. To the head is deputed the faculty of sensation and prehension; to the thorax the office of locomotion; while almost all the functions of organic life, such as digestion and reproduction, are delegated to the abdomen. The head is variously shaped, commonly resembling a disc, and presenting a flattened but still convex surface forwards, on the expanse of which are situated two antennæ or feelers. These are almost constantly present, but their form is so modified in different insects, that no general description can be given of them. Usually they are jointed, but the numbers of the joints, their relation, size, and shape, and all connected with them, are so different in different families, that they form an important means of distinguishing one family from the other. The mouth opens on the bottom part of the edge of the disc, while the large complex eyes cover the lateral edges, and extend often both in front and to the middle line at the top of the head. When this is not the case, it is no uncommon thing for three simple eyes to be placed on the very apex of the head, in the form of a triangle. These, however, are by no means constant in all insects. The organs which, standing round the mouth, minister to all the accessory functions of gaining and swallowing food, have, though very diverse in shape, been harmonised by the labours of entomologists so as to represent one plan. There is in front the labrum, or upper lip, then two pairs of jaws, one pair behind the other, but each single jaw playing from the side to meet its fellow in the mid-line. Behind these is the under lip, which is sometimes very complex, being split into three or five divisions. Additional feelers like the antennæ, but usually smaller and of fewer joints, are often placed both on the hind pair of jaws and the lower lip. When the mouth organs are spoken of as lips and lateral jaws, it must be remembered that these organs are so much modified that in some insects the terms seem hardly applicable. Thus, a reference to the illustration of the head of that insect which is found too commonly in our metropolis will show that the four jaws, though springing from separate roots, are united to form a single style-like puncturing apparatus, and this is enclosed in the lower lip, which is a tube through which juices are sucked.

The head is so consolidated that it would at first sight suggest the idea that it consists of but one ring, corresponding with one annulus of a worm, and some have thought this was really the case. Others, however, believe, and apparently with reason, that short as it is in its fore and aft or axial diameter, it nevertheless is compounded of at least six rings, each of which has its pair of appendages. Thus, the first bears the eyes; the second, the feelers; the third, the undivided labrum; the fourth, the maxillæ; the fifth, the mandibles; and the sixth, the more or less split and complex labrum. This view may appear fanciful, especially when the large rounded areas of pavement-like eyes are spoken of as appendages or limbs; but if we follow the comparison to the almost precisely similar organs in crustaceans, where they are sometimes set on long and jointed stalks, it ceases to be so.

The thorax, although it forms a more or less globular or cubical box, which lodges the muscles which ply the legs and wings, plainly consists of three rings or segments. This is apparent, not only on account of the number of appendages, but also, on examination, the plates of which it is composed show the lines of junction by sutures on the outside; while on the inside the edges of these are doubled in so as to form ridges, to which the muscles are attached. To the first segment, or *pro*thorax, are attached a pair of legs. They spring from below, and are extended outwards. The second segment, or *meso*thorax, has a pair of legs below, and generally a pair of wings, springing from the back. The hind segment, or *meta*thorax, has the same limbs as the preceding one. The legs are all jointed, the joints being of beautiful structure. The limb starts from a movable plate wedged in between the fixed plates of the body; this is called the coxa. Then comes a small joint which assists in allowing the limb to be rotated, and is called the trochanter. Beyond this is the femur, and to its end is attached, by a joint which only permits of an up and down movement, the usually long serrated or spined tibia. A string of five beaded joints forms the foot, the last of which is furnished with two curved hooks to lay hold on the minute roughnesses in the surface over which the insect crawls. Besides the claws, there are often two or three cushions of stiff hairs, which, aided by a sticky secretion, are very good sustainers of the light and strong creatures when they walk on the ceiling of a room. This description applies to the limb when most developed, as there is a vast variety in the composition of the limbs of insects. The legs are used not only for walking, but also for cleaning the body, the antennæ, and the wings. They are sometimes furnished with curious brushes and combs for effecting this purpose. The use which the working bee makes of its hind legs—namely, to store lumps of wax upon them, and so to carry a supply of this substance to its hive—will also occur to all bee-keepers.

The reader will probably wonder why the wings have not been spoken of as appendages to the body-rings. He will ask, if the number of so-called appendages is made to determine the number of rings of which the body is composed, why the wings do not count for limbs whereby to determine the number of the annuli of the thorax? A careful comparison of these organs throughout the class, with their mode of development, has led naturalists to suppose that the wings are modified gills corresponding to the gill covers of crustaceans, and not with the limbs of these. If this correspondence be genuine, it is a curious instance of how the same organ may have very different uses in different animals. The skin or integument of insects consists essentially of three layers. The outermost is a thin, transparent membrane; beneath this is the hard, horny-coloured layer, to the inside of which the live vascular skin is applied. The wing consists of an extension of the outer layer into a long bag, the two sides of which are smoothed down and applied to one another so as to form one sheet, while this is strengthened and kept in shape by a framework of stiff fibres derived from the second layer. Derivatives from the blood system and the respiratory system in some instances enter the fibres, but are not conveyed into the membranous part of the wing, so that the torn wing of an insect is never repaired. The pattern of the framework of fibres, or nervures, as they are called, is well worthy of study, not only because it is beautiful and made much use of in describing and distinguishing insects, but on account of its wonderful adaptation to the requirements of the wing, furnishing strength and resistance where strength and resistance are required. The wings are very variously developed. The fore wings are the most constant and generally the largest, but in one family (Strepsiptera) they are rudimentary, and in another large order (Coleoptera) they are converted into hard covers for the hind wings, and never employed in flight. The hind wings, though largely developed in the beetle and grasshopper, and quite as large as the fore wings in dragon-flies, are often only adjuncts to the fore wings, being much smaller than these, and fastened to them or dissevered from them as the insect wills. There are various and elaborate contrivances by which this junction of the hind wings to the fore ones is effected in insects. In flies, the hind wings are reduced to little sticks with knobs at the end, and why they should be retained at all in this form is a puzzle to entomologists. The abdomen or hind division of the body is elongated, and tapering towards the end. It consists of nine segments, but the last two or three or four are often reduced in size, and applied, not to contain the viscera, but to purposes of reproduction, defence, etc. Thus, in the bee, the sting consists of two modified rings, and the ovipositor of the saw-fly is of the same nature. The rings of the abdomen are not firmly applied to one another along their edges, as is the case with the rings of the thorax, but the front one overlaps the hind ones, and these can be retracted one into the other like the joints of a telescope. The muscles running from one ring to another, which retract the hinder joints into those before them, are so elastic, and they originate so far forward into the front segment that the whole abdomen may often be at one time doubly as long as at another time. This looseness in the jointing is not only found to be very useful to the insect in order to enable it to bend that part of the body, and so apply the tail organs as the insect requires, but also it allows the internal organs to be distended without inconvenience; and in many of the most active insects a rhythmical breathing is observed, caused by the shortening and elongating of this part of the body.

The food-canal of insects is usually not very long or very complex. From the mouth a narrow throat runs right through to the abdomen, thus interfering as little as possible with the play of the muscles of that part. When it has arrived at that division of the body, it enlarges into a bulb or crop, which is sometimes, as in bees, an enlargement lying in the track of the canal, and sometimes a bag or reservoir connected with the throat by a narrow duct which enters sideways into the canal. Below this, or occupying its place when it is absent, a gizzard is often found, whose horny internal longitudinal ridges grind the food. Below this is the true stomach—a long sack with transverse wrinkles, in the folds of which secreting glands are found. At the lower end of this, a number of long tubes enter. Six of these are seen in the beetle in the illustration, and in the bee there are a large number. These long tubes, which lie in the body cavity tangled and twisted among the other organs, commence in blind ends. Their function has been much disputed, some thinking them organs of *secretion*, and others organs of *excretion*—that is, some suppose their products are needful for the better digestion of the food, while others think it worthless and injurious if not thus got rid off. The first-named function is performed by the liver in vertebrates, and the last-named by the kidney. The names of these organs have, therefore, been applied to these blind tubes by the advocates of the respective views. Such names are liable to confuse the reader, as there can be no correspondence between organs taken from different sub-kingdoms, so far as structure is concerned. Hence, a new name has been applied to them, which is not liable to mislead, that of *Malpighian vessels*. Below the entrance of these vessels, the alimentary canal contracts, and has been called the small intestine. At the end of this is a valve which prevents an entrance of matter from behind. Beyond the valve is the large intestine, which sometimes dilates into a chamber into which the reproductive products and the poison from the poison-bag, where it exists, empty themselves. The orifice of exit is always at the extreme end of the animal. It should have been mentioned that into the mouth of the œsophagus two or more salivary glands usually empty themselves. These are often more or less attached to the sides of the canal, but are sometimes free and floating in the juices of the body. Sometimes the liquid secreted by these is very pungent and irritating, though why it should be so it is difficult to conjecture, unless, by being poured into the wound made by the compound lancet, it causes a flow of blood to that part. Otherwise, one would have supposed that the irritation caused would have been equally disturbing to the drinking insect and the victim of its attack.

One of the greatest peculiarities of insects—though, as we have seen, the apparatus is not confined to them—is the *tracheal* system. In insects the necessary process of the aëration of the blood is not accomplished through a soft membranous skin, for this in them is hard and dry; nor by protrusions of the circulatory system, so as to expose the contained blood to the influence of the surrounding medium; nor even by setting apart some internal cavity for the process; but the air is introduced and sent by small dividing and sub-dividing vessels into every organ of the body, and so the function of respiration is diffused through all parts. The entrance of the air to the body is not through the mouth, as in vertebrate animals, but through a number of oval holes in the sides of the body. As a rule, it might be said that there are a pair of these to each segment of the body, but they are by no means always present in every segment. These oval holes are called spiracles, or breathing pores. They are well seen in the illustrations of the caterpillar and chrysalis of the privet hawk-moth. Their presence in the perfect moth would be obscured by the thick coating of scales and hairs, even if the side view were given. These orifices need some protection, especially at certain times, and thus they are often placed in situations where they cannot readily be seen. In the abdomen of the beetle they are often placed under the deck-like fore-wings. In the bees and wasps they are found in the side-pieces, which are covered by the back and belly-plates of the rings. Besides these methods of protection, they are often defended by a thick fringing of hair, or by plates, or by membrane. These organs at the spiracles are sometimes vibratile, and the humming of insects is sometimes thus caused.

In the sketch of the tracheal system of a species of parasite given in the picture, it will be seen that each spiracle has a little globular enlargement below it, and that canals lead from these to join a large lateral canal which runs down the side of the body, uniting with its fellow both before and behind. From certain parts of this similar vessels are given off which run to the more important parts of the body, and there break up into branches. In this creature the tracheal system is of the simplest kind, but in the generality of insects it is very complex, the two lateral canals sending off cross branches, while from all parts of the main canals branches spring, and by dividing and sub-dividing, run into all the organs, so that no small portion of the viscera, whether taken from the nervous or any other system, can be examined under a microscope without revealing some of these vessels. Indeed, it would seem that, united with the function of respiration, they perform the additional one of sustaining the internal organs.

It may be asked, how can these minute vessels be distinguished from others when under a microscope? This is easily done on account of the peculiarity of their structure. Each tube consists of two thin membranes, with a spiral thread lying between them. The membranes are transparent, and the closely coiled thread within them looks like the wire spring of a bell. The use of these spiral threads is manifest. The air tubes must be kept open in order that respiration may be carried on, and yet the movement of the body, or any pressure, is liable to close them. These elastic coils, therefore, maintain the tube, and by their resiliency open it when it has been closed by pressure.

The nervous system is quite after the type of all Articulates, which we have described elsewhere.

One of the most striking and interesting of phenomena in nature is the transformation at certain stages of the development of insects. Such transformations are not confined to this class, but they were first noted in it, and are better defined and studied in insects than in any other class. Most animals have a protective epidermis, which, being extra-vascular, is dead or dying. Some have this constantly wearing off, while others retain it for a time, and slough it off at one act. Many creatures also, during growth, go through considerable change in the proportion and structure of these parts. Now, in insects, since the whole form of the animal is dependent on the external integument, and the whole of this is thrown off together, while at the same time extreme changes have gone on in the internal structure, we have, as a result, periodical changes of so radical a character that they are called metamorphoses. These changes are, however, very different in different insects. In all there is a growing state, in which they eat enormously. This state is

called the *larva*. Then there is a state of change, in which the forms of the organs of the perfect insect are being developed: *e.g.*, the wings grow, and the body is transformed into a shape convenient for flight. This is called the *pupa* state. Lastly, there is the perfect state, in which the insect never grows nor changes, and in which its most serious business seems to be the reproduction of its kind. In this state it is called the *imago*.

The main modifications in the method of metamorphosis consist in the condition of the insect in the second or pupa state. In butterflies and flies, it has no mouth nor organs of locomotion, and is inverted in a coffin-like box, so that its external appearance is quite unlike that of the perfect insect. In bees and beetles the pupa has already taken on the form of the perfect insect, and the limbs are detached from the body, but it is quite quiescent, while in grasshoppers and plant-bugs the three states are much alike. The only thing which distinguishes the different states of these latter from one another is the growth of the wings during the pupa state. At the top of the illustration the three states of a sphinx-moth, called the privet hawk-moth, are represented. The larva, or caterpillar, is holding its head aloft after its peculiar manner, from which habit it derived the name of sphinx. On the left hand there is a representation of two cells, one of which contains a wasp larva, which is fed in its cell by the workers. Another cell contains a pupa wasp, which is sealed up to protect it while it no longer eats. On the side a perfect insect is represented as climbing up the comb.

In a future lesson we propose to give some account of the classification of insects.

LESSONS IN GERMAN.—XXXIV.

SECTION LXVI.—VARIOUS IDIOMS (*continued*).

Weise, way, manner; as:—Auf diese Weise, in this way (on this wise). It is often compounded with adjectives and nouns, and used adverbially. Scherzweise, jestingly. Glücklicher Weise, fortunately; in a fortunate manner. (§ 105.)

1. Unter vier Augen, literally, under *four eyes*; that is, *secretly, in confidence*; between *two* persons. Man hat es mir unter vier Augen gesagt, it has been told to me in confidence.

VOCABULARY.

Amts'geschäft, *n.* official duty, business.
Asien, *n.* Asia.
Aus'richten, to do, perform.
Beina'he, almost, near, about.
Berüh'ren, to touch, to come in contact with.
Beschäf'tigung, *f.* business, employment, occupation.
Feu'ersbrunst, *f.* fire, conflagration.
Flucht, *f.* flight, escape.
Fristen, to prolong.
Furchtbar, tremendous, terrible.
Gefahr', *f.* danger.
Gehor'chen, to obey, to be obedient.
Gewalt'sam, violently, forcibly.
Hinweg'schleppen, to draw away, to take away by force.
Hof, *m.* court.
Irrung, *f.* error, mistake.
Kleiden, to dress, clothe.
Legitimi'ren, to legitimate, identify.
Litera'risch, literary.
Men'schenleben, *n.* human life.
Miß'verständniß, *n.* misunderstanding.
Mode, *f.* mode, fashion, custom.
Muße, *f.* leisure, ease.
Noth'getrun'gen, compulsory, forcedly.
Paß, *m.* passport.
Perser, *m.* Persian.
Persisch, Persian (adj.).
Römer, *m.* Roman.
Scherz'weise, by way of jest, jokingly.
Schnee'lawine, *f.* avalanche.
Schweiz, *f.* Switzerland.
Ue'brighaben, to have left.
Vergnü'gung, *f.* pleasure.
Verhin'dern, to hinder, stop from.
Verse'hen, *n.* oversight, inadvertence.
Verun'glücken, to become unfortunate, to be lost.
Vor'zugsweise, preferably, especially.
Weise, *f.* way, manner.
Wichtig, considerable, important.
Wille, *m.* will, mind.
Zu'fluchtsstätte, *f.* asylum, refuge.

RÉSUMÉ OF EXAMPLES.

Mit Güte richtet man in den meisten Fällen mehr aus, als mit Gewalt. — With kindness, one in most cases accomplishes more than with violence.

Die Fürsten Europa's verfah'ren ei'genmächtig und gewalt'sam gegen ihre Un'terthanen. — The princes of Europe proceed arbitrarily and violently against their subjects.

Aus Verse'hen kann oft das größte Unglück entste'hen. — By inadvertence the greatest misfortune may often occur.

Die Eng'länder suchten mit aller Macht die O'berherrschaft in Ame'rika zu gewin'nen. — The English sought with all (their) power to obtain the supremacy in America.

Durch ein solches Betra'gen muß nothwen'diger Weise ein Bruch zwischen beiden Freunden entste'hen. — By such conduct, a breach between the two friends must necessarily arise.

Er bindet sich an keine beson'deren Stunden, sondern ar'beitet nach Muße. — He confines himself to no particular hours, but works according to (his) leisure.

EXERCISE 126.

1. Die Franzosen eroberten Spanien mit Gewalt der Waffen. 2. Die Schneelawinen in der Schweiz stürzen oft mit furchtbarer Gewalt in die Thäler. 3. Die Einwohner dieses Landes schleppt man gewaltsam hinweg. 4. Mit aller Macht konnte er nichts ausrichten. 5. Die Griechen vertheidigten sich mit aller Macht gegen die Perser. 6. Der Schwächere muß nothwendiger Weise dem Stärkeren gehorchen. 7. Beinahe ganz Asien gehorchte dem Willen der Römer. 8. Um sein Leben zu fristen, mußte er nothwendiger Weise arbeiten. 9. Themistocles suchte nothgedrungener Weise eine Zufluchtsstätte am persischen Hofe. 10. Mein Freund vertraute mir gestern Abend unter vier Augen ein wichtiges Geheimniß an. 11. Nachdem die Schule aus war, spielten die Kinder unter den Bäumen des Gartens. 12. Alle Anwesenden kleideten sich nach der Mode von siebenzehn hundert neun und achtzig. 13. Wegen seiner Amtsgeschäfte hatte er wenig Muße zu Vergnügungen übrig. 14. Schiller konnte sich nun nach Muße in Mannheim literarischen Beschäftigungen widmen. 15. Ich habe aus Versehen einen andern Regenschirm mitgenommen. 16. Irrungen entstehen aus Mißverständnissen und Versehen. 17. Glücklicher Weise konnte er sich vermittelst seines Passes legitimiren. 18. Glücklicher Weise hatte ich noch zur rechten Zeit die Gefahr entdeckt. 19. Glücklicher Weise traf ich ihn auf der Straße. 20. Es ist bei dieser großen Feuersbrunst glücklicher Weise kein Menschenleben verunglückt. 21. Scherzweise darf man sich schon Manches erlauben. 22. Er berührte diese Scene scherzweise. 23. Ich liebe vorzugsweise die französische Sprache. 24. Er durfte ohne besondere Erlaubniß in das Zimmer des Fürsten gehen.

EXERCISE 127.

1. The inhabitants of Holstein defended themselves with all their power against the Danes. 2. William the Conqueror overcame England by force of arms. 3. Those brave soldiers forced their way with tremendous violence through the ranks of the enemy. 4. They forcibly hindered him from making his escape. 5. Do you like the German language? 6. Yes, I do; but I especially like the Italian language. 7. At the present time he is especially occupied with the German and Spanish languages (say *language*). 8. Fortunately I found my friend at home. 9. He is obliged to listen to the orders of his superiors. 10. Most people dress themselves after the French fashion. 11. I took unknowingly the hat of another. 12. My friend fortunately discovered the danger which threatened him. 13. By way of jest he told me many a truth. 14. Secretly you may tell many insults. 15. The princes of Germany proceed arbitrarily in ruling their dominion.

SECTION LXVII.—VARIOUS IDIOMS (*continued*).

The syllables chen and lein are suffixed to nouns, and form diminutives. These diminutives are always of the neuter gender, and change the radical vowel, when it admits of it:—Der Hügel, the hill. Das Hügelchen, the hillock. Die Kugel, the globe *or* ball. Das Kügelchen, the globule *or* the little ball. Nearly all nouns may take these suffixes, and drop a final e or en; as:—Der Knabe, the boy. Das Knäblein, the little boy. Die Stube, the room. Das Stübchen, the little room. They are used also as terms of endearment or familiarity, especially by children; as:—Vätercben, dear father. Mütterchen, dear mother. Schwesterchen, dear sister, etc.

1. In die Höhe, in the high, on high, upward, etc.; as:—Er sprang in die Höhe, he sprang up. In die Höhe richten, to raise, to elevate, to direct upward.

2. Gelten is variously translated, "to be worth, to pass for," etc.; as:—Diese Bücher werden für alte gelten, und ich werde deßhalb keinen Eingangszoll zu bezahlen haben, these books will pass for old ones, and I shall therefore have no duty to pay. Dieser Mann gilt viel in der Stadt, this man has great influence in the city. Was gilt dieses Pferd? what is this horse worth? Was gilt's? or Was gilt die Wette? is equivalent to our "what will you bet?" "how much is the stake?" etc. Es gilt ein Leben, there is a life at stake, etc.

VOCABULARY.

An'erkennung, *f.* recognition, acknowledgment.
Antrieb, *m.* impulse, motive.
Betrieb', *m.* business, trade.
Bewun'dern, to admire
Brauchbar, useful, serviceable.
Brüder'chen, *n.* little brother, darling brother.
Der'gestalt, in such a manner, so.
Ein'richten, to arrange, order.
Fabrik', *f.* manufactory, factory.
Fischchen, *n.* little fish.
Gänschen, *n.* gosling.
Gärtchen, *n.* little garden.
Häuschen, *n.* cottage.
Höhe, *f.* height, altitude. (See above, R. 1.)
Hüpfen, to hop, jump, skip.
Hütchen, *n.* little hat.
Kätzchen, *n.* pussy.
Kei'nesfalls, in no wise.
Kistchen, *n.* little chest.
Klatschen, to clap.
Lämmchen, *n.* lambkin.
Leistung, *f.* performance, accomplishment.
Leutchen, little people.
Niedlich, neat, nice, pretty.
Prophet', *m.* prophet.
Republika'nisch, republican.
Samstag, *m.* Saturday.
Spät, late.
Thierchen, *n.* little animal.
Trieb, *m.* impulse, instinct, inclination.

RÉSUMÉ OF EXAMPLES.

Er traf ihn der'gestalt mit seinem Schwerte, daß er zu Boden fiel. — He struck him with his sword so (in such a manner) that he fell to the ground.

Das Bübchen freut sich sehr über sein neues Hütchen. — The little boy rejoices much over his (little) new hat.

Ich werde es so ein'richten, daß ich Sie bald besu'chen kann. — I will so arrange it, that I can soon visit you.

Der Mensch soll im Glücke, wie im Leiden, seine Blicke in die Höhe richten. — In prosperity, as in affliction, man should direct his look upward.

EXERCISE 128.

1. Haben Sie dieses niedliche Gärtchen gesehen? 2. Nein, denn ich bewunderte jenes hübsche Häuschen. 3. Es gehört zwei alten Leutchen, welche ich kenne. 4. Was sind das für niedliche Thierchen? 5. Es sind in dem Garten eine Menge ganz junger Lämmchen. 6. Dieses Mädchen spielt mit seinem Brüderchen. 7. Wollen Sie mir jenes Kistchen geben? 8. Wollen Sie dieses auf dem Tischchen haben? 9. Sehen Sie, welch ein hübsches Hütchen! 10. Das Kindchen hat große Freude an seinem Kätzchen und an seinem Gänschen. 11. Richten Sie es so ein, daß Sie bis Samstag Morgen in meinem Hause sein können. 12. Machen wir es dergestalt, daß es für beide Zwecke brauchbar ist? 13. Er soll es so machen, daß er seine Bücher mitnehmen kann. 14. Ich richte es jedenfalls so ein, daß ich bis zehn Uhr bei Ihnen bin. 15. Wir machen es so, daß wir keinesfalls zu spät kommen. 16. Sagen Sie Ihrem Bruder, er möchte es dergestalt einrichten, daß es für Jedermann verständlich ist. 17. Ich hoffe, Sie werden es so einrichten, daß Sie auf dem letzten Dampfschiffe ankommen. 18. Ein Prophet gilt nirgends weniger, als in seinem Vaterlande und in seinem Hause. 19. Seine Stimme gilt viel im Rathe. 20. Was gilt's, in zwanzig Jahren ist der größte Theil Europa's republikanisch? 21. Der Trieb zum Bösen ist viel stärker in uns, als der zum Guten. 22. Die Anerkennung unserer Leistungen ist ein mächtiger Antrieb zum Fleiße. 23. Der Betrieb seiner Fabriken wird von Jahr zu Jahr größer. 24. Er richtete seine Augen in die Höhe. 25. Er sprang vor Freuden in die Höhe und klatschte in die Hände. 26. Die Kinder hüpften in die Höhe.

EXERCISE 129.

1. Dear father, will you buy me the little lambkin? 2. No, my dear daughter, but I will buy you the gosling and the little fish. 3. Have you seen that pretty cottage? 4. No, I admired that beautiful little garden. 5. Mary plays with the pussy, and her little brother with the little fish. 6. Look, what a beautiful little chest this is. 7. Men should at all times direct their thoughts to God. 8. Arrange it so, that I may find you tomorrow at home. 9. I hope you will arrange it so, that you may arrive on Monday morning. 10. What is this garden worth? 11. It is worth more than you believe. 12. What were these books worth ten years ago? 13. What will you bet against this horse? 14. There are five pounds at stake.

LESSONS IN MUSIC.—XII.

RELATION OF NOTES, ETC.

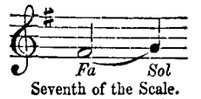
THE admired glee-writer, Webbe, whose name is second to none in the department of popular vocal music, in his solfeggio exercises and instructions in singing, adopts, as a matter of course, the "movable DOH;" Dr. Crotch, a great musical authority, used the same method in his "Elements of Composition," published A.D. 1812; and Mr. W. Forde, author of the "Art of Singing at Sight," follows their example. If other authorities are required, we would gladly leave our appeal with such men as Mr. Graham, of Edinburgh, the author of the article on "Music" in an early edition of the "Encyclopædia Britannica;" Mr. Hogarth, distinguished as a writer on musical history; General Thompson, the profound writer on musical acoustics; Mr. Hickson, the father of English school music; and Mr. Lowell Mason, the eminent American composer and teacher. Ask ninety-nine persons out of a hundred, who can really sing at sight, how they came to do so, and they will tell you: "By measuring interval from the key-note, and keeping the key-note in the eye throughout the tune." Such persons will at once acknowledge the importance of having a *distinct name* (DOH) for that key-note, and of naming all the other notes by their relation to it.

6. "In teaching," says Mr. Hickson, "the art of sight-singing, an art rarely taught by Italian professors, whose fashionable pupils only sing to the harp or pianoforte, there is but one mode of using the solfeggio syllables in which they can be of the slightest use; that is, by adhering to the rule laid down by Rousseau, and followed by many of the best of our English choral teachers, of identifying them, *not with the fixed sounds, expressed by the letters, but with the intervals of the diatonic scale,* 'DOH' *in every key* representing the key-note; 'RE,' the second of the scale, etc. We have already shown that the art of reading music at sight depends upon the ability to recognise at a glance the intervals of the scale, in whatever key they may be written; that is to say, to distinguish at once, not which is A or B, but which is the key-note, which is the 3rd, 5th, 7th, etc. It will therefore at once be seen that Forde, by adopting Rousseau's rule for using the solfeggio syllables, as names for the intervals, converts them into a most profitable exercise, an exercise which compels the pupil to study the intervals in every bar he sings, and to give up guessing. . . . Great confusion and perplexity are introduced by the opposite method. We have pointed out the different properties of the fourth and the seventh, the one tending *downwards* and the other *upwards*; yet although [the pitch note] F may sometimes be the fourth and at other times the seventh, according to the key, and although F in the key of C differs half a tone from F in the key of G, it is always, we are told, to be called FA!"

Two notes OPPOSED *to one another in mental effect, and* DIFFERING *in pitch, yet called by the* SAME *name, and in connection with a system that prides itself on its educational* "METHOD."



Fourth of the Scale.



Seventh of the Scale.

"We think it must be obvious," continues Mr. Hickson, "that the solfeggio syllables, thus employed, tend to *mislead* the pupil rather than assist him in learning the art of sight-singing. It is using words, as a lawyer would say, in the sense of a *suggestio falsi*." Perhaps the most marked practical advantage of the tonic (or key-note) method of solfa-ing is that it establishes in the ear of the pupil a complete association of interval and syllable. So that the syllables become not only an unchanging *language* of interval, useful in connection with the whole study of music, however far it may be carried, but also a *guide* and *prompter* in the art of striking interval with accuracy and certainty. Thus, if the syllables ME, FAH are *frequently* sung to a "semitone," the mind soon learns to associate that interval with those syllables, so that the very attempt to pronounce the syllable shall call up into the mind the interval to which they have so often been sung. In this way our syllables become invaluable aids and interpreters.

7. We take this opportunity of giving our reason for accompanying the established notation with a constant interpreter, in the new notation placed between the staves. The truth is that the old notation, being used perhaps chiefly in connection with instruments, sets forth the *pitch* of a note (the thing the ordinary instrumentalist wants) in a most clear, distinct, and pictorial manner, but leaves *key-relationship* (that which the vocalist requires to be the first and most obvious thing to

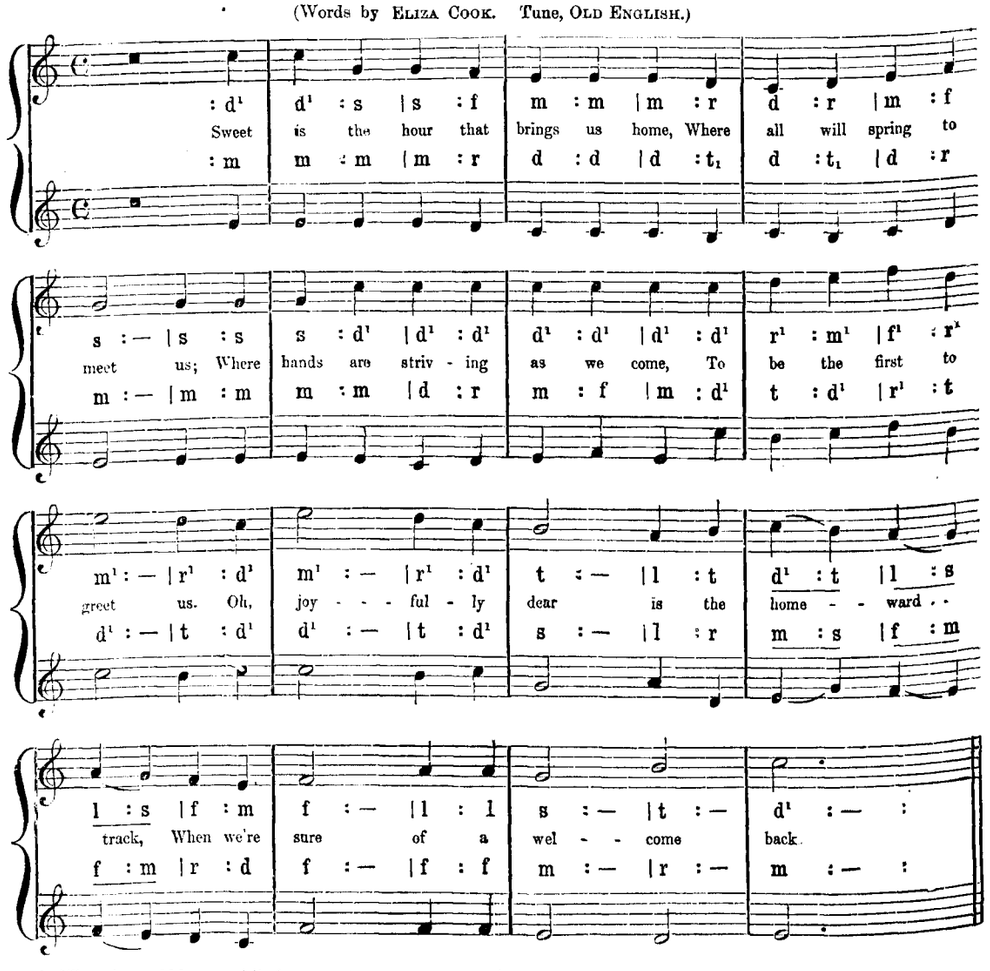
meet the eye, and which is by far the most important thing in the science of music itself) but dimly expressed. Hence the vast variety of sol-fa systems, figure systems, tetrachordal systems, etc., which have sprung up, every good teacher feeling the necessity of marking the key-note and the notes related to it more visibly. The most successful modern teachers of sight-singing have adopted a similar plan. Thus the Rev. J. J. Waite, who taught some thousands of English people how to sing, did so by means of an interpreting notation of figures placed under the other notes, figure 1 standing for the key-note, 2 for the next, etc. We have watched Mr. Waite's pupils, and have found them singing, not from the crotchets and quavers on the staff, but from the figures below, which they find incomparably easier, because those figures are to them a notation of key-relationship.

In Scotland, the well-known educational writer and publisher, Mr. Gall, of Edinburgh, has adopted a figure notation for many years; and in Ireland we find Dr. Bryce using both the figures and the sol-fa syllables, in his exercises, to set forth the *relation* of notes, while the old notation sets forth the *pitch*. For the present we shall do the same, but soon we shall teach our pupils to do without the syllables, and to use *intelligently* the established notation alone.

Our pupils will now study with care the following exercises on the mental effects of DOH, ME, and SOH. Let them be as scrupulous as ever in the self-discipline of learning the tune, piecemeal, by "heart" (or by "hear it," as Cobbett used to explain the word), until they can sol-fa it all by *memory*, pointing on the modulator the while.

EXERCISE 20.—THE WELCOME BACK. KEY C. M. 138.

(Words by ELIZA COOK. Tune, OLD ENGLISH.)



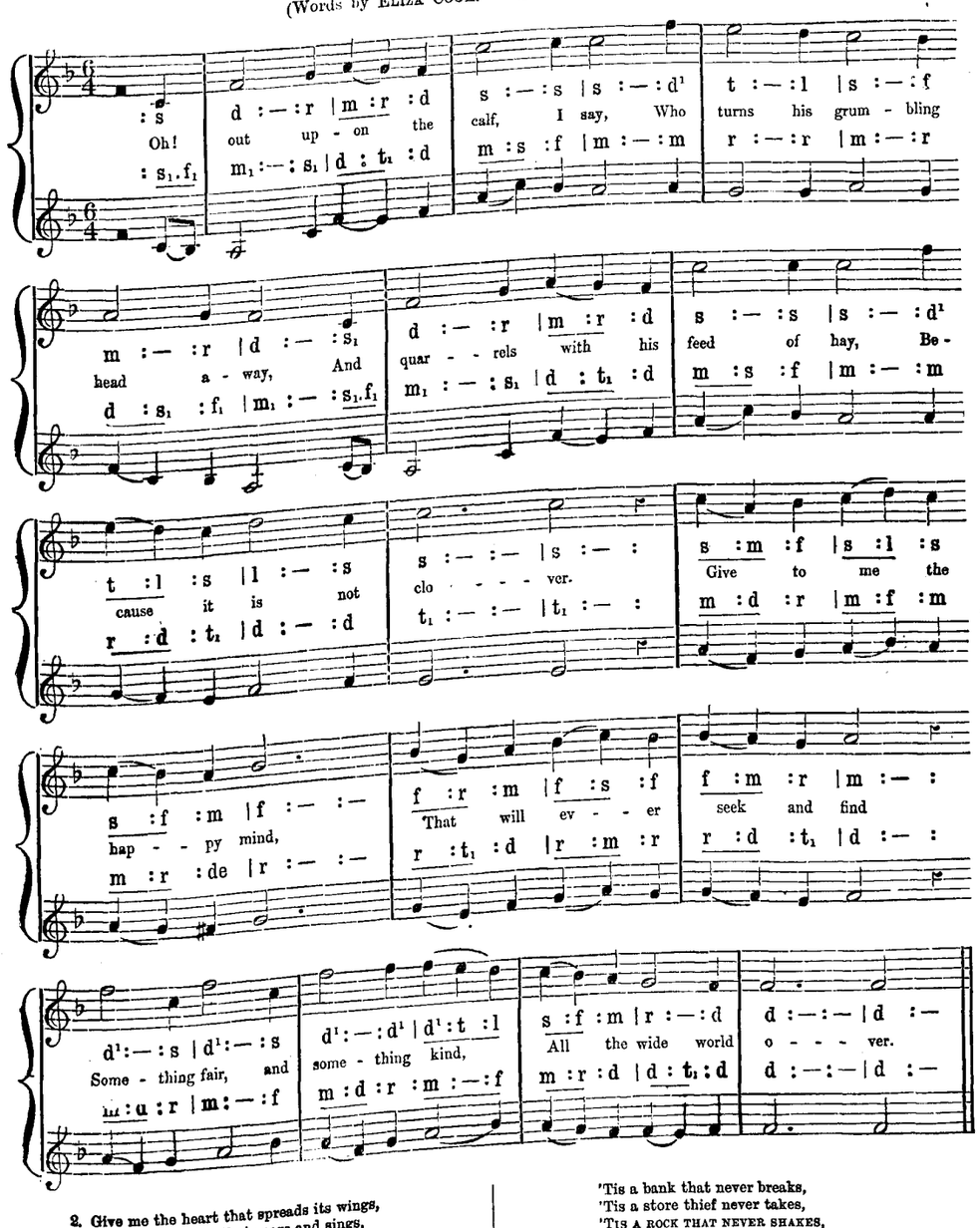
2. When the world has spent its frowns and wrath,
And care been sorely pressing,
'Tis sweet to leave our roving path,
And find a fireside blessing.
Oh! joyfully dear, etc.

3. What do we reck on a dreary way,
Though lonely and benighted,
If we know there are lips to chide our stay,
And eyes that beam love-lighted.
Oh! joyfully dear, etc.

When once this simple tune is learnt, it should be sung *very quickly* and lightly, and yet with a *perfect* and *distinct* enunciation of the words. Let every motion of lips, tongue, and teeth, by which the words are produced, be very decided and sharp. We should sing so as to make ourselves understood by a listener. Try the experiment. If our pupil is wise, he will still continue to neglect the staff, and confine his attention to the sol-fa syllables *and to the modulator.*

EXERCISE 21.—THE HAPPY MIND. KEY F. M. 160.

(Words by ELIZA COOK. Tune, OLD ENGLISH.)



2. Give me the heart that spreads its wings,
Like the free bird that soars and sings,
And sees the bright side of all things
From Behring's Straits to Dover.

'Tis a bank that never breaks,
'Tis a store thief never takes,
'TIS A ROCK THAT NEVER SHAKES,
ALL THE WIDE WORLD OVER.

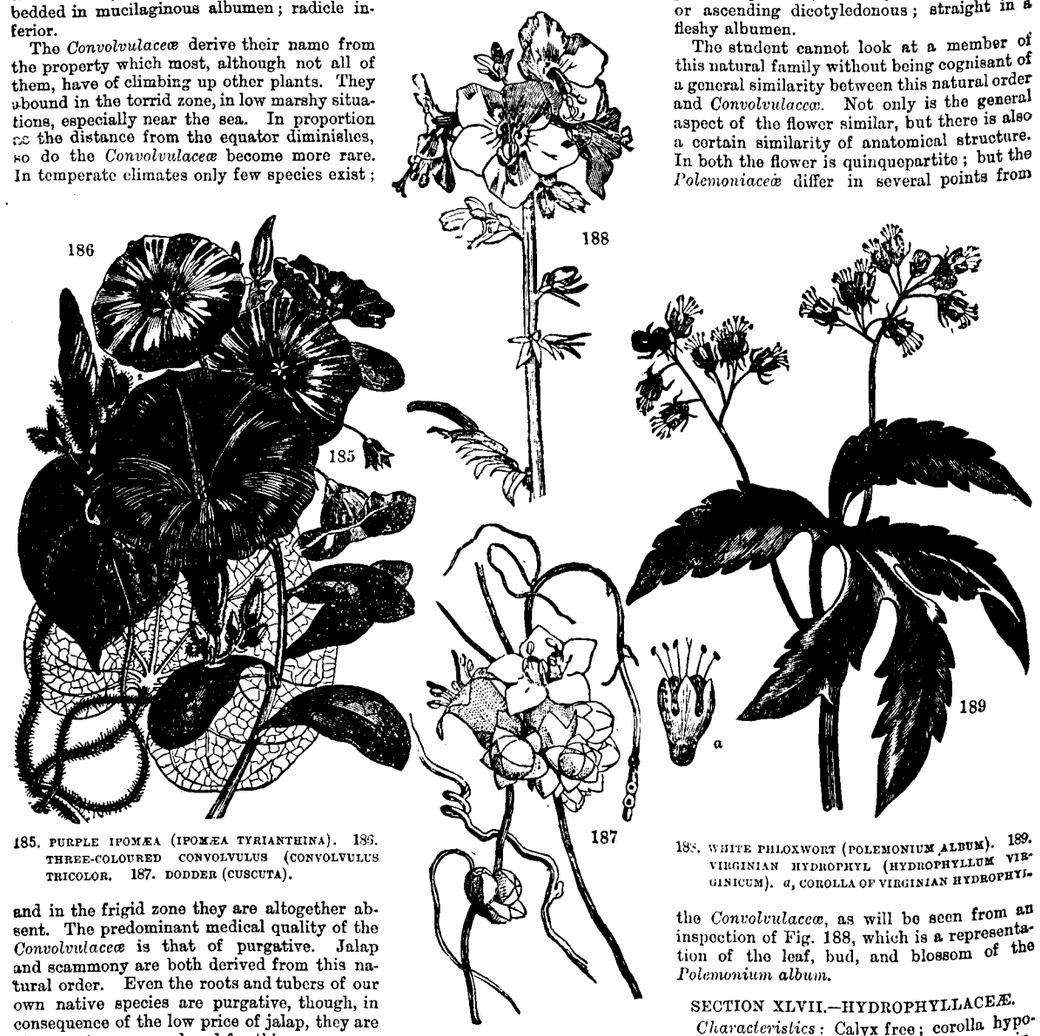
It is to the *melody* of these tunes that we call special attention at present. We are obliged to introduce into the "second" or accompanying part some notes which have not yet been explained in our course of lessons. It will be seen that the note *de* occurs. This note is as much lower than RAY as TE is lower than DOH. Sing it then as a sort of "leading note" to *ray*. Illustrations of the mental effect of FAH and LAH will be given in our next lesson.

LESSONS IN BOTANY.—XXIV.

SECTION XLV.—CONVOLVULACEÆ.

Characteristics: Calyx free, corolla hypogynous, mohopetalous, regular; æstivation contorted; stamens inserted into the tube of the corolla, their number equal to that of the lobes; ovary two to four celled; ovules solitary or twin, erect; fruit capsular or bacciform; séed dicotyledonous, curved, imbedded in mucilaginous albumen; radicle inferior.

The *Convolvulaceæ* derive their name from the property which most, although not all of them, have of climbing up other plants. They abound in the torrid zone, in low marshy situations, especially near the sea. In proportion as the distance from the equator diminishes, so do the *Convolvulaceæ* become more rare. In temperate climates only few species exist; and in the frigid zone they are altogether absent. The predominant medical quality of the *Convolvulaceæ* is that of purgative. Jalap and scammony are both derived from this natural order. Even the roots and tubers of our own native species are purgative, though, in consequence of the low price of jalap, they are at present never employed for this purpose.



185. PURPLE IPOMÆA (IPOMÆA TYRIANTHINA). 186. THREE-COLOURED CONVOLVULUS (CONVOLVULUS TRICOLOR. 187. DODDER (CUSCUTA).

188. WHITE PHLOXWORT (POLEMONIUM ALBUM). 189. VIRGINIAN HYDROPHYL (HYDROPHYLLUM VIRGINICUM). *a*, COROLLA OF VIRGINIAN HYDROPHYL.

It is scarcely necessary to append an engraving for the purpose of giving the reader a general idea of the external characteristics presented by this natural order. Nevertheless, we do this that we may introduce three beautiful species, the *Ipomœa tyrianthina* (Fig. 185), or purple ipomœa, a stove evergreen climber, indigenous to Mexico, the *Convolvulus tricolor* (Fig. 186); and the *Cuscuta*, or dodder (Fig. 187). It should be said that although the dodders are generally referred to the order *Convolvulaceæ*, by some botanists they are grouped into a small distinct order termed *Cuscutaceæ*. Like the *Convolvulaceæ* they are climbing plants, but they differ from them in being leafless and parasitic, often causing great injury to crops of leguminous plants and flax, to the stalks of which the stem of the dodder attaches itself by small rootlets, the original root which had been sent out from the seed when it germinated in the ground dying away as soon as the stem has commenced to throw out rootlets.

SECTION XLVI.—POLEMONIACEÆ, OR PHLOXWORTS.

Characteristics: Corolla hypogynous, monopetalous, regular; stamens inserted upon the tube of the corolla, in number equal to its lobes, and alternate with them; ovary three to five celled; placentæ parietal; fruit capsular; seeds erect or ascending dicotyledonous; straight in a fleshy albumen.

The student cannot look at a member of this natural family without being cognisant of a general similarity between this natural order and *Convolvulaceæ*. Not only is the general aspect of the flower similar, but there is also a certain similarity of anatomical structure. In both the flower is quinquepartite; but the *Polemoniaceæ* differ in several points from the *Convolvulaceæ*, as will be seen from an inspection of Fig. 188, which is a representation of the leaf, bud, and blossom of the *Polemonium album*.

SECTION XLVII.—HYDROPHYLLACEÆ.

Characteristics: Calyx free; corolla hypogynous, monopetalous, regular; stamens inserted upon the tube of the corolla, in number equal to the divisions of the latter, and alternate with them; ovary unilocular or imperfectly bilocular; placentæ parietal; ovules solitary or numerous on each side of the placentæ; fruit capsular or almost fleshy; seeds few in number; seed dicotyledonous; embryo straight, imbedded in an abundant cartilaginous albumen.

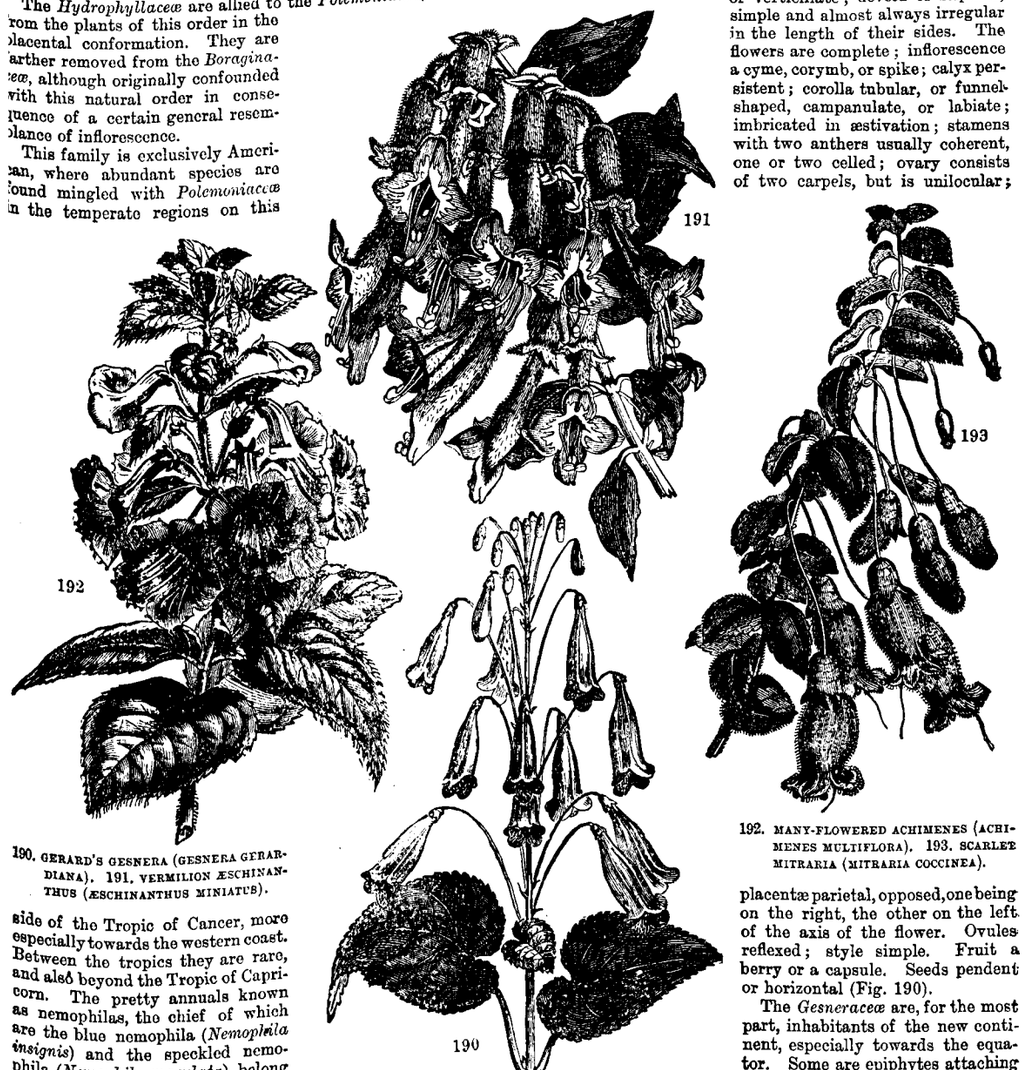
Members of this natural family, to which the genus *Hydrophyllum* lends its appellation, are herbs either annual or perennial, possessing an aqueous juice; an angular stem considerably ramified; leaves alternate, especially towards the upper part of the vegetable, usually deprived of stipules; flowers complete, regular, disposed in corymbs or unilateral spikes, scorpioidal, or scorpion-like, simple, or dichotomous, rarely solitary; calyx deeply fissured in five divisions, imbricated in æstivation, and

persistent; corolla inserted externally to a ring surrounding the base of the ovary, campanulate or imperfectly rotate, occasionally funnel-shaped, its tube ordinarily furnished with tongue-like scales alternating with the stamens; limb five-partite, imbricated in æstivation; stamens to the number of five having their filaments bent inwards during æstivation; anthers introrse; ovary composed of two carpels (Fig. 189).

The *Hydrophyllaceæ* are allied to the *Polemoniaceæ*, differing from the plants of this order in the placental conformation. They are farther removed from the *Boraginaceæ*, although originally confounded with this natural order in consequence of a certain general resemblance of inflorescence.

This family is exclusively American, where abundant species are found mingled with *Polemoniaceæ* in the temperate regions on this side of the Tropic of Cancer, more especially towards the western coast. Between the tropics they are rare, and also beyond the Tropic of Capricorn. The pretty annuals known as nemophilas, the chief of which are the blue nemophila (*Nemophila insignis*) and the speckled nemophila (*Nemophila maculata*), belong to this natural order.

One species, the Canadian hydrophyl (*Hydrophyllum Canadense*), a hardy herbaceous perennial, is employed in North America as a remedy for the bites of snakes, also for erysipelas caused by the contact of a poisonous North American plant, the sumach (*Rhus pumila*). *Hydrophyllum Virginicum*, a species now frequent in botanical gardens, has pinnatisect leaves, and white or blue corolla.



190. GERARD'S GESNERA (GESNERA GERARDIANA). 191. VERMILION ÆSCHINANTHUS (ÆSCHINANTHUS MINIATUS). 192. MANY-FLOWERED ACHIMENES (ACHIMENES MULTIFLORA). 193. SCARLET MITRARIA (MITRARIA COCCINEA).

SECTION XLVIII.—GESNERACEÆ, OR GESNERWORTS.

Characteristics: Calyx free, more or less adherent to the ovary; corolla monopetalous, irregular, inserted upon the receptacle or upon a fleshy annulus between the calyx and ovary; stamens inserted upon the tube of the corolla, four, didynamous, occasionally five, the fifth being sterile, occasionally only two; ovary unilocular; placentæ parietal; fruit superior or inferior; seed dicotyledonous, containing little or no albumen.

The *Gesneraceæ* are herbaceous plants, rarely ligneous, usually possessing a tetragonal ramified stem; leaves generally opposite or verticillate; devoid of stipules, simple and almost always irregular in the length of their sides. The flowers are complete; inflorescence a cyme, corymb, or spike; calyx persistent; corolla tubular, or funnel-shaped, campanulate, or labiate; imbricated in æstivation; stamens with two anthers usually coherent, one or two celled; ovary consists of two carpels, but is unilocular; placentæ parietal, opposed, one being on the right, the other on the left of the axis of the flower. Ovules reflexed; style simple. Fruit a berry or a capsule. Seeds pendent or horizontal (Fig. 190).

The *Gesneraceæ* are, for the most part, inhabitants of the new continent, especially towards the equator. Some are epiphytes attaching themselves to the trunks of trees. A few of this natural order are found in tropical India, especially in the islands of the Indian Archipelago, and on the southern slopes of the Himalaya Mountains.

These two families, although considerable in the number of their species, offer but little of importance in respect of useful properties. *Columnea scandens*, a little shrub of India, bearing pretty blue flowers, is cultivated in our hot-houses. Many other species of *Gesneraceæ* are in favour amongst cultivators; for example, the *Æschinanthus miniatus*, or vermilion æschinanthus (Fig. 191), and the *Chirita Moonii*, or Moon's chirita, from Ceylon,

of the former of which a representation is given. The *Chirita Sinensis* is acaulescent; its radical peduncle is blue or yellow, and divided into two or three pedicels, each bearing a flower. The *Chirita Moonii* is remarkable for its elevation, its beautiful foliage, and its pale violet corolla ornamented internally with a golden spot.

Mitraria coccinea, or scarlet mitraria (Fig. 193), is a little Chilian shrub, a beautiful spring-blooming plant for the greenhouse. Its stem and boughs are weak and slender, its peduncles opposed and unifloral. Its corolla is of a bright red. The *Achimenes multiflora*, or many-flowered achimenes (Fig. 192), is a Brazilian species, only introduced into Europe in 1843, remarkable, like all its congeners, for its general elegance of aspect and the long duration of its flowers.

READING AND ELOCUTION.—XXIV.

EXERCISES ON EXPRESSIVE TONE (*continued.*)

[To be marked for *Inflections* by the student.]

XV. CAUSES OF WAR.

What are sufficient causes of war let no man say, let no legislator say, until the question of war is directly and inevitably before him. Jurists may be permitted, with comparative safety, to pile tome upon tome of interminable disquisition upon the motives, reasons, and causes of just and unjust war. Metaphysicians may be suffered with impunity to spin the thread of their speculations until it is attenuated to a cobweb; but for a body created for the government of a great nation, and for the adjustment and protection of its infinitely diversified interests, it is worse than folly to speculate upon the causes of war, until the great question shall be presented for immediate action—until they shall hold the united question of cause, motive, and present expediency, in the very palm of their hands. War is a tremendous evil. Come when it will, unless it shall come in the necessary defence of our national security, or of that honour under whose protection national security reposes, it will come too soon—too soon for our national prosperity—too soon for our individual happiness—too soon for the frugal, industrious, and virtuous habits of our citizens—too soon, perhaps, for our most precious institutions. The man who, for any cause, save the sacred cause of public security, which makes all wars defensive—the man who, for any cause but this, shall promote or compel this final and terrible resort, assumes a responsibility second to none, nay, transcendently deeper and higher than any which man can assume before his fellow-man, or in the presence of God, his Creator.—*Binney.*

XVI. A CHILD CARRIED AWAY BY AN EAGLE.

The great golden eagle, the pride and the pest of the parish, stooped down, and flew away with something in his talons. One single sudden female shriek, and then shouts and outcries, as if a church spire had tumbled down on a congregation at a sacrament! "Hannah Lamond's bairn! Hannah Lamond's bairn!" was the loud, fast-spreading cry. "The eagle's ta'en off Hannah Lamond's bairn!" and many hundred feet were in another instant hurrying towards the mountain. Two miles of hill, and dale, and copse, and shingle, and many intersecting brooks, lay between; but in an incredibly short time the foot of the mountain was alive with people.

The eyrie was well known, and both old birds were visible on the rock-ledge. But who shall scale that dizzy cliff, which Mark Steuart, the sailor, who had been at the storming of many a fort, attempted in vain? All kept gazing, weeping, wringing of hands in vain, rooted to the ground, or running backwards and forwards, like so many ants essaying their new wings in discomfiture. "What's the use—what's the use o' ony puir human means? We have no power but in prayer!" and many knelt down—fathers and mothers thinking of their own babies—as if they would force the deaf heavens to hear!

Hannah Lamond had all this while been sitting on a rock, with a face perfectly white, and eyes like those of a mad person fixed on the eyrie. Nobody had noticed her; for strong as all sympathies with her had been at the swoop of the eagle, they were now swallowed up in the agony of eyesight. "Only last sabbath was my sweet wee wean baptized, in the name o' the Father, and the Son, and the Holy Ghost!" and, on uttering these words, she flew off through the brakes, and over the huge stones, up—up—up, faster than ever huntsman ran in to the death, fearless as a goat playing among the precipices.

No one doubted, no one could doubt, that she would soon be dashed to pieces. But have not people who walk in their sleep, obedient to the mysterious guidance of dreams, climbed the walls of old ruins, and found footing, even in decrepitude, along the edge of unguarded battlements, and down dilapidated staircases, deep as draw-wells, or coal-pits, and returned with open, fixed and unseeing eyes, unharmed to their beds, at midnight? It is all the work of the soul, to whom the body is a slave; and shall not the agony of a mother's passion, who sees her baby, whose warm mouth had just left her breast, hurried off by a demon to a hideous death, bear her limbs aloft wherever there is dust to dust, till she reach that devouring den, and, fiercer and more furious far, in the passion of love, than any bird of prey that ever bathed its beak in blood, throttle the fiends that with their heavy wings would fain flap her down the cliffs, and hold up the child, in deliverance, before the eye of the all-seeing God?

No stop—no stay; she knew not that she drew her breath. Beneath her feet Providence fastened every loose stone, and to her hands strengthened every root. How was she ever to descend? That fear, then, but once crossed her heart as she went—up—up—up, to the little image made of her own flesh and blood. "The God who holds me now from perishing, will not the same God save me when my child is on my bosom?" Down came the fierce rushing of the eagles' wings—each savage bird dashing close to her head, so that she saw the yellow of their wrathful eyes. All at once they quailed and were cowed. Yelling, they flew off to the stump of an ash jutting out of the cliff, a thousand feet above the cataract; and the Christian mother falling across the eyrie, in the midst of bones and blood, clasping her child—dead, dead, dead, no doubt—but unmangled and untorn, and swaddled up, just as it was when she laid it down asleep among the fresh hay, in a nook of the harvest field.

Oh! what a pang of perfect blessedness transfixed her heart from that faint, feeble cry, "It lives—it lives—it lives!" and baring her bosom, with loud laughter, and eyes dry as stones, she felt the lips of the unconscious innocent once more murmuring at the fount of life and love! "O Thou great and thou dreadful God! whither hast thou brought me, one of the most sinful of thy creatures? Oh! save my soul, lest it perish, even for thy own name's sake! O Thou, who diedst to save sinners, have mercy upon me."

Cliffs, chasms, blocks of stone, and the skeletons of old trees—far, far down, and dwindled into specks—a thousand creatures of her own kind, stationary, or running to and fro! Was that the sound of the waterfall, or the faint roar of voices? Is that her native strath?—and that tuft of trees, does it contain the hut in which stands the cradle of her child? Never more shall it be rocked by her foot! Here must she die—and, when her breast is exhausted, her baby too! And those horrid beaks, and eyes, and talons, and wings will return; and her child will be devoured at last, even within the dead bosom that can protect it no longer.

Where, all this while, was Mark Steuart, the sailor? Half way up the cliffs. But his eye had got dim, and his head dizzy, and his heart sick; and he who had so often reefed the top-gallant sail, when at midnight the coming of the gale was heard afar, covered his face with his hands, and dared look no longer on the swimming heights.

"And who will take care of my poor bedridden mother?" thought Hannah, whose soul, through the exhaustion of so many passions, could no more retain in its grasp that hope which it had clutched in despair. A voice whispered, "God!" She looked around, expecting to see an angel; but nothing moved except a rotten branch, that, under its own weight, broke off from the crumbling rock. Her eye, by some secret sympathy of her soul with the inanimate object, watched its fall, and it seemed to stop not far off, on a small platform.

Her child was bound within her bosom—she remembered not how or when—but it was safe; and scarcely daring to open her eyes, she slid down the shelving rocks, and found herself on a small piece of firm root-bound soil, with the tops of bushes appearing below. With fingers suddenly strengthened into the power of iron, she swung herself down by brier, and broom, and heather, and dwarf-birch. There a loosened stone leapt over a ledge; and no sound was heard, so profound was its fall. There the shingle rattled down the screes, and she hesitated not to follow. Her feet bounded against the huge stone that stopped them, but she felt no pain. Her body was callous as the cliff.

Steep as the wall of a house was now the side of the precipice. But it was matted with ivy centuries old, long ago dead, and without a single green leaf, but with thousands of arm-thick stems, petrified into the rock, and covering it as with a trellis. She bound her baby to her neck, and with hands and feet clung to that fearful ladder. Turning round her head and looking down, lo, the whole population of the parish, so great was the multitude, on their knees! and hush! the voice of psalms! a hymn breathing the spirit of one united prayer! Sad and solemn was the strain, but nothing dirge-like—breathing not of death, but deliverance. Often had she sung that tune—perhaps the very words, but them she heard not—in her own hut, she and her mother, or in the kirk, along with all the congregation. An unseen hand seemed fastening her fingers to the ribs of ivy; and in sudden inspiration, believing that her life was to be saved, she became almost as fearless as if she had been changed into a winged creature.

Again her feet touched stones and earth. The psalm was hushed, but a tremulous sobbing voice was close beside her, and lo! a she-goat, with two little kids at her feet. "Wild heights," thought she, "do these creatures climb; but the dam will lead down her kid by the easiest paths, for oh! even in the brute creatures, what is the holy power of a mother's love!" and turning round her head, she kissed her sleeping baby, and for the first time she wept.

Overhead frowned the front of the precipice, never touched before by human hand or foot. No one had ever dreamt of scaling it; and the golden eagles knew that well in their instinct, as, before they built their eyrie, they had brushed it with their wings. But all the rest of this part of the mountain-side, though scarred, and seamed, and chasmed, was yet accessible; and more than one person in the parish had reached the bottom of the Gload's Cliff. Many were now attempting it; and ere the cautious mother had followed her dumb guides a hundred yards, though among dangers that, although enough to terrify the stoutest heart, were traversed by her without a shudder, the head of one man appeared, and then the head of another; and she knew that God had delivered her and her child in safety into the care of their fellow-creatures.

Not a word was spoken—eyes said enough; she hushed her friends with her hands, and with uplifted eyes, pointed to the guides sent to her by heaven. Small green plats, where those creatures nibble the wild flowers, became now more frequent; trodden lines, almost as easy as sheep-paths, showed that the dam had not led her young into danger; and now the brushwood dwindled away into straggling shrubs, and the party stood on a little eminence above the stream, and forming part of the strath.

There had been trouble and agitation, much sobbing, and many tears, among the multitude, while the mother was scaling the cliffs: sublime was the shout that echoed afar the moment she reached the eyrie; then had succeeded a silence deep as death. In a little while arose the hymning prayer, succeeded by mute supplication; the wildness of thankful and congratulatory joy had next its sway; and now that her salvation was sure, the great crowd rustled like the wind-swept wood. And for whose sake was all this alternation of agony? A poor humble creature, unknown to many even by name—one who had but few friends, nor wished for more, contented to work all day—here, there, anywhere—that she might be able to support her aged mother and her little child; and who on Sabbath took her seat in an obscure pew, set apart for paupers, in the kirk.—*Professor Wilson.*

XVII. THE DOWNFALL OF POLAND.

O sacred Truth! thy triumph ceased awhile,
And Hope, thy sister, ceased with thee to smile,
When leagued Oppression poured to Northern wars
Her whiskered pandours and her fierce hussars,
Waved her dread standard to the breeze of morn,
Pealed her loud drum, and twanged her trumpet horn;
Tumultuous horror brooded o'er her van,
Presaging wrath to Poland,—and to man!

Warsaw's last champion from her height surveyed,
Wide o'er the fields a waste of ruin laid:
O Heaven! he cried, my bleeding country save!
Is there no hand on high to shield the brave?
Yet, though destruction sweep these lovely plains,
Rise, fellow-men! our country yet remains!
By that dread name, we wave the sword on high!
And swear for her to live!—with her to die!

He said, and on the rampart-heights arrayed
His trusty warriors, few, but undismayed;
Firm-paced and slow, a horrid front they form,
Still as the breeze, but dreadful as the storm:
Low murmuring sounds along their banners fly,
"Revenge, or death,"—the watchword and reply;
Then pealed the notes omnipotent to charm,
And the loud tocsin told their last alarm!

In vain, alas! in vain, ye gallant few,
From rank to rank your volleyed thunder flew:
Oh! bloodiest picture in the book of Time,
Sarmatia fell, unwept, without a crime;
Found not a generous friend, a pitying foe,
Strength in her arms, nor mercy in her woe;
Dropped from her nerveless grasp the shattered spear,
Closed her bright eye, and curbed her high career:
Hope, for a season, bade the world farewell,
And Freedom shrieked—as Kosciusko fell.

The sun went down, nor ceased the carnage there;
Tumultuous murder shook the midnight air,—
On Prague's proud arch the fires of ruin glow,
His blood-dyed waters murmuring far below;
The storm prevails, the rampart yields away,
Bursts the wild cry of horror and dismay!
Hark! as the mouldering piles with thunder fall,
A thousand shrieks for hopeless mercy call!
Earth shook,—red meteors flashed along the sky,
And conscious Nature shuddered at the cry!

O righteous Heaven! ere Freedom found a grave,
Why slept the sword, omnipotent to save?
Where was thine arm, O Vengeance! where thy rod,
That smote the foes of Sion and of God;
That crushed proud Ammon, when his iron car
Was yoked in wrath, and thundered from afar?
Where was the storm that slumbered till the host
Of blood-stained Pharaoh left their trembling coast;
Then bade the deep in wild commotion flow,
And heaved an ocean on their march below?

Departed spirits of the mighty dead!
Ye that at Marathon and Leuctra bled!
Friends of the world! restore your swords to man,
Fight in his sacred cause, and lead the van!
Yet for Sarmatia's tears of blood atone,
And make her arm as puissant as your own!
Oh! once again to freedom's cause return
The patriot Tell, the Bruce of Bannockburn!

Yes, thy proud lords, unpitied land! shall see
That man hath yet a soul, and dare be free!
A little while, along thy saddening plains,
The starless night of Desolation reigns;
Truth shall restore the light by Nature given,
And, like Prometheus, bring the fire of Heaven!
Prone to the dust Oppression shall be hurled,
Her name, her nature, withered from the world.

Thomas Campbell.

XVIII. EDMUND BURKE.

A SAGACIOUS critic has advanced the opinion, that the merit of Burke was almost wholly literary; but I confess I see little ground for this assertion, if literary excellence is here understood in any other sense, than as an immediate result of the highest intellectual and moral endowments. Such compositions as the writings of Burke suppose, no doubt, the fine taste, the command of language, and the finished education, which are all supposed by every description of literary success. But in the present state of society, these qualities are far from being uncommon; and are possessed by thousands, who make no pretensions to the eminence of Burke, in the same degree in which they were by him. Such a writer as Cumberland, for example, who stands infinitely below Burke in the scale of intellect, may yet be regarded as his equal or superior in purely literary accomplishments taken in this exclusive sense.

The style of Burke is undoubtedly one of the most splendid forms in which the English language has ever been exhibited. It displays the happy and difficult union of all the richness and magnificence that good taste admits, with a perfectly easy construction. In Burke we see the manly movement of a well-bred gentleman; in Johnson, an equally profound and vigorous thinker, the measured march of a grenadier. We forgive the great moralist his stiff and cumbrous phrases, in return for the rich stores of thought and poetry which they conceal; but we admire in Burke, as in a fine antique statue, the grace with which the large flowing robe adapts itself to the majestic dignity of the person.

But with all his literary excellence, the peculiar merits of this great man were, perhaps, the faculty of profound and philosophical thought, and the moral courage which led him to disregard personal inconvenience in the expression of his sentiment. Deep thought is the informing soul, that everywhere sustains and inspires the imposing grandeur of his eloquence. Even in the Essay on the Sublime and Beautiful, the only work of pure literature which he attempted—that is, the only one which was not an immediate expression of his views on public affairs—there is still the same richness of thought, the same basis of "divine philosophy," to support the harmonious superstructure of the language. And the moral courage which formed so remarkable a feature in his character, contributed not less essentially to his literary success.

It seems to be a law of nature, that the highest degree of eloquence demands the union of the noblest qualities of character, as well as intellect. To think, is the highest exercise of the mind; to say what you think, the boldest effort of moral courage; and both these things are required for a really powerful writer. Eloquence without thoughts is a mere parade of words; and no man can express with spirit and vigour any thoughts but his own. This was the secret of the eloquence of Rousseau, which is not without a certain analogy in its forms to that of Burke. The principal of the Jesuits' college one day inquired of him by what art he had been able to write so well. "*I said what I thought,*" replied the unceremonious Genevan; conveying in these few words the bitterest satire on the system of the Jesuits, and the best explanation of his own.—*A. H. Everett.*

In the "Downfall of Poland," by Thomas Campbell, and the spirited word-painting by Professor Wilson of the recovery of a child by its mother from an eagle's eyrie, to which even a sailor had not dared to climb, the reader will find admirable exercises, in the first-named for his elocutional powers, and in the latter for his ability to render a well-described scene even still more graphic by the manner in which he reads it.

LESSONS IN BOOKKEEPING.—XV.

THE JOURNAL.

BEFORE entering on this lesson it will be advisable for the student to refer to, and read over carefully, Lessons V. and VI. (Vol. I., p. 368, and Vol. II., p. 31), in which the nature and purport of the *Journal* and the points in which it differs from the *Day Book* are fully described. It may be as well to state, for facilitating reference, that in the same lessons will be found a description of all the subsidiary books that are generally used in the merchant's counting-house, etc.

The *Journal*, as we have before remarked, is no longer what its name denotes, a *Day Book;* but is now used, in Double Entry, as a book for collecting all the transactions of business for a given period into a focus, previous to their being entered in the *Ledger*. In an ordinary business, where the transactions are neither too numerous nor too complicated, the formation of this book from the various subsidiary books of the concern, may take place only *once a month;* and then with reference to time, as we formerly observed, it might be called the *Month-Book;* and in the same way, according to the regular intervals when this collective book is made up, it might be called *Week-Book*, or even *Day-Book*. The best name, however, which could be given to it, would be one indicative of its actual use, without reference to time; we have already suggested the name *Sub-Ledger*, and we may now propose a name which would, perhaps, be more accurate and distinct, as regards the method in which it is made up, and the connection which it has with the Ledger—we mean the GENERAL POSTING BOOK. Some of our students who are, no doubt, keen business-men, and are on the alert to discover any improvements that can be made in Bookkeeping, in order to shorten their labour and produce more accurate results, or rather to effect less frequent liability to error, will, if they have gone with us thus far, propose some shorter or more pointed name than the preceding; for once, therefore, we leave this subject in their hands.

(1) JOURNAL. (1)

Date.	Fol.	January, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
22	1	Cash Dr.	2205	0	0			
		To Sundries, as per C. B. fol. 1.						
1	1	To Stock Account				1200	0	0
22	3	To London and Westminster Bank				1005	0	0
22		Sundries Dr.						
	1	To Cash, as per C. B. fol. 1				2205	0	0
3	3	London and Westminster Bank	1200	0	0			
10	2	Petty Cash	10	0	0			
17	3	Three per Cents. Consols	985	0	0			
22	1	Private Account	10	0	0			
31		Sundries Dr.						
	2	To Bills Payable, as per B. P. B. fol. 1				751	7	1
21	4	Osmond and Co.	288	3	4			
31	5	Andrews and Co.	463	3	9			
26	3	Cotton Dr.	751	7	1			
		To Sundries.						
7	4	To Osmond and Co.				288	3	4
26	5	To Andrews and Co.				463	3	9
		£	5912	14	2	5912	14	2

(2) JOURNAL. (2)

Date.	Fol.	February, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
26	1	Cash Dr.	220	0	0			
	3	To London and Westminster Bank, as per C. B. fol. 1				220	0	0
28		Sundries Dr.						
	1	To Cash, as per C. B. fol. 1				220	0	0
22	3	London and Westminster Bank	100	0	0			
26	4	Darling and Co.	50	0	0			
28	6	East India Company	60	0	0			
	2	Petty Cash	10	0	0			
21		Sundries Dr.						
	3	To Cotton				673	19	9
1	5	Brown and Smith	313	14	5			
21	5	Williams and Co.	360	5	4			
25	3	Cotton Dr.	1146	14	7			
		To Sundries						
17	5	To White and Co.				425	2	7
25	6	To East India Company				721	12	0
25	4	Charges Dr.	3	12	2			
	6	To James Manning				3	12	2
		£	2264	6	6	2264	6	6

(3) JOURNAL. (3)

Date.	Fol.	March, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
29	1	Cash Dr.	2920	8	6			
		To Sundries, as per C. B. fol. 1.						
1	5	To Brown and Smith				313	14	5
3	3	To Three per Cents. Consols				997	10	0
5	4	To Darling and Co.				50	0	0
26	3	To London and Westminster Bank				800	0	0
21	5	To Williams and Co.				360	5	4
16	6	To Thompson and Co.				257	12	1
29	7	To Althorpe and Co.				141	6	8
30		Sundries Dr.						
	1	To Cash, as per C. B. fol. 1				2908	14	9
30	3	London and Westminster Bank	2460	0	0			
2	6	James Manning	3	12	2			
17	5	White and Co.	425	2	7			
18	1	Private Account	20	0	0			
31	7	Baring, Smith, and Co. Dr.	288	1	3			
	2	To Bills Payable, as per B. P. B. fol. 1				288	1	3
22		Sundries Dr.						
	3	To Cotton				559	12	4
13	6	Spencer and Co.	160	13	7			
16	6	Thompson and Co.	257	12	1			
22	7	Althorpe and Co.	141	6	8			
24	3	Cotton Dr.	288	1	3			
	7	To Baring, Smith, and Co.				288	1	3
		£	6964	18	1	6964	18	1

(4) JOURNAL. (4)

Date.	Fol.	April, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
25	1	Cash Dr.	1150	13	7			
		To Sundries, as per C. B. fol. 2.						
13	6	To Spencer and Co.				160	13	7
27	3	To London and Westminster Bank				990	0	0
30		Sundries Dr.						
	1	To Cash, as per C. B. fol. 2				1161	19	7
25	6	East India Company	661	12	0			
15	2	Petty Cash	20	0	0			
18	4	Osmond and Co.	183	4	3			
24	2	Bills Payable	288	3	4			
30	1	Private Account	9	0	0			
26	2	Bills Receivable Dr.	600	1	8			
		To Sundries, as per B. R. B. fol. 1.						
13	7	To Allison and Co.				150	0	6
25	8	To Lloyd and Co.				223	9	10
26	7	To Thomas Jones				226	11	4
29		Sundries Dr.						
	2	To Bills Payable, as per B. P. B. fol. 1				484	5	4
11	5	Andrews and Co.	238	17	4			
29	8	Ovington and Co.	245	8	0			
22	3	Cotton Dr.	667	9	7			
		To Sundries.						
4	4	To Osmond and Co.				183	4	3
7	5	To Andrews and Co.				238	17	4
22	8	To Ovington and Co.				245	8	0
30		Sundries Dr.						
	3	To Cotton				1150	3	4
12	7	Allison and Co.	150	0	6			
30	7	Thomas Jones	776	13	0			
20	8	Lloyd and Co.	223	9	10			
		£	5214	13	1	5214	13	1

LESSONS IN LATIN.—XXIV.

REGULAR VERBS.—THE FIRST CONJUGATION.

PASSIVE VOICE.

EXAMPLE.—Amor, 1, *I am loved.*

Chief Parts: Amor, amātus sum, amāri.
Characteristic letter, a long.

PARTS WITH THE CORRESPONDING ENGLISH.

	Ind. Pres.	*Sub. Pres.*	*Ind. Imp.*	*Sub. Imp.*
Latin.	Amor,	Amer,	Amābar,	Amārer,
English.	*I am loved.*	*I may be loved.*	*I was loved.*	*I might be loved.*

	1 Fut.
Latin.	Amābor,
English.	*I shall be loved.*

	2 Fut.	*Ind. Perf.*	*Sub. Perf.*
Latin.	Amatus ero,	Amatus sum,	Amatus sim,
English.	*I shall have been loved.*	*I have been loved.*	*I may have been loved.*

	Ind. Plup.	*Sub. Plup.*	*Inf. Pres.*
Latin.	Amatus eram,	Amatus essem,	Amari,
English.	*I had been loved.*	*I might have been loved.*	*to be loved.*

	Inf. Perf.
Latin.	Amatum esse,
English.	*to have been loved.*

	Inf. Fut.	*Imp.*	*Past Part.*	*Fut. Part. in-dus.*
Latin.	Amatum iri,	Amare,	Amatus,	Amandus,
English.	*to be about to be loved.*	*be thou loved.*	*loved.*	*ought to be loved.*

After what has been said, the corresponding English and Latin signs will easily be deduced by the student; thus—of the present, the Latin sign is *or*, the English *be loved;* in the sub. imp. the Latin sign is *rer*, the English *might be.*

Compare together the forms in the active voice and the forms in the passive voice, and carefully notice how they differ, and how the one may be changed into the other—that is, the active into the passive, and the passive into the active.

Remark that the English *I am loved, he is loved,* etc., denotes a present act, equivalent to this, *they* or *you love me, they are loving me,* loving me *now;* such is the force of amor with its several persons. It is thus contrasted with amatus sum, which, if translated literally, would seem to mean, *I am loved,* but which is a past tense and signifies *I have been loved.* Mark carefully that amatus sum (es, est, etc.) is a past tense; learners are apt to construe it as a present tense. The Latin verb has, in strict speech, no perfect tense of the passive voice, though it can express a perfect passive act. That expression it effects by a periphrasis (a Greek word equivalent to the Latin circumlocution, or *roundabout way of speaking*); thus it uses the passive participle, and parts of the verb esse, *to be:* for instance, amatus sum, *I have been loved;* amatus sim, *I may have been loved;* amatus eram, *I had been loved,* etc. The participle amatus, of course, undergoes the variation of declension, so as to agree with the pronoun or noun connected with it.

The inf. fut. pass. is formed by the aid of the passive infinitive of eo, *I go,* as amatum *iri, to go to be loved,* that is, *to be about to be loved.*

MOODS, TENSES, ETC., OF A REGULAR VERB OF THE FIRST CONJUGATION, PASSIVE VOICE.

PRESENT TENSE.

	Indicative.	*Subjunctive.*	*Imperative.*	*Infinitive.*	*Participle.*
Sing.	Amor.	Amer.			
	Amāris.	Amēris.	Amāre or amātor.	Amari.	
	Amātur.	Amētur.	Amātor.		
Plu.	Amāmur.	Amēmur.	[āminor.		
	Amāmini.	Amēmini.	Amāmini or am-		
	Amantur.	Amentur.	Amantor.		

IMPERFECT TENSE.

Sing.	Amābar.	Amārer.
	Amābaris.	Amāreris.
	Amābatur.	Amarētur.
Plu.	Amabāmur.	Amarēmur.
	Amabāmini.	Amarēmini.
	Amabantur.	Amarentur.

FIRST FUTURE TENSE.

Sing.	Amābor.	*Amatum iri.*	*Amandus.*
	Amāberis.		
	Amābitur.		
Plu.	Amābimur.		
	Amābimini.		
	Amabuntur.		

PERFECT TENSE.

Sing.	Amatus sum.	Amatus sim.	Amatum esse. Amatus.
	Amatus es.	Amatus sis.	
	Amatus est.	Amatus sit.	
Plu.	Amati sumus.	Amati simus.	
	Amati estis.	Amati sitis.	
	Amati sunt.	Amati sint.	

PLUPERFECT TENSE.

Sing.	Amatus eram.	Amatus essem.
	Amatus eras.	Amatus esses.
	Amatus erat.	Amatus esset.
Plu.	Amati erāmus.	Amati essēmus.
	Amati crātis.	Amati essētis.
	Amati erant.	Amati essent.

SECOND FUTURE TENSE.

Sing.	Amatus ero.
	Amatus eris.
	Amatus erit.
Plu.	Amati erimus.
	Amati eritis.
	Amati erunt.

INSTANCES.—Form according to these examples the following verbs; namely, honōro, 1, *I honour;* corōno, 1, *I crown;* and judĭco, 1, *I judge.*

VOCABULARY.

Æquus, -a, -um, *equal, just.*
Castīgo, 1, *I chastise, punish.*
Caveo, 2, *I avoid* (E. R. *caution*).
Congrego, 1, *I collect* or *gather together* (E. R. *congregation*, from grex, gregis, *a flock*).
Contamino, 1, *I defile, contaminate.*
Crucio, 1, *I crucify, I torture* (Latin, crux, crucis, *a cross*).
Emendo, 1, *I amend, improve.*
Exōro, 1, *I entreat, obtain by entreaty.*
Flagitium, -i, n., *a shameful deed.*
Judex, judicis, m., *a judge.*
Morbus, -i, *sickness, disease.*
Munus, -ĕris, *reward, present.*
Muto, 1, *I change* (E. R. *mutation*).
Obscūro, 1, *I darken* (E. R. *obscure*).
Pax, pacis, f., *peace.*
Piger, -gra, -grum, *idle, lazy.*
Recupero, 1, *I regain, recover.*
Sanctē, adv., *holily.*
Spero, 1, *I hope.*
Splendor, -ōris, m., *splendour, bright, shining.*
Studium, -i, n., *desire, effort* (E. R. *study*).
Violo, 1, *I violate, injure.*

EXERCISE 79.—LATIN-ENGLISH.

1. Ego laudabar, tu vituperabāre.* 2. Urbs oppugnabatur. 3. Ego laudabor, tu vituperabēre.† 4. Urbs oppugnabitur. 5. Quum urbs ab hostibus oppugnabatur, omnium civium animi ingenti timore occupabantur. 6. Cives vehementer ab hostibus vexati sunt. 7. Quum pugna erat atrocissima, sol nubibus obscurabatur. 8. Malefici post mortem justis pœnis castigabuntur. 9. Urbs ab hostibus oppugnata est. 10. Omnium civium animi ingenti terrore occupati sunt. 11. Si literas diligenter tractavĕrimus, a parentibus pulchris muneribus donabĭmur. 12. Quum urbs ab hostibus expugnata erat, omnes cives acerbissimo dolore cruciabantur. 13. Si liberi vestri bene a vobis educati sunt laudabimini. 14. Industrius discipulus laudātor, piger vituperator. 15. Leges divinæ ab hominibus sancte observantor. 16. Exoramini, O mi parentes! 17. O mi puer, delectare literarum studio! 18. Exorare, O judex! 19. Milites certa die in urbem congregantor. 20. Cives ne flagitiis contaminantor. 21. Melior est certa pax quam sperata victoria. 22. Terra mutata non mutat mores. 23. Dolor patienter toleratus minus acerbus est. 24. Bonus vir laudandus est. 25. Boni parentes curant ut liberorum mores emendentur. 26. Cura ut in omni re conscientia recta servetur. 27. Tu a me amaris ut ego a te redămer. 28. Heri ambulabam ut tristis animus exhilararetur. 29. Milites nostri acerrime pugnabant ut urbs ab interitu servaretur. 30. Vide ne a præceptoribus vituperēre. 31. Bonus civis cavet ne leges a se violentur. 32. Non dubito quin amicus meus morbo liberatus sit. 33. Nemo dubitabat quin pax recuperata esset. 34. Nescio qua re pax turbata sit.

EXERCISE 80.—ENGLISH-LATIN.

1. Peace has been regained. 2. Peace will be regained. 3. Peace was regained. 4. I do not doubt that they are about to regain peace. 5. Peace has been disturbed. 6. Has peace been disturbed? 7. Has not (*nonne*) peace been disturbed? 8. Peace will be disturbed. 9. Peace ought not to (must not) be disturbed. 10. I shall be praised, he will be blamed. 11. He must be blamed. 12. He has been blamed. 13. The city has not been captured. 14. O father, be entreated (overcome by entreaty) by your suppliant daughter! 15. The mother was overcome by entreaty. 16. The sun is obscured by a cloud. 17. Yesterday the sun was obscured by clouds. 18. Dear son, thy mind is occupied by terror. 19. My mind was occupied with grief. 20. The minds of all the citizens will be occupied with fear and sorrow. 21. Young men, be not contaminated with vice. 22. I love thee that I may be loved again by thee. 23. The father must be loved. 24. The bad boy must be chastised. 25. Let the laws of the state be conscientiously observed by all citizens. 26. The laws of God are observed by holy men. 27. Have the precepts of virtue been observed by the young men (*adolescens, -tis*) of the city?

* Another form of vituperabāris. † Another form for vituperabēris.

HISTORIC SKETCHES.—XXIV.

ORIGIN OF THE UNITED STATES.

"THE gentleman tells us America is obstinate; America is almost in open rebellion. Sir, I rejoice that America has resisted. Three millions of people so dead to all the feelings of liberty as voluntarily to submit to be slaves, would have been fit instruments to make slaves of all the rest. I come not here armed at all points with law cases and Acts of Parliament, with the statute-book doubled down in dog's ears, to defend the cause of liberty. If I had, I myself would have cited the two cases of Chester and Durham. I would have cited them to show that even under arbitrary reigns Parliament were ashamed of taxing a people without their consent, and allowed them representatives. The gentleman asks, when were the colonies emancipated? But I desire to know when they were made slaves."

Such were the words of Mr. Pitt, on the 14th of January, 1766, in the course of an indignant remonstrance he made against the policy the Government was pursuing towards the British colonies in America, a policy which was arousing in the colonists a fierce and implacable resentment towards the mother country, and which finally determined them to sever at all risks their connection with her. The occasion was a memorable one, the words used by some orators in the debate were almost prophetic, and the blindness of the rulers in the matter savoured almost of affliction.

Of all the colonies of Great Britain none were more loyal, more generous in their devotion, more easy to be governed, than the plantation colonists in America. Though founded originally by men who preferred to face Nature in her wildest form, both as regards scenery and men, rather than live under the rule of oppressors in their native land, the colonies had become famous for inhabitants of unquestionable loyalty, men whose pride it was to speak of England as their home, who cherished English ways and English modes of thought, named their towns after towns in England, taught their children not only to fear God, but also to honour the king who had never seen their land, and who dwelt in a remote island 2,000 miles across the sea.

Nearly 150 years had elapsed since the Pilgrim Fathers, leaving England in a vessel of 186 tons, the *Mayflower*, landed near Cape Cod and founded Plymouth, the first of the New England settlements. By conquest, by treaty, by settlement, by purchase, the American colonies grew till they constituted thirteen large provinces, each having a governor appointed by the King of England, with local magistrates, on the municipal system, administering the laws of England and such local laws as were from time to time found to be necessary. At the time Mr. Pitt spoke of them in the English House of Commons they included over two millions of people of European blood, and about a million more of Africans and native Indians, but these three millions were scattered over a vast tract of country, and might well have been deemed unable to cope with the organised forces of a powerful empire. "I know the valour of your troops. I know the skill of your officers," said Pitt. "In a good cause, on a sound bottom, the force of this country can crush America to atoms. But," he added, "in such a cause as this your success would be hazardous. America, if she fell, would fall like the strong man. She would embrace the pillars of the State and pull down the Constitution along with her! Is this your boasted peace? Not to sheathe the sword in its scabbard, but to sheathe it in the bowels of your countrymen?"

But what was the occasion of this language? Of what nature was the fear that the loyal colonies would throw off their allegiance? What cause was there to suppose that the United States were about to come into existence? Where was the vulnerable place in the dutifulness of the Americans? Let us see.

From the time of the first settlement till 1765 all had gone well with the colonists, because they had been left alone by the Home Government. Beyond sending out governors, and occasionally issuing orders which were necessarily to be obeyed, not only by the American colonies, but by every part of the empire, for the common good, the authorities at Whitehall troubled their heads very little about the "plantations," as they were called. But in 1765 it occurred to Mr. Grenville, then at the head of affairs in England, to recruit the exhausted imperial treasury, by extending some of the imposts, which were payable in England, to the colonies. It must be conceded that if he did not know he was doing right, he was by no means assured he was doing wrong, in resorting to such an expedient, though the arguments which were advanced to him, to say nothing of the question as to the policy or impolicy of the movement, might have had more weight than he chose to allow them. He decided, after trying one or two petty imposts, which though not acquiesced in were not resisted, to extend to America the same stamp duties as were payable by the people at home, and he hoped by this means to gather into the imperial coffers a sum estimated at something less than £100,000 a-year.

Now one of the most valuable concessions ever made by a king was the concession which was made by King John in the Great Charter, and afterwards ratified in a separate Act of Parliament, to the effect that no money by way of tax, or by any other means, should be levied on the commons of England without their own consent previously expressed by the voice of their representatives in Parliament. The American colonies had not any representatives in the English House of Commons, no one by whom they could give assent or dissent to the proposals made to tax them, and they could not therefore legally be called upon to obey the orders in such a matter even of the British king, lords, and commons. Already they had put up their backs against some custom-house charge which had been imposed in 1764, though they admitted the abstract right of the imperial Government to charge them, and though the money raised was intended to be spent on the protection and improvement of the colonies. They were taking annually something like the worth of £3,000,000 a-year in British produce and manufactures, and with increasing prosperity would have taken much more, when the imposition of these vexatious duties turned the current of their commercial liberality backwards, and resolved them to form societies for the renunciation of trade with Great Britain. It was while things were in this state that Mr. Grenville, "by way of experiment, towards further aid from the Americans," brought into the British House of Commons a bill to extend to America almost all the stamp duties in force at home.

The American colonists were deeply incensed when they heard that the bill had passed into law, and that it had done so without a division in the House of Lords, and with only one division in the House of Commons. It was not because they begrudged the money. Had the king chosen to send letters to the assemblies of each of the provinces, asking for a grant in aid of imperial expenses, especially the expenses incurred in defending the American coasts and frontiers, there cannot be any doubt but the call would have been answered liberally. They would give handsomely if asked to give, but pay as a matter of right they would not. So the colonists determined. Mr. Grenville, though remonstrated with by all who knew most about the colonies, insisted on his Stamp Act; collectors and assessors were appointed, and Boston was chosen as the head-quarters of the Stamp Commissioners.

As soon as the news reached Boston, the flags of the shipping there were hoisted half-mast high, and the church bells tolled as if for a funeral, the Stamp Act itself was reprinted and sold, with a death's head instead of the royal arms, and for its proper title was substituted, "The folly of England and the ruin of America." The House of Representatives in Virginia, under the guidance of Patrick Henry, drew up a spirited remonstrance to be laid before the king; other colonial legislatures, imitating the example of Virginia, did the same thing ere the several governors could dissolve them; and the people bound themselves not to buy any British thing with which they could possibly dispense, until the obnoxious tax should be repealed.

In England the strongest efforts were made to procure a repeal of the Act. All the eloquence of Mr. Pitt, all the learning of Lord Camden, all the authority of the largest-hearted and clearest-sighted statesmen of the day were employed to convince the king and his ministers of the danger in which the country stood in respect of the colonies, and to devise some means by which that danger might be averted. Pitt declared it as his opinion that the Stamp Act ought to be repealed "absolutely, totally, and immediately. That the reason for

the repeal be assigned, because it was founded on an erroneous principle;" and upon this advice the Government was forced to act. The Stamp Act was repealed, though accompanied by an Act declaring the right of the Crown to legislate for the colonies as the Home Government thought fit.

After the experience thus gained, though at the cost of allowing the Americans to discover how strong they were, it might have been thought the Government would have been wiser than to irritate the sensitive feelings of the people by again touching them on the tender point of money. But in 1767 it was determined to attempt to raise revenue out of new customs duties on articles, supposed to be necessaries, which were imported into the colonies. Boston was again the head-quarters of the excise, and the people, indignant at the disposition to coerce them, especially after their clearly expressed feeling on the subject of imposts, showed an intention to resist violently if need were. The severity with which the smuggling trade was suppressed, and the annoyances to which several of the assemblies were exposed from injudicious governors, added to the popular discontent, which rose to its height when it was found that a squadron of ships of war and four regiments of soldiers were to be sent to Boston, to keep the people in check. Before the troops arrived, the people rose, sacked the houses of some of the excise officers, and compelled the Commissioners to seek safety in Castle William, at the mouth of Boston Harbour. This was in the autumn of 1768.

With the arrival of the troops a different state of things prevailed so long as force could overawe the people and keep them down; but there were frequent collisions between the townsmen and the soldiers, and after a while the troops were withdrawn from the immediate neighbourhood of Boston. Five years passed away, the Americans constantly raising objections to what was done by the Home Government, even in matters which were unquestionably within its proper authority; and the Home Government, and incidentally the Parliament and nation, grew tired of having such subjects. There was, in fact, in the American colonies too much of the republican spirit and notion of freedom which the earlier settlers in New England had brought thither, to allow of any abiding peace with the monarchy; and those who were loyal to the throne were made disgusted by the instrumentality of those who were not loyal, and were appealed to on the ground of the common injustice done to the colonies by the ill-advised acts of the Government in 1766. At length, in 1774, the smouldering flame burst forth.

The East India Company, who then had the monopoly of the trade in tea, had arranged with the English Government that they should have the drawback on all tea conveyed to America, and that the amount should be recovered through duties levied at the American custom-houses. As soon as the colonists heard of the arrangement they determined to frustrate it, for they fancied they saw in the tea-tax, as they called it, a forerunner of other domestic taxes, as hearth-tax, window-tax, and others equally hateful. Besides, they now questioned the right of Government to impose custom duties on them for the general expenses of the empire, and they resolved to withstand the tea-tax accordingly.

Before the ships arrived in Boston harbour the people gave notice to the consignees that they should not gain by their cargoes; some of the agents they induced to renounce their agencies, and to promise that as soon as the vessels came they should be sent back again without being discharged; the pilots were warned not to bring any of the obnoxious ships into port; and steps were taken for still further pursuing the matter should these measures prove ineffectual. When the tea-ships came, the action begun at Boston was followed at all the other ports—the cargoes when landed were stored purposely in cellars; and the people having bound themselves not to use tea, and so to avoid a sale of the consignments, the article rotted, and was lost. In other cases the cargoes were sent back as they came, while at Boston the people were not content with such negative measures, but disguised as Mohawk Indians, they rushed by night on board three ships in the harbour, rummaged the cargo, and threw some £18,000 worth of tea into the sea. This last performance took place in December, 1773, and the actors in it having escaped without punishment, the British Government at home was determined to take the matter up sharply.

A bill was brought in and passed, whereby the port of Boston was declared to be closed, during the king's pleasure, against all commercial operations, though Pitt, Burke, and some of the leading men in both Houses raised their voices in loud protest against a punishment so far in excess of the offence, especially without first asking the city of Boston to make good the loss incurred by the tea-shippers. Acting according to his lights—but how great was the darkness of those lights!—Lord North and his colleagues carried their coercive measure against Boston, and another, yet more stinging and stringent, against the county of Massachusetts itself, by which the whole power in the county was taken away from the people and centred in the governor and a council of his own choosing; the former governor was changed for a military man of decided ways and habits, and troops were promised to support him in case of need.

The colonies, too, were not behindhand in energetic measures. Virginia first proposed to sympathise practically with Boston, then the other colonies joined, and finally it was agreed that delegates should be chosen from each of the twelve colonies, who should meet in general congress at Philadelphia for the purpose of deciding what combined action should be taken. On the 5th of September, 1774, fifty-five delegates, including George Washington and Patrick Henry from Virginia, met in congress at Philadelphia, and proceeded to deliberate with closed doors. What passed in the meeting is not of material importance, but the upshot was truly momentous. A declaration of rights, in which they claimed all the privileges of Englishmen—privileges they had neither surrendered, lost, nor forfeited by emigration—was drawn up, together with some other statements to the effect that several of the recent Acts of Parliament were contrary to the spirit and letter of English law, and that until they were repealed there would not be any harmony between Great Britain and her colonies. To give these declarations force, they further resolved, on the part of their constituents and themselves, not to import any of the products of England, her colonies, or dependencies, nor to export to them any American produce, until the obnoxious Acts had been repealed. Addresses were written to the king, and to the people of Great Britain, in which the case of the colonists was manfully set forth, and an appeal made to justice and fair play.

How these addresses were received, what action the Government took upon the conduct of the Americans, are matters of history. Instead of examining into the case with impartiality, and doing then according to right, the Government took offence at its slighted dignity, and resolved to treat the Americans with sole reference to that.

The result was the United States. Continuous jarrings, and occasionally something more, went on between the Government and the colonists, till the latter did not scruple to declare their intention to throw off their allegiance. An extensive organisation, going right through the colonies, was prepared with secrecy, collections of arms and stores were made, the militia were drilled, everything was got ready for the emergency which all knew must arise sooner or later. Hostilities commenced in April, 1775, and from this moment civil war began in earnest, and was continued with varying success for six years, by which time the American soldiers, under George Washington, and the American people, under the guidance of Henry, Jefferson, Adams, Franklin, and Lee, made good, as against all the world, the declaration of independence which they made on July 4, 1776. The British troops fought bravely enough, but were badly handled; the American troops fought equally well, and were admirably handled, and had the satisfaction to receive, as the reward of their valour, the surrender of almost all the British forces with their generals in succession. Finally, the British king was obliged to acknowledge the independence of his former colonies, to treat with them on the basis of an independent nation, and to accept a representative from them for all international purposes.

More than a century has elapsed since Independence Day first dawned. In the course of that time each side has found out that there is room enough for both in the world, and that there is no reason why they should not exist with peace and goodwill towards each other. Old jealousies, old suspicions have worn away; new principles, new bonds of union have taken their place; so that as an American of to-day still takes pleasure in England as the home of his race and his family, so an Englishman of to-day finds no difficulty in sympathising with him when he talks about American independence, and tells with pride and satisfaction the story of how in the old time the States came to earn their motto—*E pluribus unum!*

RECREATIVE NATURAL HISTORY.

THE SPIDER.—PART II.

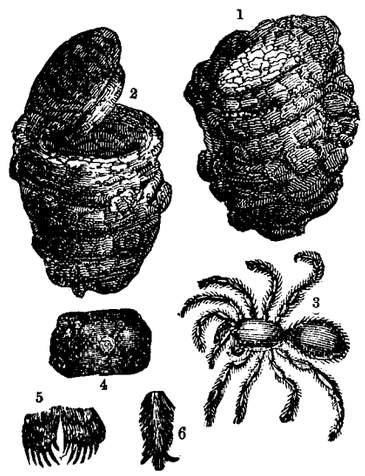
EQUALLY wonderful as the structure of the feet of the spider, described in the preceding lesson on this interesting insect (see page 303), is the formation of the organs with which the spider grasps and kills his prey. The instruments with which this is effected—called the *mouth hands*, or mandibles or *falces*—are as fitted for their purpose as the fang of the viper. Most readers must have observed the manner in which the spider seizes a fly; how firmly the victim is gripped by the two mandibles, which act both as spears and poison tubes. The sharp points pierce the insect; the poison is then injected into the wound through a tube which runs down each mandible from the venom reservoirs at the upper end. Thus the entrapped fly is assailed in four ways at once: pierced by the mandibles, stupefied by the poison, bitten by the mouth of its foe, and fettered by the lines of web.

The circulation of the blood may be clearly seen, through a microscope, in the leg of the common hairless spider. The heart is in the form of a tube, placed in the abdomen, and beating strong enough for the "pulse" to be easily noted.

The breathing apparatus is not the same in all spiders, most of them having what may be called two lungs, some four, and a few eight. Air is admitted to the breathing apparatus through two or four openings, called *stigmata* or spiracles, placed on the under part of the abdomen.

We cannot find any concentrated mass of nervous matter in the spider to which the term brain may be given; but many "nerve knots," called ganglions, answer the same purpose. From these, nerves are sent off to various parts of the body.

It seems desirable that we should here pause to give a fuller account of the mason or building spider, to which a brief allusion was made in a former paper on this subject. This spider belongs to the *Mygale** family, but only some species become masons; others being noted for the great size and strength of their webs. The building spiders are mostly found in tropical countries, but some are met with in the south of France, Italy, and Greece; others have been discovered in New South Wales, and one (*Atypus Sulzeri*) has been observed near London, and in several parts of the south of England.



1. NEST OF BUILDING SPIDER WITH THE ENTRANCE CLOSED. 2. NEST WITH ENTRANCE OPEN. 3. THE BUILDING SPIDER. 4. THE EYES (MAGNIFIED). 5 AND 6. PARTS OF THE FOOT AND CLAW (MAGNIFIED).

The building spider (*Cteniza nidulans*) † seems in general to select a clay soil for its habitation; often the sloping side of a bank, from which water can readily run off. In this earth the animal scoops out a tube-shaped hole, varying in depth from one to six inches, and being about one inch in diameter. When the cell has been made, the spider covers the rough walls with a layer of very fine cement-like substance. So thoroughly does this harden, that it may sometimes be detached from the clay walls like a casting, without breaking, notwithstanding its extreme thinness. This first layer of cement is then covered with a lining of soft but tough web, resembling fine whitish silk; on this another layer of mortar is placed, and this is also covered by a lining of web, as before. In this manner the spider proceeds in its marvellous work, until often not less than fifteen layers of fine cement alternate with as many of soft but tenacious web. Thus one of these wonderful cells often consists of thirty distinct walls. It is no marvel that such a house should be waterproof, however wet the soil in which the compact domicile is formed.

The trap-door which covers the nest is deserving of more attention than the house it protects and conceals. This door is usually composed, like the walls, of alternate layers of cement and web. One peculiarity must, however, be noted. These layers gradually decrease in size, like a series of diminishing boxes, the smaller fitting in into the larger beneath. One important result of this arrangement is that the rim of the trap-door has a conical shape, so that it cannot easily be pushed inwards upon the spider, though readily opening outwards. This slope of the door-edge is shown in the accompanying illustration (Fig. 2).

The upper part of the nest is formed with an inclination exactly adapted to the angle of the door rim, so that when this falls, the entrance to the spider's home is completely closed. This fitting of the door to its frame is not the least wonderful part of the structure.

The hinge of the door is formed of the layers of web which alternate with the beds of cement. The ends of these webs are drawn out at one point and interlaced with the silky lining of the upper part of the nest, and thus form a strong connecting band of tissue between the wall of the house and its trap-door. The thicker the door the more numerous will be the web layers, and the stronger the hinge, which will, therefore, be always adapted to the weight it has to support. Sometimes it happens that a door, especially in the Jamaica spider's nest, is formed wholly of webs, without a single layer of earth. The English mason species, mentioned above, can scarcely be said to form a door, the strong silky lining of its tube protecting the entrance somewhat like a curtain. The insides of these movable nest-covers are generally lined with the same kind of soft but tough web, which gives smoothness to the inner walls of the cells. Thus, when the entrance is closed, the building spider is most effectually sheltered in a luxuriously tapestried room.

As the door shuts by its own weight when the spider goes out, there is no trouble in closing it, and when the animal wishes to enter, the lid is easily raised by the claws. But predacious insects may also wish to raise the opening and attack the tenant in its snug home; the mason spider has the means of baffling such attempts. At the part of the door furthest from the hinge, about thirty small holes may sometimes be seen on the inside; by fixing the claws in these, and pulling with all its force, the spider is able to resist such attempts to invade its home.

Some nests have been found with two doors at the same end, others with a door at each end. Some persons have removed the lid, by way of experiment, and in such cases a new cover has generally been constructed in a very short time. Though the nest is so elaborately formed, there is no outward sign of the subterranean structure. The upper surface of the door resembles the common earth around, and as the spider rarely comes out in the day-time, the discovery of its singular home is by no means easy.

Superstition and popular fancy have not quite neglected the spider. In some parts a small species called Money-spinners are deemed a sign of good luck to any person on whom they may be found; but to ensure this result the money-spinner must be caught and thrown over the left shoulder. The Kentish proverb—

> "If you wish to live and thrive,
> Let a spider run alive,"

also connects this creature with man's prosperity. The Hampton Court Spider (*Tegenaria domestica*) is a creature of doleful aspect. These large spiders were formerly believed to be the embodied ghosts of Cardinal Wolsey and his aiders and abettors. It is sometimes called the "cardinal spider."

Spiders were formerly considered in rural districts to be a cure for ague. Some years ago, a lady in Ireland was famous for her success in curing people thus affected. It appears that the only medicine she employed was a large spider rolled up in treacle

* An ancient name of the small field-mouse; but now designating those spiders which usually form nests in the ground, like mice.

† Nest-making, comb-clawed-spider.

The patients were ignorant of the contents of this novel bolus, so that imagination had nothing to do with the matter. In England, also, the spider has been called in as ague doctor. In Lincolnshire the creature was treated much after the above-mentioned Irish fashion, being rolled up in paste and swallowed, but in other parts the animal is put into a bag and worn round the neck. Men of science have employed, not, indeed, spiders themselves, but their webs, as a valuable medicine, especially in fevers and agues. The web is rolled up into pills, and given in doses of five grains each, every four hours. Attempts to manufacture spider's silk have been made, with very poor results. Waistcoats, gloves, and stockings have, indeed, been formed from the silk, but the expense and difficulty seem to forbid the hope of prosecuting the manufacture as a business. The obstacles are three. The feeding a great collection of spiders is a puzzling operation. Then, if numbers be kept in one place, the ferocious creatures wage an incessant and destructive war one upon the other. Lastly, more than 27,000 spiders are required to produce one pound of silk, for twelve will only make as much as one silkworm. M. Bon, a Frenchman, and M. Tremezar, a Spaniard, spent years in trying to domesticate spiders for manufacturing purposes. The former gentleman managed to keep for some time about 5,000, placing fifty or a hundred in separate compartments. Nearly all perished, chiefly from daily battles among themselves. M. Bon seems to have felt sure of his success, and sent some stockings and gloves to the Royal Society in 1710, with a full description of his experiments. He seems to have obtained four ounces of silk from thirteen ounces of cocoons. Others made similar attempts. M. Lebon, of Montpellier, sent a pair of gloves made from spiders' silk, to Louis XIV.; and M. d'Orbigny actually had a pair of drawers manufactured from the webs of American spiders.

Are spiders themselves useful? One benefit they evidently confer upon man—that of keeping within due limits the exuberant swarms of insect life. Imagine the nuisance of an unchecked increase of house-flies only.

Whether, then, we note the geometrical beauty of many webs, admire the marvellous complexity of the spinning machine, scrutinise the mechanism of the feet, wonder at the completeness of the weapons for attack, meditate on the ingenuity of the building spider, or ponder over the work allotted to spiders in the great system of Nature, we shall feel that even these creatures present us with proofs of wonderful design and rich diversity of structure. A spider's web may suggest volumes of philosophy.

LESSONS IN GREEK.—XII.

THE THIRD DECLENSION—(*continued*).

We pursue our task in the third declension, and offer models of nouns in -ος (gen. -εος), contracted into -ους. The substantives of this class are exclusively neuter, and the terminating σ belongs to the stem. In the nominative, the stem-vowel ε has passed into ο; for example, το γενος (Latin, *genus*), race; το κλεος, fame, glory.

	Singular.	
N.A.V.	γενος.	κλεος.
Gen.	(γενε-ος) γενους.	(κλεε-ος) κλεους.
Dat.	(γενε-ι) γενει.	(κλεε-ι) κλεει.
	Plural.	
N.A.V.	(γενε-α) γενη.	(κλεε-α) κλεᾶ.
Gen.	(γενε-ων) γενῶν.	(κλεε-ων) κλεῶν.
Dat.	γενε-σι.	κλεε-σι.
	Dual.	
N.A.V.	(γενε-ε) γενη.	(κλεε-ε) κλεη.
G.D.	(γενε-οιν) γενοῖν.	(κλεε-οιν) κλεοῖν.

VOCABULARY.

Αλλα, but.	Θαλπος, το, warmth.	Κρινω (Latin, *cerno*), I separate, decide, judge.
Ανθος, το, a flower.	Θνητος, -η, -ον, mortal, deadly.	Μηκος, το, length.
Ασφαλης, -ες, firm, sure.	Κερδος, το, gain (in the plural).	Πονηρος, -α, -ον, wicked.
Γη, γης, ἡ, the earth.	Κλεος, το, fame, glory; in the plural, honourable deeds.	Ὑψος, το, height.
Εαρ, εαρος, το, the spring.		Χαλκος, -ου, -ο, brass.
Ειδος, το, a form.		Ψευδος, το, a lie.
Ζημια, -ας, ἡ, disgrace, punishment.		Ψυχος, το, cold.

EXERCISE 41.—GREEK-ENGLISH.

1. Ἡ γη καλοις ανθεσιν θαλλει. 2. Μη απεχου ψυχους και θαλπους. 3. Το καλον ου μηκει χρονου κρινομεν αλλα αρετη. 4. Ουκ ασφαλες παν ὑψος εν θνητῳ γενει (understand εστιν). 5. Μη ψευδη λεγε. 6. Απεχου πονηρων κερδων. 7. Κερδη παντα ζημιαν αει φερει. 8. Κατοπτρον ειδους χαλκος, οινος δε νοῦ (understand εστιν). 9. Οἱ ανθρωποι κλεους ορεγονται. 10. Οἱ ανδρες κλεει χαιρουσιν. 11. Οἱ ανδρειοι κλεῶν ορεγονται. 12. Θαυμαζομεν τα των ανδρων κλεα.

EXERCISE 42.—ENGLISH-GREEK.

1. Keep from (abstain) wicked gains. 2. Good men keep from wicked gains. 3. Good men desire honourable deeds. 4. Do not, O young man, keep from heat and cold, but from wicked men. 5. Punishment follows a lie. 6. We admire the Greeks on account of their (the) honourable deeds. 7. We avoid wicked gains. 8. The soldiers rejoice in honourable deeds (dat.).

Our next class of words ends in -ις, -υς, -ι, -υ. Of these we take first those words in -ις -ῡς; namely, ὁ κις (gen. κι-ος), the corn weevil; ἡ συς (Latin, *sus*), a sow; ὁ ιχθυς, a fish.

	Singular.		
Nom.	ὁ κῖς.	ἡ σῦς.	ὁ ιχθυς.
Gen.	κι-ος.	συ-ος.	ιχθυ-ος.
Dat.	κι-ι.	συ-ι.	ιχθυ-ῖ.
Acc.	κῖν.	σῦν.	ιχθυν.
Voc.	κῖ.	σῦ.	ιχθυ.
	Plural.		
Nom.	κι-ες.	συ-ες.	ιχθυ-ες.
Gen.	κι-ῶν.	συ-ῶν.	ιχθυ-ων.
Dat.	κι-σι.	συ-σι.	ιχθυ-σι.
Acc.	κι-ας.	συ-ας.	ιχθυ-ας.
Voc.	κι-ες.	συ-ες.	ιχθυ-ες, ιχθῦς.
	Dual.		
N.A.V.	κι-ε.	συ-ε.	ιχθυ-ε.
G.D.	κι-οῖν.	συ-οῖν.	ιχθυ-οιν.

VOCABULARY.

Αγκιστρον, -ου, το, a hook.	Βασιλευω (gen.), I am king, I reign.	Μυς, μυος, ὁ, a mouse (Latin, *mus*).
Αγρευω, I catch.	Βατραχος, -ου, ὁ, a frog.	Νεκυς, -υος, ὁ, a dead body, corpse.
Αγριος, -α, -ον, wild.	Βοτρυς, -υος, ὁ, a bunch of grapes.	Παγις, -ιδος, ἡ, a trap.
Αμπελος, -ου, ἡ, a vine.	Ἰσος, -η, -ον, equal.	Σταχυς, -υος, ὁ, an ear of corn.
Ανακυπτω, I emerge.		Συρος, -ου, ὁ, a Syrian.

EXERCISE 43.—GREEK-ENGLISH.

1. Οἱ ιχθυες εκ του ποταμου ανακυπτουσιν. 2. Οἱ θηρευται τας αγριας συας αγρευουσιν. 3. Παντες ισοι νεκυσι. 4. Ψυχων δε θεος βασιλευει. 5. Ἡ αμπελος φερει βοτρυας. 6. Ἡ γη φερει σταχυς και βοτρυας. 7. Τοις μυσι μαχη ποτε ην προς τους βατραχους. 8. Οἱ μυες παγισιν αγρευουται. 9. Οἱ Συροι σεβονται τους ιχθῦς ὡς θεους. 10. Αγκιστροις αγρευομεν τους ἰχθῦς.

EXERCISE 44.—ENGLISH-GREEK.

1. We catch fish with hooks. 2. Fish are caught with hooks. 3. The hunter lies in wait for wild boars. 4. The bunches of grapes and ears of corn are beautiful. 5. The vine bears grapes. 6. The frogs had (*to the frogs there was*) once a battle with (*against*) the mice. 7. We look on corpses. 8. The earth bears many vines. 9. God reigns over fishes and frogs.

I now proceed to words in -ῑς, -ῐ, -ῡς, -ῠ. The vowel of the stem remains only in the accusative and vocative singular, in the other cases it passes into ε. In the genitive singular the masculines and feminines take -ως, and in the genitive plural -ων: as, ἡ πολις, a city; ὁ πηχυς, an ell. Neuters end in -εος in the genitive singular; as, το σιναπι, mustard; το αστυ, a city.

	Singular.			
Nom.	ἡ πολις.	ὁ πηχυς.	το σινᾶπι.	το αστυ.
Gen.	πολε-ως.	πηχε-ως.	σιναπε-ος.	αστε-ος.
Dat.	πολει.	πηχει.	σιναπει.	αστει.
Acc.	πολιν.	πηχυν.	σιναπι.	αστυ.
Voc.	πολι.	πηχυ.	σιναπι.	αστυ.
	Plural.			
Nom.	πολεις.	πηχεις.	σιναπη.	αστη.
Gen.	πολε-ων.	πηχε-ων.	σιναπε-ων.	αστε-ων.
Dat.	πολε-σι.	πηχε-σι.	σιναπε-σι.	αστε-σι.
Acc.	πολεις.	πηχεις.	σιναπη.	αστη.
Voc.	πολεις.	πηχεις.	σιναπη.	αστη.
	Dual.			
N.A.V.	πολε-ε.	πηχε-ε.	σιναπε-ε.	αστε-ε.
G.D.	πολε-οιν.	πηχε-οιν.	σιναπε-οιν.	αστε-οιν.

Here belong the adjectives in -υς, -εια, -υ, which in declension depart from that of masculine and feminine substantives in this only, that the genitive of the masculine singular has the common form -εος, and not -εως, and that the neuter plural has -εα; thus, γλυκυς, sweet.

	Singular.			*Plural.*		
N.	γλυκυς,	γλυκεια,	γλυκυ.	γλυκεῖς,	γλυκειαι,	γλυκεα.
G.	γλυκε-ος,	γλυκειας,	γλυκε-ος.	γλυκεων,	γλυκειων,	γλυκεων.
D.	γλυκεῖ,	γλυκειᾳ,	γλυκεῖ.	γλυκεσι,	γλυκειαις,	γλυκεσι.
A.	γλυκυν,	γλυκειαν,	γλυκυ.	γλυκεῖς,	γλυκειας,	γλυκεα.
V.	γλυκυ,	γλυκεια,	γλυκυ.	γλυκεῖς,	γλυκεῖαι,	γλυκεα.
	Dual.	γλυκεε,	γλυκεια,	γλυκεε.		
		γλυκεοιν,	γλυκειαιν,	γλυκεοιν.		

Here also belong the adjectives in -ῡς, -ῠ (gen. -εος), which are declined as γλυκυς, γλυκυ, only that the neuter plural is contracted into η, like αστη; as ὁ, ἡ διπηχυς, το διπηχυ, τα διπηχη, two ells long.

Some substantives in -ῑς, as well as the adjectives in -ις, -ι—as ιδρις, ιδρι, skilful—have the regular inflection, without any change of the radical vowel; for example, ὁ, ἡ πορτις, a calf *or* heifer; ὁ, ἡ οἶς, a sheep; also (in the singular) ἡ εγχελυς, an eel.

	Singular.		
Nom.	ὁ, ἡ πορτις.	ἡ εγχελυς.	ὁ, ἡ οἶς.
Gen.	πορτι-ος.	εγχελυ-ος.	οιος.
Dat.	πορτι-ι, πορτῖ.	εγχελυ-ῖ.	οι.
Acc.	πορτιν.	εγχελυν.	οἶν.
Voc.	πορτι.	εγχελυ.	οἶς.
	Plural.		
Nom.	πορτι-ες, πορτῖς.	εγχελεις.	οἷες.
Gen.	πορτι-ων.	εγχελε-ων.	οιῶν.
Dat.	πορτι-σι.	εγχελε-σι.	οισι.
Acc.	πορτι-ας, πορτῖς	εγχελεις.	οἷας, οἷς.
Voc.	πορτι-ες, πορτῖς.	εγχελεις.	οἷες.
	Dual.		
N.A.V.	πορτι-ε.	εγχελε-ε.	οἷε.
G.D.	πορτι-οιν.	εγχελε-οιν.	οιοῖν.

VOCABULARY.

Αρχη, -ης, ἡ, a beginning, a principle, government; *plural*, magistrates	Καρπος, -ου, ὁ, fruit.	Πραξις, -εως, ἡ, doing, deed.
Ασελγεια, -ας, ἡ, wantonness.	Κοσμος, -ου, ὁ, order, beauty, the world; ornament.	Πυργος, -ου, ὁ, a tower.
Βεβαιος, -α, -ον, firm, sure.	Κτημα, -ατος, το, a possession.	Σπανις, -εως, ἡ, want.
Βροτος, -η, -ον, mortal; οἱ Βροτοι, mortals.	Κτησις, -εως, ἡ, acquisition.	Στασις, -εως, ἡ, insurrection, a rising
Βρωσις, -εως, ἡ, eating.	Μονος, -η, -ον, alone, single.	Συνεσις, -εως, ἡ, understanding.
Διαφορος, -ον, different.	Νομος, -ου, ὁ, law.	Τειχος, -ους, το, a wall.
Δωρον, -ου, το, a gift.	Ονησις, -εως, ἡ, assistance.	Ὑβρις, -εως, ἡ, pride, arrogance, insult.
Ενδεια, -ας, ἡ, want.	Πολεμος, -ου, ὁ, war.	Φυλαξ, -ακος, ὁ, a watchman, guardian.
Επιθυμια, -ας, ἡ, desire	Ποσις, -εως, ἡ, drinking.	Φυσις, -εως, ἡ, nature.

EXERCISE 45.—GREEK-ENGLISH.

1. Ασελγεια τικτει ὑβριν. 2. Εν ποσει και βρωσει πολλοι εισιν ἑταιροι, εν δε σπουδαιῳ πραγματι ολιγοι. 3. Ὁ πλουτος σπανεως και ενδειας τους ανθρωπους λυει. 4. Ἑπου τῃ φυσει. 5. Αἱ απο του σωματος επιθυμιαι πολεμους και στασεις και μαχας παρεχουσιν. 6. Εν ταις πολεσιν αἱ αρχαι νομων φυλακες εισιν. 7. Απεχεσθε, ω πολῖται, στασεων. 8. Ορεγεσθε, ω ανδρες, καλων πραξεων. 9. Διαφοροι εισιν αἱ των βροτων φυσεις. 10. Εξ ὑβρεως πολλα κακα γιγνεται. 11. Κακου ανδρος δωρα ονησιν ουκ εχει. 12. Δοξα και πλουτος ανευ συνεσεως ουκ ασφαλῆ κτηματα εισιν. 13. Οἱ των σικων καρποι γλυκεῖς εισιν. 14. Αρετης βεβαιαι εισιν αἱ κτησεις μοναι. 15. Πολλα αστη τειχη εχει. 16. Οἱ του αστεος πυργοι βεβαιοι εισιν. 17. Οἱ πυργοι τῳ αστει κοσμος εισιν.

EXERCISE 46.—ENGLISH-GREEK.

1. Riches free from (λυω) want. 2. We have friends in eating and drinking, but not in misfortune. 3. In the city the king is the guardian of the laws. 4. Obey, O young man, the magistrates. 5. O child, strive after honourable deeds. 6. The possession of virtue is alone sure. 7. The city has (*to the city are*) many towers. 8. Good laws bring honour to the city. 9. Follow nature. 10. The soldiers fight for the deliverance (σωτηρια) of the city. 11. O citizen, avoid insurrection.

KEY TO EXERCISES IN LESSONS IN GREEK.—XI.

EXERCISE 35.—GREEK-ENGLISH.

1. The tragedies of Sophocles are beautiful. 2. We admire Socrates because of his wisdom. 3. Socrates has many disciples. 4. India produces many reeds alongside of its rivers and marshy districts. 5. Always tell the truth, my son. 6. Anaxagoras, the sophist, was the teacher of Pericles. 7. O Hercules, bring safety to the unfortunate. 8. Epaminondas was of an unknown father. 9. Pity an unfortunate man. 10. Be eager, O young man, for truth. 11. The immoderate serve a base servitude.

EXERCISE 36.—ENGLISH-GREEK.

1. Σωκρατει ην θαυμαστη σοφια. 2. Ελεαιρε τους ατυχεῖς. 3. Ελεαιρομεν τους ατυχεῖς. 4. Πολλοι νεανιαι ησαν μαθηται Σωκρατους. 5. Σωκρατει ην πολλη σοφια. 6. Θαυμαζουσι την σοφιαν Σωκρατους. 7. Οἱ ακρατεις δουλευουσι την αισχραν δουλειαν. 8. Θαυμαζομεν τας καλας τραγωδιας Σοφοκλους. 9. Οἱ αληθεις λογοι πειθυνται. 10. Ελεαιρω τον βιον των ακρατων. 11. Μη εχετε την ὁμιλιαν τοις ακρατεσι.

EXERCISE 37.—GREEK-ENGLISH.

1. Homer sings of many heroes. 2. We admire the valour of the heroes. 3. The slaves lead a sad life. 4. The garden of the uncle is fine. 5. O child, be desirous of modesty. 6. Modesty follows good men. 7. We admire Lysias for his persuasiveness and grace. 8. Reverence is implied in modesty. 9. Do not look at the face of Gorgon. 10. O Echo, often thou deceivest men. 11. All men aim at prosperity. 12. It is becoming for a child and a young man to be modest. 13. Clio and Erato are muses.

EXERCISE 38.—ENGLISH-GREEK.

1. Ὁμηρος ᾀδει Αχιλλη τον ἡρωα. 2. Αχιλλευς ὁ ἡρως ᾀδεται ὑπο Ὁμηρου. 3. Ἡ αρετη του ἡρωος εστι θαυμαστη. 4. Θαυμαζομεν την αρετην των ἡρωων. 5. Τοις δουλοις εστι βιος λυπηρος. 6. Πατρωι εστι κηπος καλος. 7. Παντες χαιρουσι τῃ ευεστοῖ. 8. Θαυμαζε, ω παι, μετα της αιδοῦς τα πραγματα των αγαθων. 9. Ηχοι πολλακις ψευδομεθα.

EXERCISE 39.—GREEK-ENGLISH.

1. The gods send prodigies to men. 2. Death is the cure of the ills of old age. 3. Rewards encourage the bravery of soldiers. 4. The milk and flesh of goats and sheep are of use for nourishment. 5. The soldiers give the signal with horns and trumpets. 6. We taste different kinds of meat. 7. The foundation of a good old age in children is (laid) in the goodness of their constitutions. 8. Stags have horns. 9. The life of old age is hard.

EXERCISE 40.—ENGLISH-GREEK.

1. Τερα πεμπεται ὑπο των θεῶν τοῖς ανθρωποις. 2. Στρατιωται τερπονται κερασι και σαλπιξι. 3. Γευομεθα γαλακτος και κρεως. 4. Θανατος απολυει τα κακα του γηρως. 5. Ὁ βασιλευς πεμπει γερα τοις στρατιωταις. 6. Τα γερα προτρεπει τους στρατιωτας. 7. Οἱ στρατιωται προτρεπονται τοις γερασι.

LESSONS IN GEOGRAPHY.—XXV.

CONSTRUCTION OF PROJECTION OF MAP OF EUROPE.

The best and surest mode that a student of geography can adopt, in order to become thoroughly acquainted with the contour or general outline of any country, the direction of its rivers and mountain-ranges, the situation of its most important physical features, and the relative positions of its cities and towns, is to accustom himself to construct maps of the country that he is studying on a scale large enough to enable him to write in or print clearly and legibly all the names that he may wish to insert.

The first thing to be done in making a map is to construct a projection of the meridians and parallels of latitude and longitude that intersect the country which is to be delineated. The form of projection most commonly employed is the conical projection, by which a portion of a spherical or rounded surface may be represented on a plane or flat surface without much alteration of its dimensions or distortion of its various features. To make this clear, suppose the quadrant A B C (Fig. 14) to represent the fourth part of the section of a sphere in a plane passing through any meridian or great circle, and the straight line D E to represent the section of the side of a cone, placed over the sphere in such a way that its apex E is in the straight

line C B, produced towards B, while it touches the sphere in a small circle or parallel of latitude passing round the sphere through the point F, in which the straight line D E touches the arc A B. We will assume this small circle, which is indicated in the diagram by the dotted line F G, to represent the 55th parallel of north latitude, and divide the whole arc A B into eighteen arcs of 5 degrees each, in the points marked 5, 10, 15, etc. Now, supposing straight lines to be drawn from the centre C, through the points in the arc marked 45 and 65, cutting D E in the points H, K, it is manifest that the straight line H K, the projection on the surface of the cone of the arc between 45 and 65 on the surface of the sphere, does not differ materially from the arc itself in length, and that if this process were adopted for a small portion of the surface of the sphere on either side of the arc between 45 and 65, instead of the arc itself only, the result on the surface of the cone, when the cone was unrolled and spread out flat on a table, would represent accurately enough for all practical purposes on a flat surface the portion of the sphere which is thus projected on the cone. The measurement on the surface of the cone between places situated on or very near the 55th parallel, would be precisely the same as their distances from each other on the sphere, while the distances between places on the cone near the parallels passing through 45 and 65 would be a little in excess of their distances from each other on the surface of the sphere. If, however, instead of touching the sphere, we suppose the circumscribing cone to pass through it, through two parallels of latitude, as M L, the section of the side of a cone which cuts the sphere in the parallels of 45 and 65, it is manifest that we ensure a greater degree of accuracy in delineating the features of that portion of the sphere that are to be depicted on the cone, especially when a larger extent of the sphere has to be projected on the cone, as we have two parallels, namely, those of 45 and 65, along which measurements on the cone are identical with measurements on the sphere.

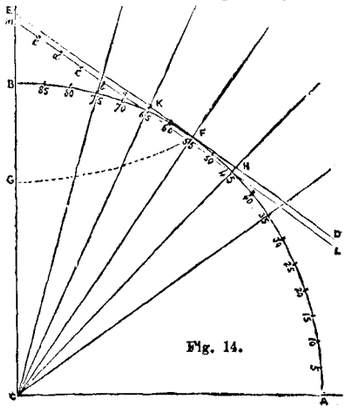
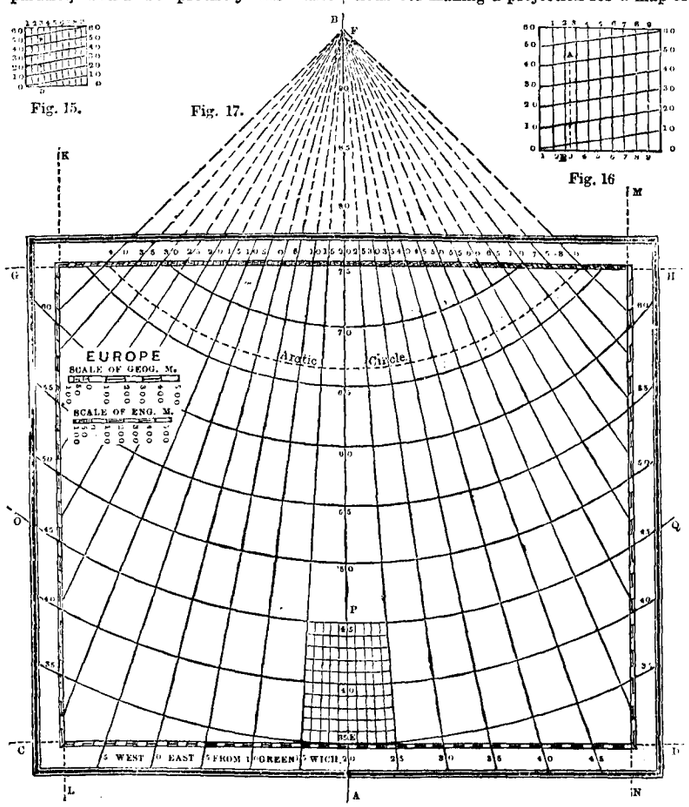


Fig. 14.

Fig. 15.

Fig. 16

Fig. 17.



In projecting the arc B A on the surface of the circumscribing cone, it is manifest that the distances between every two parallels at intervals of 5 degrees would be accurately determined by drawing straight lines through the centre to the points of division, and producing them till they meet the side of the cone; but as the points so obtained would exhibit unequal divisions for the measure of degrees on the meridian (as the learner may see more clearly if he will take the trouble to construct Fig. 14 on a large scale), in making, for example, a map of any portion of the surface of the sphere between the 35th and 75th parallels, it is merely necessary to set off equal spaces on the line of the central meridian, as the spaces 65 to M, marked at *a*, *b*, *c*, *d*, and *e*, each of which is equal to a fourth of the chord from 45 to 65. This is done to obtain equal distances between the parallels of latitude on the conical projection as on the sphere. It may be said, indeed, that the great advantages presented by the conical projection are the preservation of equal distances between the parallels of latitude and rectangular intersections of the parallels and meridians, as on the globe; the opposite diagonals measured across any space contained by two parallels and two meridians being in all cases equal to one another.

As the learner, if he have read carefully what has been said above, will now thoroughly understand why the conical projection is far better suited than any other for developing portions of a sphere on a flat surface, we will proceed with instructions for making a projection for a map of Europe, after saying that the conical projection is the easiest that a learner can construct, as it consists of nothing more than straight lines and concentric arcs of circles, which can be readily drawn by means of a ruler and pair of compasses.

In Fig. 17 is given a conical projection for a map of Europe, which the learner should construct on a larger scale by the process about to be described, on stout cartridge paper, pasted or pinned to a drawing board, taking care that the board is large enough to include the centre from which the arcs representing the parallels of latitude are to be described. First draw the base line, C D, as shown in the figure, with a fine pencil; bisect it in E, and through E draw the straight line, A B, at right angles to C D. The straight lines A B, C D should be drawn as far as the paper will admit. An inspection of a map of Europe will show that the whole of this continent is included within the 35th and 75th parallels of north latitude on the south and north, and bisected by the meridian of 20° or the 20th degree of longitude east from Greenwich. The straight line A B may therefore be taken to represent longitude 20° east from Greenwich in our projection. Take any space to represent five degrees, but be careful

that the space thus assumed is not taken too long in proportion to the base line of the map, and set off from E along the straight line E B eight of these spaces, and number the points, beginning with E, 35, 40, 45, 50, 55, 60, 65, 70, 75, as in the figure, and through the point marked 75 draw the straight line G H parallel to C D. The line G H will be the limit of the map towards the top, and the points numbered upwards in succession from E will be the points through which will pass the parallels of latitude corresponding with the numbers. To find the centre from which to draw the parallels of latitude, measure four spaces upwards from the point marked 75, along A B, and number them 80, 85, 90, and F. The point F, just five degrees higher than the pole marked 90, is the centre from which the parallels of latitude are to be described. This point corresponds to the point M in Fig. 14, in which the sphere is supposed to be entered by a cone passing through it in parallels 45 and 65, the spaces from 45 to M, along the line L M, in Fig. 14, and the spaces from 45 or P to F, along the line A B, in Fig. 17, corresponding in number, as the reader may ascertain on comparing them. The actual distance of the point F beyond the pole is 4° 30′ 30″, when determined by calculations involving a knowledge of trigonometry; but for maps on a small scale it is near enough to consider it as being equal to five degrees, and therefore to the space assumed to represent five degrees in the construction of the projection. The point F being thus determined, the parallels of latitude may be described through the points marked on the central meridian with a finely pointed pencil, or, as there is no absolute occasion to describe these arcs until the limits of the map on either side are determined, it will be sufficient to draw a single arc O P Q through the point marked 45 or P. This arc should be drawn for some distance beyond the ultimate limits of the map on either side.

We now proceed to draw the meridians, and to determine their position. The learner will have to refer to the table at the end of this lesson, which shows the number of geographical miles contained in a degree of longitude under each parallel of latitude, supposing the earth to be a perfect sphere in form.

It will be remembered that the cone on which our map of Europe is projected was supposed to pass through the sphere in the parallels of 45° and 65°, and that the measurements on the cone along these lines are exactly equal to measurements along the same lines on the sphere, or, in other words, that the degrees of longitude on these parallels, both on the cone and the sphere, are exactly equal. On looking at the table, we find that a degree of longitude under the parallel of 45° is equal to 42·43 geographical miles on the sphere, while a degree of longitude under the parallel of 65° is equal to 25·36 geographical miles. What we want to do, then, is to find a line bearing the same proportion to the line which we assumed at first to represent 5 degrees, as 42·43 geographical miles bears to 60 geographical miles, to enable us to set off points along the arc O P Q on either side of the central meridian, through which the other meridians may be drawn from the point F. It would do equally well to find a line bearing the same proportion to the line assumed to represent 5 degrees as 25·36 bears to 60, and to set off spaces equal to this line on either side of the central meridian along the arc representing the parallel of 65°; but it is always safer, and ensures a higher degree of accuracy, to deal with the larger arcs and spaces instead of the smaller.

To enable us to find lines bearing the required proportions to the line originally assumed to represent 5 degrees, we must take a straight line exactly equal to it, as in Fig. 15, and on it construct a square. The sides of this square must be divided into six equal parts, and numbered upwards at the points of section from 0 to 60, while the top and bottom must be divided into ten equal parts, the points of section between the extremities being numbered from 1 to 9. Lines must then be drawn diagonally across the square, from 0 on the left hand to 10 on the right hand, etc., and perpendicular lines parallel to the sides through the points of section numbered 1, 2, 3, etc. This diagonal scale, constructed on the same principle as the scale shown in Lessons in Geometry, Vol. I., p. 113, enables us to measure with accuracy any part not less than one-sixtieth of the line assumed to represent 5 degrees. The line required has to bear the same proportion to this line as 42·43 bears to 60, and will be represented by the dotted line in Fig. 15, drawn midway between the lines representing 42 and 43, and a little nearer to the former than to the latter. In Fig. 16 a larger diagonal scale is given, from which the reader may construct a projection for a map of Europe, taking the dotted line A B to represent the distances to be set off along the arc representing the parallel of 45°; but it will be better for him to construct scales for himself, much larger in size than the largest which we have given in Fig. 16.

Distances equal to the line *a b* that represents 42·43 on the small scale in Fig. 15, must now be set off on either side of the central meridian, represented by the straight line A B, along the arc O P Q, and straight lines must be drawn from F with a fine drawing-pen through the points thus obtained. The dotted lines between F and the top of the map need not be drawn by the learner. The remaining arcs must then be drawn with a compass pen, and the limits of the map to the east and west determined by drawing the straight lines K L, M N at right angles to the base line C D, the former a little to the left of the meridian 5° west longitude, and the latter a little to the right of the meridian 45° east longitude. The border lines should then be drawn as shown in the engraving. The double lines at the sides and top and bottom of the inner space, which contains the map, should be divided into single degrees and ruled, as in the figure, to present a distinction of colour, and thus afford a ready means of counting and measuring degree lines not marked and numbered on the map. The meridians should be numbered in the border at the top and bottom, and the parallels of latitude at the sides. The Arctic Circle must be inserted in the form of a dotted line at the distance of 1° 30′ above the parallel of 65°. A blank space should be left in the upper left-hand corner, or the lower right-hand corner, for the title and scale of geographical and British miles. To construct these scales, it must be remembered that 60 geographical miles are equal to 69·07 British miles, or that the line which was at first assumed as being equal to 5 degrees, represents 60 × 5, or 300 geographical miles, and 69·07 × 5, or 345 British miles, very nearly.

In order to fix the position of places with accuracy, the student is advised to divide the field of his map by pencil lines into spaces of a degree each way, as shown in the lower part of Fig. 17. This, however, can only be done when the map is on a sufficiently large scale. Learners are cautioned to use Indian ink instead of common ink in drawing maps, as the ordinary ink will run and spoil the map where a final wash of colour is given to the sea, and the boundary lines are distinguished by contrasting tints.

TABLE SHOWING THE NUMBER OF GEOGRAPHICAL MILES IN A DEGREE OF LONGITUDE UNDER EACH PARALLEL OF LATITUDE, THE EARTH BEING SUPPOSED TO BE A PERFECT SPHERE.

Par. of Lat.	Geog. Miles.	Eng. Miles.	Par. of Lat.	Geog. Miles.	Eng. Miles.	Par. of Lat.	Geog. Miles.	Eng. Miles.	Par. of Lat.	Geog. Miles.	Eng. Miles.
0	60·00	69·07	23	55·23	63·51	46	41·68	47·93	69	21·50	24·73
1	59·99	69·06	24	54·81	63·03	47	40·92	47·06	70	20·52	23·60
2	59·96	69·03	25	54·38	62·53	48	40·15	46·16	71	19·53	22·47
3	59·92	68·97	26	53·93	62·02	49	39·36	45·26	72	18·54	21·32
4	59·85	68·90	27	53·46	61·48	50	38·57	44·35	73	17·54	20·17
5	59·77	68·81	28	52·98	60·93	51	37·76	43·42	74	16·54	19·02
6	59·67	68·62	29	52·48	60·35	52	36·94	42·48	75	15·53	17·86
7	59·55	68·48	30	51·96	59·75	53	36·11	41·53	76	14·51	16·70
8	59·42	68·31	31	51·43	59·13	54	35·27	40·56	77	13·50	15·52
9	59·26	68·15	32	50·88	58·51	55	34·41	39·58	78	12·47	14·35
10	59·09	67·95	33	50·32	57·87	56	33·55	38·58	79	11·45	13·17
11	58·90	67·73	34	49·74	57·20	57	32·68	37·58	80	10·42	11·98
12	58·69	67·48	35	49·15	56·51	58	31·79	36·57	81	9·39	10·79
13	58·46	67·21	36	48·54	55·81	59	30·90	35·54	82	8·35	9·59
14	58·22	66·95	37	47·92	55·10	60	30·00	34·50	83	7·31	8·41
15	57·96	66·65	38	47·28	54·37	61	29·09	33·45	84	6·27	7·21
16	57·68	66·31	39	46·63	53·62	62	28·17	32·40	85	5·23	6·00
17	57·38	65·98	40	45·96	52·85	63	27·24	31·33	86	4·18	4·81
18	57·06	65·62	41	45·28	52·07	64	26·30	30·24	87	3·14	3·61
19	56·73	65·24	42	44·59	51·27	65	25·36	29·15	88	2·09	2·41
20	56·38	64·84	43	43·88	50·46	66	24·40	28·06	89	1·05	1·21
21	56·01	64·42	44	43·16	49·63	67	23·44	26·96	90	0·00	0·00
22	55·63	63·97	45	42·43	48·78	68	22·48	25·85			

As the learner will have to refer to this table when engaged in the construction of a conical projection of any portion of the sphere, whether large or small, he should carefully study it, and endeavour to commit to memory the number of geographical miles under every fifth parallel of latitude, counting from the equator, that is to say, the 5th, 10th, 15th, 20th, etc.

LESSONS IN ENGLISH.—XXV.

GREEK STEMS (*continued*).

By derivation, grammar is the science of letters. This is not an incorrect definition, for the science of letters, considered in all its relations, is the science of language, of which letters are the elementary portions. "Letters" is often used, however, for systematic knowledge, or the results of a high and varied education. So we speak of "a man of letters." In this sense the term is used in the question, "How knoweth this man *letters*, having never learned?" (John vii. 15.) The hostile questioner took Jesus to be *ignorant* (Acts iv. 13)—that is, as in the original, ἰδιωτης (*id-i-o'-tees*), *idiot*, *untaught*—such as Peter and John were accounted.

"I made it both in forme and matter to emulate the kind of poeme which was called *epithalamium*, and by the ancients used to be sung when the bride was led into her chamber."—*Ben Jonson*, "*Masques*."

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meanings.*	*Stems.*	*English Words.*
Ἁγιος	hag'-i-os	*holy*	*hagio*	*hagiography.*
Ἑκατον	hek'-a-ton	*hundred*	*hecato*	*hecatomb.*
Βους	bous	*an ox*	*b*	*hecatomb.*
Ἡλιος	he'-li-os	*the sun*	*helion*	*aphelion.*
Περι	per'-i	*near*	*peri*	*perihelion.*
Απο	ap'-o	*from*	*ap*	*apology.*
Ἡμερα	he'-mer-a	*a day*	*hemer*	*ephemeral.*
Ἑπτα	hep'-ta	*seven*	*hept*	*heptagon.*
Ἱερος	hi'-e-ros	*holy*	*hiero*	*hieroglyphics.*
Γλυφειν	glu'-phine	*to engrave*	*glyph*	*glyphography.*
Ἱππος	hip'-pos	*a horse*	*hippo*	*hippopotamus.*
Ποταμος	pot'-a-mos	*a river*	*potam*	*Mesopotamia.*
Ὁδος	hod'-os	*a way*	*od*	*exodus.*
Εκ, εξ	ek, ex	*out of*	*ec*	*ecorcism.*
Ὁμος	hom'-os	*the same*	*homo*	*homologous.*
Ὑγρος	hu'-gros	*wet*	*hygro*	*hygrometer.*
Ἰχθυς	ik'-thuse	*a fish*	*ichthy*	*ichthyology.*
Ισος	is'-os	*equal*	*iso*	*isothermal.*
Κακος	kak'-os	*bad*	*caco*	*cacophony.*
Φωνη	pho'-ne	*a sound*	*phono*	*phonography.*
Καλος	kal'-os	*beautiful*	*cali*	*caligraphy.*
Καλυπτ	ka-lūp'-to	*I cover*	*calyp*	*apocalypse.*
Κοσμος	kos'-mos	*the world*	*kosm*	*microcosm.*
Κυκλος	ku'-klos	*a circle*	*cycl*	*cycle.*
Λαος	la'-os	*the people*	*lai*	*laity.*
Μονοι	mon'-os	*alone*	*mono*	*monosyllable.*
Συν	sune	*with*	*syn*, *syl*	*synthesis.*, *syllogism.*
Λαμβανειν	lam'-ba-nine	*to take*	*lab*	*syllable.*
Θησις	the'-sis	*a placing*	*thesis*, *thet*	*thesis.*, *synthetic.*
Μορφη	mor'-phe	*shape*	*morph*	*metamorphosis.*
Μετα	met'-a	*change*, *after*	*meta*	*metathesis.*
Μυθος	mu'-thos	*a speech*, *a fable*	*myth*	*mythology.*
Νεκρος	nek'-ros	*dead*	*necro*	*necromancy.*
Μαντεια	man-tei'-a	*divination*	*mancy*	*geomancy.*

A *hecatomb* is the slaughter of a hundred oxen in sacrifice. It is sometimes used metaphorically, as, for example:—

"And here, sir, she offers by me to the altar of your glory, whole *hecatombs* of most happy desires, praying all things may prove prosperous unto you."—*Drummond.*

Isothermal lines are lines of equal heat in different parts of the globe. *Iso* is also found in *isosceles* (σκελος, skel'-os, *a leg*), applied to a triangle which has its two sides of the same length.

Aphelion is that point of the orbit of a planet in which it is most distant from the sun; *perihelion* is that point in which it is nearest to the sun. As the planets move in elliptic orbits, they are necessarily at a greater distance from the sun at one part of their course than at another.

Anything whose duration or existence is very short is termed *ephemeral*, or lasting for a day. Thus, insects that spring into life at sunrise and perish at sunset are styled *ephemera*.

"There are certain flies that are called *ephemera*, that live but a day."—*Bacon.*

An *ephemeris* is properly a journal (French, jour, *day*), an account of daily transactions. *Ephemerides* (the plural of *ephemeris*) denote a set of astronomical tables, showing the state of the heavens for every day.

The expression *homologous* is used by Euclid in his "Elements of Geometry," in reference to lines and angles that correspond in relative position, proportion, or structure: hence any two forms or expressions that exactly correspond in position, proportion, formation, or value, may be said to be *homologous*.

"Comparing the *homologous* or *correspondent* members on both sides, we find that the first member of the expression," etc.—*Bishop Berkeley*, "*Analyst*."

Apocalypse, by its very derivation, signifies *uncovering*; in Latin it is *unveiling*—that is, *revelation*.

In *apocrypha* we have another theological term, which is interpreted to mean a *hidden* writing, from απο (ap-o), *from*, and κρυπτειν, krup-tine (*crypt*), *to hide*. But why should not the *apo* here have the same meaning as in apocalyse, and so reverse the import of *kryptein* (English *crypt*), *to hide*, and thus signify the disclosed, discovered, or *detected* writing? Any way, *apocryphal* is equivalent to *spurious*, and opposed to *canonical* or authentic.

"Now, beside the Scriptures, the bookes which they called *ecclesiasticall* were thought not unworthy sometimes to bee brought into publicke audience; and with that name they intituled the bookes which we term *apocryphal*."—*Hooker*, "*Ecclesiastical Polity*."

Laity denotes the people as contradistinguished from the *clergy*. In ancient times the laity were ignorant, the clergy learned. Hence arose a broad contrast, exhibiting the people as wicked as well as untaught, and the clergy (*clerks*) no less holy than instructed. These usages are found in the substance of our language, and still linger amongst us in both thought and feeling.

"He entended (intended) to set forth Luther's heresy, teaching that presthed (priesthood) is no sacrament, but the office of a lay-man or a lay-woman appointed by the people to preache."—*Sir T. More.*

"No wonder though the people grew profane,
When churchmen's lives gave *laymen* leave to fall."—*Drayton.*

Synthesis is properly the *putting together*, as *analysis* (ανα, an'-a, *up*; and λυειν, lu'-ein, *to undo*, *to loosen*) is *the undoing*. A watchmaker performs an act of *analysis* when he takes a watch to pieces, and an act of *synthesis* when he puts the parts together again.

"*Synthesis* consists in assuming the causes discovered and established as principles, and by them explaining the phenomena proceeding from them, and proving the explanations."—*Newton*, "*Optics*."

"*Analysis* consists in making experiments and observations, and in drawing general conclusions from them by induction."—*Ibid.*

Analysis is the way of discovery, *synthesis* is the way of teaching or communication. By *synthesis* men put together and exhibit what they have ascertained by *analysis*.

Metamorphosis denotes a change of form.

"Thus mea (my lord) be *metamorphosed*
From seemly shape to byrds and ougly beasts."—*Gascoigne.*

Metempsychosis (μετα, meta, *change*; εν, en, *in*; and ψυχη, psu'-ke, *the soul*) has for its Latin equivalent *transmigration* (trans, *over*; migro, *I change my place*).

"The sages of old live again in us, and in opinions there is a *metempsychosis*. We are our re-animated ancestors, and antedate their resurrection."—*Glanvill.*

Metathesis is a change of position or a transposition. Thus what we write *bird* was formerly *bryd*, the *i* and the *r* changing places.

Mythology is the science of fable, and is applied to the religion of the Greeks, the Romans, the Hindoos, etc., in opposition to the pure religion of the Gospel. German philosophy has introduced amongst us the new term *myth*, as denoting a *legend*, or a *version of facts*, shaped and coloured by opinion, fancy, prejudice, by the workings of the intellect, the workings of the imagination, or the workings of the heart. In origin, *myth*, *fable*, and *legend* are one, for the words severally denote a *word*, something spoken, something narrated. But as *old stories* soon lose their primitive form, and acquire new shapes and hues, so *words* pass into *legends*, and legends are corrupted into *fables*.

Necromancy is the fancied art of learning and disclosing facts by communication with the dead. The witch of Endor dealt *necromantically* with Samuel at the request of Saul. (1 Sam. xxviii. 7; compare Deut. xviii. 9.)

*

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meanings.*	*Stems.*	*English Words.*
Νεος	ne'-os	*young, new*	*neo*	*neology.*
Φυτος	phu'-tos	*begotten, created*	*phyt*	*neophyte.*
Νομος	nom'-os	*an allotment*	*nom*	*astronomy.*
Ἀστρον	as'-tron	*a star*	*astro*	*astronomical.*
Νοσος	nos'-os	*disease*	*noso*	*nosology.*
Οικειν	oi'-kein	*to dwell* [*side*	*ochi*	*parochial.*

Neology, or *new doctrine*, conveys with it the same tacit blame as *new light*, on the ground that what is *old* is more likely to be true than what is *new*, and that what is *new* may be *fanciful*.

"They endeavour, by a sort of *neology* of their own, to confound all ideas of right and wrong."—*Boothby*, "*On Burke*."

Neos supplies also the first syllable to *neophyte*, one *newly born*, or *created anew* by grace, *a convert*.

"In effects of grace, St. Paul makes a difference between those he calls *neophytes*—that is, newly grafted into Christianity—and those that are brought up in the faith."—*Bacon.*

In 1 Tim. iii. 6, the Greek word νεοφυτης (ne-o-phu'-tes) is rendered *novice*.

Astronomy, from the Greek words in the preceding list, means the *allotment* or *distribution* of the stars into classes, and not the *laws* of the stars, which is a modern idea.

"Not from the stars do I my judgment pluck,
And yet methinks I have *astronomy*."—*Shakespeare.*

In the word *parochial*, the original form of the Greek root is seen better than in *parish*; which, however, is of the same derivation. *Parish*, from παροικια (par-oi'-ki-a), *a division*, a district formed of persons living together, takes its English form from the French *paroisse*. Blackstone defines a parish as "a circuit of ground committed to the charge of one person, or vicar, or other minister having care of souls therein."

EXERCISES IN COMPOSITION.

Words with their Prepositions to be formed into sentences.

	FOREIGN REPRESENTATIVES.
Arrive at,	ripa, *a river-side.*
Ask of a person, / „ for or after a person, / „ for a thing,	ascian, *to petition.*
Aspire to,	spiro, *I breathe.*
Assent to,	sentio, *I feel.*
Assimilate to,	similis, *like.*
Associate with,	socius, *a companion.*
Assure of,	assurer, *to assure.*
Atone for,	at one, *to at-one.*
Attached to,	attacher, *to bind.*
Attain to,	atteindre, *to reach.*
Attend to,	tendre, *to stretch.*
Averse to, from,	verto, *I turn.*

EXERCISES FOR PARSING.

A pedagogue is a term of Greek origin, equivalent to our schoolmaster. Pedagogue is a word which is now used contemptuously. In an oligarchy the interests of a few predominate. In a democracy the interests of the many prevail. The real and the apparent interests of men are sometimes very different. A polemical spirit is undesirable. Polemical writings are occasionally required. The character of the apostle Paul is very noble. Apostolical virtues are rare. The apostles received their mission immediately from Christ. Without enthusiasm the best of causes cannot be carried forward. Enthusiasm is in danger of degenerating into fanaticism.

GEOMETRICAL PERSPECTIVE.—IV.

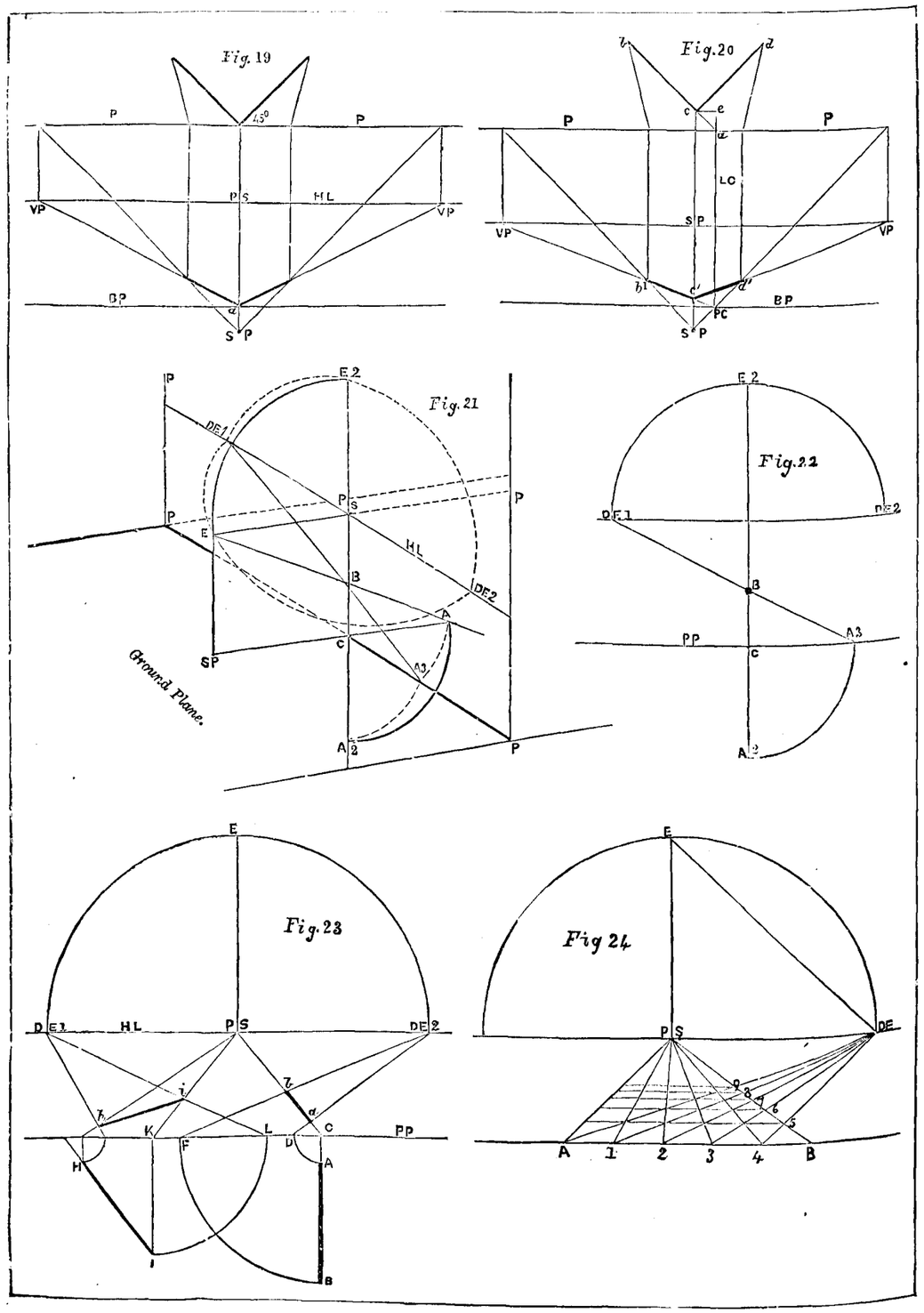
PROBLEM VII. (Fig. 19).—*Two lines, each 5 feet long, form a right angle; the angle touches the* PP, *and is opposite the eye; each line is 45° with the* PP.

In this case *two* vanishing points must be found, as there are *two* lines in the plan, drawn in *different* directions. As this is but a repetition of Problem I., Fig. 7, drawn each way, there will be no necessity for our repeating it; only we wish to direct the attention of the pupil to the position of the eye being opposite the angle. Therefore, the line drawn from the angle to the base of the picture, perpendicularly to the picture-plane, serves, first, to *place the station-point*; secondly, acts as a *visual ray*; and thirdly, as a *line of contact*. Consequently, the position of the angle in the picture will be at *a*, touching the base of the picture. Let us state the question as that the angle *does not touch* the PP, but is 1 foot within it (Fig. 20). Draw a line from *a* at the given angle, 45°. From *a* draw *a e*, equal to 1 foot (still using the scale of 4 feet to the inch), and perpendicular to the PP; draw *e c* parallel to PP; *c* will then be the position for placing the angle. It will be seen that the *line of contact*, marked LC, is drawn from *a*, because *a* is the *point of contact* for the line *c b*. Thus the pupil will observe, if no part of the plan touches the PP, one line must be produced, as *b c* has been done to *a*, from which the line of contact is drawn perpendicularly to the PP, and the point of contact, PC, is brought down to the base of the picture, from which the perspective view of the line *b' c'* is drawn to its VP. The visual ray from *c* to SP will determine upon *b'* PC the position of the angle *c'* in the picture—that is, the *perspective distance* of one foot within the picture; the rest will be the same as in Fig. 19.

The above, and also the greater portion of our previous lessons, is a part explanation of one system of the ground-plan method; we have introduced it first, and said thus much upon it, more for the sake of clearing up technicalities than for any other reason. It is a beginning from which we intend gradually to lead our pupils into deeper water, and we hope by this course of treatment to make the subject easier to comprehend. We now intend to take up another line of explanation for the same purpose, and here we especially ask for the close attention of our pupils whilst we say a few words upon the way we wish them to proceed. We desire to make our observations as clear as we can, nowever difficult it may be to do so; therefore we ask them to accompany us slowly, and not to feel discouraged if they have to read our instructions more than once. In some of our lessons on drawing, we introduced some perspective problems in order to give the *why* and *wherefore* of the reasons for the practice and methods we recommended; it is true that we could have simply stated how, and in what direction a line was to be drawn, and the pupil might have understood the instruction, and have done as he was directed very satisfactorily; but we felt it was our duty not to leave him with such superficial guidance, but open out to him *the reasons* for these directions, because if he understood them, he was then furnished with a key to innumerable other facts and positions, thus enabling him to dispense with oft-repeated explanations, varied in some respects only by the difference there might be in the subject.

This way of proceeding entails a greater amount of difficulty in the explanation, and necessarily a greater amount of attention and study on the part of the pupil; but there is this satisfaction attending it, the subject becomes in proportion more interesting, and a more solid, extensive, and really useful amount of knowledge is acquired. These are gains well worth the additional care and painstaking necessarily incumbent upon both master and pupil, and certainly ought not to be passed over by either. We are about to follow the same plan again, as far as possible, in explaining the reasons for the directions we shall give as we proceed with our lessons. Should difficulties arise, there will be no occasion to stop. Let the pupil proceed according to the rules laid down in the problems, and very likely, after he has done a few, and again returned to those he stumbled over, he will find they have become clear and simple, and that his future course will be at once pleasant and easy. One of the great difficulties in perspective to beginners is to understand how *several planes are brought together upon one plane*—that is, the sheet of paper upon which we draw the picture. We will take *a point* and place it in its perspective position, and further illustrate it by an *eidograph*. First, with regard to the *several planes* we speak of. The *first plane* is the plane or surface of the picture (see Fig. 21), PPPP; secondly, the *ground-plane*, or surface of the ground upon which the object, A, is lying; and, thirdly, there is the plane passing through the eye and the picture-plane, its trace being shown by the horizontal line, or line of sight, *parallel with the ground*, upon which is drawn the semicircle DE^1 E DE^2. The letter E means *the eye*, or in other words, its position with regard to the object and the picture-plane; DE^1 and DE^2 mean the distance of the eye from the picture-plane thrown round upon the HL, because DE^1 and DE^2 are the same distance from PS (the point of sight) as E is from PS, being the extremities of a semicircle drawn through

*



E from PS as a centre. Now this horizontal plane through the eye, E, is turned up upon the perpendicular or picture-plane; mark the course of the dotted arc from E to E^2, therefore PS E^2 is equal to PS E. Thus, it will be seen, *two planes* are reduced to one. The result is shown also in Fig. 22. Now we must turn the ground-plane upon the picture-plane. First, let us repeat a remark or two made in Lesson II., Fig. 5 (page 225). The line from E to A (Fig. 21) is a visual ray cutting the picture-plane in B; B then is the picture of the point A. The line from A to S P, on the ground-plane, is the *ground plan* of this visual ray; therefore a perpendicular line from C (where A SP cuts the base of the picture) drawn to the line E A, determines B, the picture of A, the object. The pupil will now perceive there is a plane perpendicular to the ground, and also to the picture-plane, upon which the distinctive points E, P S, B, C, A, and S P are placed; but first make C A^2 equal to C A, as shown in the arc from A to A^2; this brings the *ground-plane* upon the picture-plane (in the same way as we turned E to E^2). Compare Fig. 22 with Fig. 21; A^2 will be seen in both figures. From C, in Fig. 22, draw the arc A^2 A^3. This will be recognised in Fig. 21; and the line A^3 to DE^1 will also be seen in both figures; therefore the line E B A in Fig. 21 is turned round upon the picture-plane, and represented by A^3 B DE^1, shown also in Fig. 22. Thus the perspective projection B of the point A on the ground is determined. We have remarked (see Lesson II.) that points are the extremities of lines; and if we can determine the positions of points in the picture, we can represent straight lines by uniting these points. Our pupils will also recollect that we have said, "all lines which are perpendicular to the picture-plane have the point of sight for their vanishing-point." Let these observations be borne in mind as we proceed.

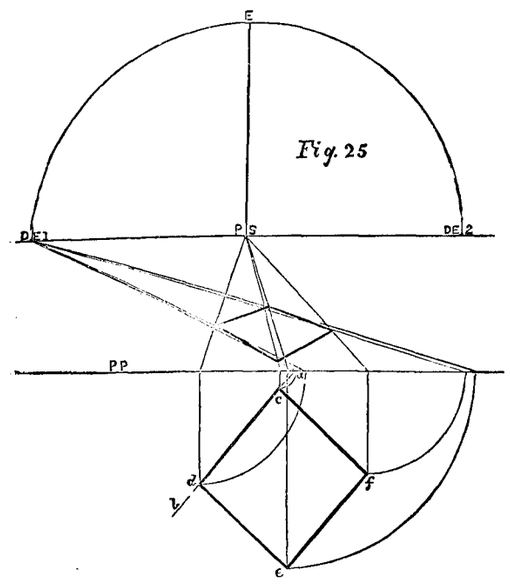
PROBLEM VIII. (Fig. 23).—*A straight line,* A B, 5 *feet long, is perpendicular to the picture-plane lying on the ground, and* 1 *foot from it; height of eye,* 5 *feet, and distance from the picture-plane,* 10 *feet. Scale,* 4 *feet to the inch.*

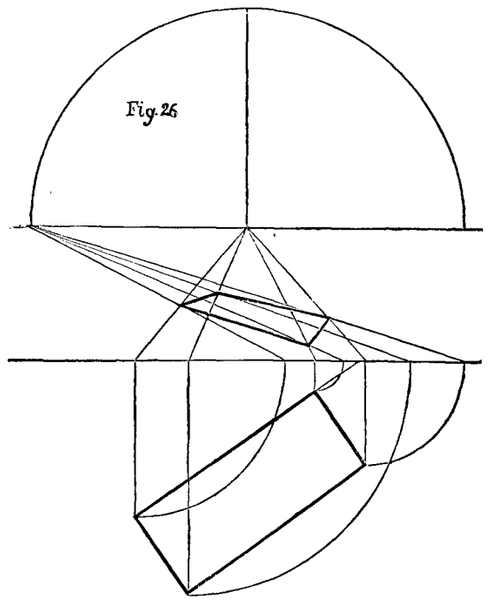
Draw the line C A B perpendicularly to PP, make C A 1 foot, and A B 5 feet. Draw HL parallel with PP, and 5 feet from it. Draw PS E perpendicularly to H L, and 10 feet long. From PS, with distance PS E, describe the semicircle DE^1 E DE^2. From C, and with the distance C A, draw the arc A D. From *i*, again draw the arc B F, join F and D with DE^2, also draw the line C PS. Between the intersections of C PS with the lines from F and D to DE^2 will be the perspective of A B, viz., *a b*. *Let the line* H I *be* 5 *feet long, and at an angle of* 50° *with the picture-plane.* From H and I draw perpendiculars to the picture-plane, and proceed with each extremity as was done with the line A B; *h i* will be the perspective of the given line H I.

The following remarks upon the line K I will refer to all the lines similarly drawn—that is, perpendicularly to PP; because the line K I is perpendicular to PP, therefore the *perspective representation* of that line is drawn to the point of sight, viz., K *i* PS, and somewhere upon that line is the position of I in *i* found first by drawing from the centre K the arc I L, and joining L with DE^1; this last line cutting K PS in *i*, fixes the perspective view of I; the same may be repeated for *h*; *i h* being joined gives the perspective view of H I.

PROBLEM IX. (Fig. 24).—*Draw the perspective view of a pavement composed of square slabs, the edges of which shall measure* 1·5 *feet; height of eye and distance as before.*

Let A B be the total width of all the slabs, and A 1, 1 2, 2 3, 3 4, 4 B, each equal to 1·5 feet. Draw lines from each of these divisions to the point of sight: upon the horizontal line set off from PS to DE 10 feet. From each of the divisions on A B, viz., A, 1, 2, etc., draw lines to DE; where these lines intersect those drawn from the given divisions A, 1, 2, etc., will be found the angles from which are drawn the opposite sides of the squares, viz., 5, 6, 7, 8, 9. We must here observe, as will be seen in Fig. 24, that *all lines which retire at an angle of* 45° *with the* P P *have the distance-point for their point of sight.* For if one side of a square is parallel with the P P, the other side will be at right angles with the P P; therefore the *diagonal* of the square will be 45° with P P.





PROBLEM X. (Fig. 25).—*Draw the perspective view of a square, the sides of which are* 3 *feet in length,* 2 *feet from the* PP, *and one side at an angle of* 50° *with the* PP.

Draw *a b* at the given angle. Find the point *c* according to Figs. 13 and 14, Lesson III., and Fig. 20. Construct the square *c d e f*, and from each angle draw perpendicular lines to the PP, and from thence vanishing lines to the PS. In these several vanishing lines find the projected angles of the square as in Problem VIII., Fig. 23; between these points respectively draw straight lines which will produce the perspective representation of the square. In the next problem we only give the proposition and the diagram, trusting the pupil will be able to work it, as the explanation would be a repetition of Problems VIII. and X.

PROBLEM XI. (Fig. 26).—*Draw the perspective view of a parallelogram* 5 *feet long,* 3 *feet broad, one edge at an angle of* 40° *with the* PP, *and the nearest angle* 1 *foot within, or from the* PP.

LESSONS IN ARITHMETIC.—XXXIV.

PER CENTAGE—PROFIT AND LOSS.

1. *Per cent.* is an abbreviation for *per centum*. So much *per cent.*, therefore, is so much a hundred.

Thus, 7 per cent. upon 400 is 28; $3\frac{1}{2}$ per cent. upon 345 is $\frac{345}{100} \times 3\frac{1}{2}$, for 100 is contained $\frac{345}{100}$ times in 345.

The quantity or number *per cent.* is called the *rate* per cent.

The number or quantity which is produced by reckoning a certain rate per cent. upon any given number or quantity is called the *per centage*.

Thus, at £27 per cent. £28 is the per centage on £400. Again, if we have to find how much per cent. one given number is of or on another, it is the same thing as dividing the first number into as many equal parts as there are hundreds in the second number. One of these equal parts in the first will then correspond to each hundred of the second number, which is the same thing as saying that the first number is so much per cent. on the other.

Thus, if we want to find how much per cent. 27 is of 900, we must divide 27 into 9 parts, which gives 3, and hence we see that for every 100 of the 900 there corresponds 3 in the 27. Hence 27 is 3 per cent. on 900.

Again, to find how much per cent. $31\frac{1}{2}$ is of 73:—

100 is contained in 73, $\frac{73}{100}$ times.

The result therefore required is $\frac{31\frac{1}{2}}{\frac{73}{100}}$, or $\frac{100}{73} \times 31\frac{1}{2}$ or $\frac{3150}{73}$.

```
73 ) 3150 ( 43·15
     292
     ---
     230
     219
     ---
     110
      73
     ---
     370
     365
     ---
       5
```

Hence, correctly to 2 places of decimals, $31\frac{1}{2}$ is 43·15 per cent. on 73.

2. The above remarks will be sufficient to explain the following rules:—

(1.) *To find what a given rate per cent. upon any number amounts to.*

Divide the number by 100, and multiply by the rate.

(2.) *To find how much per cent. one given number is of another.*

Multiply the former number by 100, and divide by the latter.

PROFIT AND LOSS.

3. Questions relating to the amount gained or lost in commercial transactions upon sales or purchases effected, can be performed by the aid of the Rule of Three and the above remarks upon per centage.

EXAMPLE 1.—If I buy 1 cwt. of coffee for 8 guineas, what do I gain by selling it at $1\frac{1}{2}$d. per oz.? Find also what I gain per cent.

112 lbs. cost 168s.

Therefore 1 lb. costs. $1\frac{1}{2}$s., or $1\frac{1}{2}$s.

Now 1 lb. is sold for $16 \times 1\frac{1}{2}$d., or 2s. Therefore the gain on 1 lb. is 6d., and on 112 lb. is £2 16s.

Next, 6d. being gained on 1s. 6d., we have to find what would be gained on £100.

Then, by the Rule of Three,

As 3 sixpences : 1 sixpence :: 100 : required rate per cent.

Hence $\frac{100}{3}$, or $33\frac{1}{3}$ per cent. is the required answer.

EXAMPLE 2.—What is the prime cost of an article per yard upon which a gain of $7\frac{1}{2}$ per cent. is obtained by selling it at 10s. 9d. a yard?

By the question, a quantity of the article which cost £100 would be sold for £107.

Hence, by Rule of Three, we have—

As £$107\frac{1}{2}$: £100 :: 10s. 9d. : cost price per yard.

Therefore cost price per yard $= \frac{100}{107\frac{1}{2}} \times 129$d.

$= \frac{200}{215} \times 129$d.

$= 120$d. $= 10$ shillings.

If the article had been sold at a *loss* of $7\frac{1}{2}$ per cent., the question would have been stated thus. Since a quantity, value £100, is sold for £100 — £7 10s., we have—

As £$92\frac{1}{2}$: £100 :: 10s. 9d. : cost price.

Therefore cost price $= \frac{100}{92\frac{1}{2}} \times 129$d.

$= \frac{200}{185} \times 129$d.

$= \frac{40}{37} \times 129$d. $= \frac{5160}{37}$d. $= \frac{430}{37}$ shillings $= 11$s. $7\frac{17}{37}$d.

EXAMPLE 3.—Having bought a quantity of tea, I find that I lose 7 per cent. by selling it at 3s. a pound. What ought I to sell it at, so as to gain 10 per cent.?

We have—

As £93 : £100 :: 3s. : prime cost per pound.

Therefore the prime cost per pound $= \frac{300}{93}$ shillings $= \frac{100}{31}$ shillings.

Now if I am to gain 10 per cent., we have the proportion—

As 100 : 110 :: $\frac{100}{31}$s. : selling price required.

Therefore the selling price required $= \frac{110}{31} = 3$s. $6\frac{4}{31}$d.

EXERCISE 53.—EXAMPLES OF PER CENTAGE, PROFIT AND LOSS, ETC.

1. How much is 4 per cent. upon £375?
2. How much is $3\frac{1}{2}$ per cent. upon 373, to 4 places of decimals?
3. How much is $3\frac{1}{2}$ per cent. upon $27\frac{2}{3}$?
4. The population of London in 1861 being 2,803,034, and that of the whole of England 29,307,276, how many per cent. of the population lived in London?
5. If the population of a town in a certain time increases by 8 per cent., and the actual population at the beginning of the time was 20,000, what was it at the end of the time?
6. If at the same rate of increase, it is found at the end of the time to be 20,000, what was it at the beginning?
7. How much per cent. on 353 is 29 to 2 places of decimals?
8. How much per cent. on 534 is $27\frac{1}{2}$ to 2 places of decimals?
9. If standard silver can be bought for 5s. an ounce, what profit does the Mint make per cent. by coining a pound Troy into 66 shillings?
10. A mixture professing to be coffee contains 24 per cent. chicory. How much chicory would there be in one pound of coffee?
11. In the last question, if the cost price of pure coffee be 1s. a pound, and of chicory 4d. a pound, what does the grocer gain per cent. by selling the mixture at 1s. 4d. a pound?
12. The population of a town increases in 10 years from 26,485 to 28,351. What is the rate of increase per cent.?
13. A grocer mixes 9 lbs. of coffee at 2s. 3d. a pound with 6 pounds of chicory at $7\frac{1}{2}$d. a pound. At what price must he sell the mixture to gain 25 per cent.?
14. If $3\frac{3}{4}$ per cent. is lost by selling steel pens at 3s. 6d. a gross, how much would be gained or lost per cent. by selling them at 2s. $6\frac{5}{8}$d. a hundred?
15. At what rate must sherry be sold which costs 40s. a doz., if on every £100 of outlay the selling price of 5 doz. is gained? What is the gain per cent.?
16. What sum must A bequeath to B, so that B may receive £1,000 after a legacy-duty of 10 per cent. has been paid?
17. What must be the gross rental of an estate, so that after deducting 7d. in the pound for income-tax, and $4\frac{1}{2}$ per cent. upon the remainder for expenses of collection, there may be left a nett rental of £1,000?
18. By the sale of goods which cost me £3 19s. 2d., I lost a sum equal to $5\frac{5}{9}$ per cent. of the proceeds; and by the sale of another quantity which cost me £5, I gained a sum equal to $31\frac{2}{7}$ of the proceeds. What did I gain per cent. on the whole outlay?
19. A man bought a house which cost him 4 per cent. upon the outlay to put into repair; it then stood empty for a year, during which time he reckoned he was losing 5 per cent. upon his total outlay. He then sold it for £1,192, by which means he gained 10 per cent. upon the original purchase-money. What did he give for the house?

KEY TO EXERCISE 52, LESSON XXXIII. (Vol. II., page 326).

1. 18.	7. £225.	13. $15\frac{1}{13}$ months.
2. 1314.	8. £140.	14. 15 days.
3. 27.	9. £600.	15. $33\frac{1}{3}$ days.
4. 240.	10. 32 days.	16. 48 oz.
5. 24.	11. 60s.	17. 100.
6. 144 days.	12. 278160.	18. $7\frac{3}{17}$ days.

LESSONS IN CHEMISTRY.—XII.

HYDRO-CARBONS, COAL GAS, FLAME, ETC.

THERE are many compounds of carbon and hydrogen. They are all derived from the decomposition of organic bodies, and therefore properly belong to "organic chemistry." Only two demand our attention at present—

Light carburetted hydrogen . . .	CH_4
Heavy carburetted hydrogen . . .	C_2H_4.

Marsh Gas, or *Light Carburetted Hydrogen* (symbol, CH_4; combining weight, 16; density, 8).—When the mud at the bottom of stagnant pools is stirred, bubbles of this gas rise to the surface; and when mixed with the spontaneously inflammable gas, phosphoretted hydrogen, the bubbles ignite, giving rise to the *ignis fatuus*, or the "Will-o'-the-Wisp." In collieries it exudes from the coal-beds, and often in such quantities as to come with a hissing noise from the seams, called by the miners "blowers." Here, when mixed with a certain quantity of air, it becomes the dangerous "fire-damp." In many parts of the world it issues from the ground, and is utilised by the inhabitants as a source of light and heat.

Preparation.—The gas may be artificially procured by heating, in a flask of German glass, sodium acetate mixed with caustic soda. Considerably under red-heat the gas comes off, and may be secured in the usual way. The reaction may be thus expressed—

$$NaOC_2H_3O + HNaO = Na_2CO_3 + CH_4;$$

the product remaining in the retort being sodium carbonate.

The gas is without colour, taste, or smell; it burns, in the presence of oxygen, with a bluish flame, into carbonic acid and water:—

$$\begin{array}{rcl} CH_4 + 4O & = & CO_2 + 2H_2O. \\ 2 \ + \ 4 & = & 2 \ + \ \text{——}. \end{array}$$

On reference to the numerals, it will be seen that for the complete combustion of marsh gas a double quantity of oxygen is required, or ten volumes of air. It will also be noticed that one-half the volume of oxygen makes the carbonic acid gas, whilst the other half becomes water with the hydrogen. This fact enables us to analyse marsh gas by means of the eudiometer. Seeing the explosion is very violent, it is better not to use pure oxygen, but air, adding to the quantity of gas in the instrument at least ten times its volume of air. After the spark has passed, the diminution will indicate the quantity of gas which has become water; and as this water possesses all the hydrogen of the gas, its composition is discovered.

Marsh gas may be decomposed by a series of electric sparks being passed through it, or if the gas be sent through a tube heated to whiteness. The carbon is deposited, and a volume of hydrogen, double that of the gas, is received. This will be indicated by the numerals—

$$\begin{array}{rcl} CH_4 & = & C \ + \ 4H. \\ 2 & = & — \ + \ 4. \end{array}$$

This gas is the chief ingredient of "coal gas."

Ethylene, Olefiant Gas, or *Heavy Carburetted Hydrogen* (symbol, C_2H_4; combining weight, 28; density, 14).—It is one of the minor constituents of coal gas. It may be obtained by heating in a flask one measure of alcohol and two of sulphuric acid. Alcohol may be considered as composed of olefiant gas and water. It is deprived of this latter by the sulphuric acid, thus:—

$$\text{Alcohol, } C_2H_6O = C_2H_4 + H_2O.$$

The gas, to purify it, should be passed through a tube packed with pieces of pumice stone, soaked with sulphuric acid (this retains any alcohol vapour and ether in the gas), and then through caustic potash, which deprives it of sulphurous acid, and carbonic acid, if any be present. The gas has no colour, but a feeble ethereal odour. It can be liquefied under great pressure. It burns in contact with the air very brightly.

$$\begin{array}{rcl} C_2H_4 + 6O & = & 2CO_2 + 2H_2O. \\ 2 \ + \ 6 & = & 2 \ + \ \text{——}. \end{array}$$

This equation shows that the products are carbonic acid and water, and the numbers indicate that the gas requires for its combustion three times its volume of oxygen, or fifteen of air. Its constitution may be determined by the eudiometer. When strongly heated, it deposits half its carbon, and becomes marsh gas without change of volume. If the heat be very intense, the whole of the carbon is separated, and twice the volume of hydrogen remains.

These processes are explained in the following equations:—

$$\begin{array}{rcl} C_2H_4 & = & CH_4 \ + \ C \\ 2 & = & 2 \ + — \end{array}$$

And

$$\begin{array}{rcl} C_2H_4 & = & 2C \ + \ 4H \\ 2 & = & — \ + \ 4. \end{array}$$

It takes its name, olefiant, from the fact that it forms, with chlorine, a heavy, oily liquid called Dutch liquid.

Coal Gas.—Coal gas, so generally used for illuminating purposes, is procured by the destructive distillation of coal, a process which is effected by exposing the coal to a high heat in cast-iron tubes called *retorts*. Coke remains in the retort, and various volatile products, together with a mixture of some dozen gases, pass into the *condensers* and *purifiers*. Many of these retorts are heated in the same furnace, and a pipe from each dips into the *main*, which is a tube of great diameter, half-filled with water, beneath the surface of which the pipes from the retorts dip. As the products of the distillation pass through this water, the *tar*, an ammoniacal liquid called *gas liquor*, and *water*, condense, whilst the gas bubbles through and is carried away by the main to the purifiers, and thence to the gasometer.

The tar has proved productive of many useful substances, such as the aniline colours, mauve, magenta, etc. From the ammoniacal liquid we derive our chief supply of ammonia. The gas in the main is a mixture of

Hydrogen	H
Marsh gas	CH_4
Olefiant gas	C_2H_4
Butyline (oil gas), traces . . .	C_4H_8
Carbonic oxide	CO
Carbonic acid	CO_2
Sulphide of hydrogen	H_2S
Nitrogen	N
Cyanogen, a trace	C_2N_2
Vapour of bisulphide of carbon . .	CS_2
" benzole	C_6H_6.

Of these the sulphide of hydrogen, the bisulphide of carbon, and carbonic acid gas are not only useless, but injurious.

To remove them the gas is exposed to a surface of *slaked lime*; this retains the sulphide of hydrogen and carbonic acid. The bisulphide of carbon may be removed by passing the gas through a tube filled with slaked lime, maintained at a temperature of 250° Cent. Under these circumstances the bisulphide is decomposed. The presence of this compound is so minute that its separation is seldom attempted; yet it is chiefly due to it that plants cannot live in rooms lit with gas. Purified gas, therefore, consists of marsh gas, olefiant gas, oil gas, and other hydro-carbons; carbonic oxide, hydrogen, and nitrogen. An idea of the relative quantities of these gases may be had from an analysis, made by Bunsen, of a Manchester gas:—

Hydrogen	45·58
Marsh gas	34·90
Carbonic oxide	6·64
Olefiant gas	4·08
Butyline	2·38
Sulphide of Hydrogen	0·29
Nitrogen	2·46
Carbonic acid	3·67
	100·00

What causes the luminosity of flame?—The presence in the flame of a solid. If sulphur be ignited, it burns with a blue non-luminous flame; because the product of the combustion is not a solid, but a gas (SO_2). Phosphorus, on the other hand, has a luminous flame, because the result of the action is a solid, phosphoric acid, the particles of which being heated in the chemical action, become white hot, and emit light.

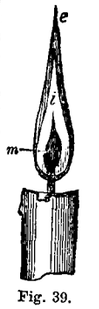


Fig. 39.

A striking instance of this truth is offered in the oxy-hydrogen light. The flame of the gas is scarcely visible, but when it plays upon a piece of lime (a solid), it raises it to a white heat, and a brilliant light is the result. Therefore, those gases are the illuminators of "coal gas," which contains carbon, the only solid in the list except the trace of sulphur. The gas will not give light unless this carbon be in a *free* state, and while in this state heated to a white heat. In considering the structure of flame, the conditions which secure this result will become evident.

Flame.—The flame of a candle is supported by the decomposition of the tallow, etc., of which it is composed, into the vapours of hydro-carbons. This decomposition is furthered by the melted fat being spread over the wick by capillary action. In the non-luminous cone, *m* (Fig. 39), the vapours are rising from the wick; in the other two cones, *i* and *e*, these vapours mix with air, and chemical action ensues.

Only a certain limited quantity of air can mix with the

vapours as they rise from the wick. The hydrogen, having a much greater affinity for the oxygen than the carbon has, at once appropriates it all, forming water; but, as we have before noticed, the combination of oxygen and hydrogen produces great heat. This raises the atom of carbon, just liberated from its combination with the hydrogen, to a white heat. This process goes on in the light-giving cone of the flame, *i*. These heated particles of carbon pass to the outside of the flame, where they combine with the oxygen of the air, first forming carbonic oxide, which again, taking another atom of oxygen, burns into carbonic acid with a blue flame, *c*, which forms the third cone of the flame. Thus it is seen that the luminosity of a flame entirely depends upon the *quantity* of air which can find an entrance into the body of the vapour undergoing combustion. If there be present too little oxygen, some of the hydrogen will pass to the outside of the flame unburnt, and thus much of its heating power will be wasted. On the other hand, if too much oxygen mix with the flame, then not only is the hydrogen burnt, but also some of the carbon at once becomes carbonic oxide, and the illuminating power of the flame will be diminished. This is illustrated in "Bunsen's burner."

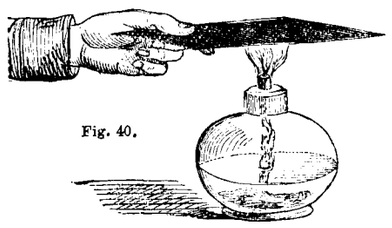


Fig. 40.

Here the air is mixed with the gas before it escapes at the top of the tube. When ignited, there is not only sufficient oxygen to satisfy the demands of the hydrogen, but also enough for the combustion of the carbon, which is never "free," burning at once into carbonic oxide. If the holes be covered with the fingers, the flame becomes luminous, the supply of air being limited to that which can mix with the gas as it escapes from the tube. A flame may be deprived of its luminosity by simply blowing it, for then, by mechanical means, sufficient oxygen has been introduced to burn the carbon, and the flame becomes blue.

It will be evident, then, in all flames, that the maximum illuminating power will entirely depend on the right quantity of air; as may often be noticed by moving the chimney of a moderator lamp higher or lower.

If a cold surface be depressed into the flame of a Bunsen's burner or a spirit-lamp, it will be found that a film of moisture is deposited upon it, which is, of course, driven off as soon as the body is heated, for the products of such a flame are water and carbonic acid, and the latter being a gas cannot be deposited; but if the same experiment be tried in a luminous flame, besides the moisture, carbon—soot—will be found on the cold surface; the reason being, that carbon will only combine with oxygen at certain temperatures. Coals will remain in a cellar for any length of time, but when once heated to a certain temperature their combination with oxygen commences, and we say they burn. In a flame, the combustion of the hydrogen just produces a sufficient heat to raise the carbon to this required temperature; but if any of this heat be detracted—by the cold surface, for instance, above alluded to—the carbon is deprived of the power of combustion, and is therefore deposited in its elementary condition.

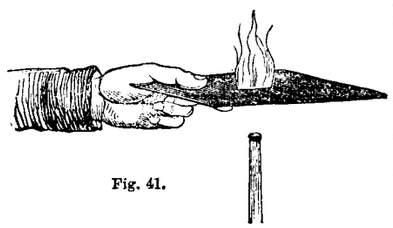


Fig. 41.

This accounts for the smoking of fires. Cold air passes through them, and its temperature is raised at the expense of the heat given out by the combustion of the hydrogen, thus taking away the heat necessary for the complete combustion of the carbon, a portion of which comes away unburnt in the shape of smoke. If a fire can be fed with hot air, or supplied with a limited quantity, all the carbon will be burnt, and there will be no smoke. One or other of these means is resorted to in all "engine" fires. Perhaps the most satisfactory method is to bend an iron pipe, about four inches in diameter, in the form of a U: place it beneath the grate, and turn one end into the mouth of the furnace, which is closed by tightly-fitting doors. The air passes through the tube, which is red-hot, and then enters the furnace, which is now enabled to burn without smoke.

A flame cannot exist if too much heat be taken from it. Thus, when we blow a candle too violently, it "goes out," because we have caused such a quantity of cold air to take away its heat as to render it unable to exist.

If a piece of wire gauze be held in the flame of a spirit-lamp (Fig. 40), the flame will not pass through the gauze, although the unburnt vapour will, which may be ignited on the upper side. The fact is admirably shown in Fig. 41, where the gas from a Bunsen's burner is lit *above* the gauze, but is unable to ignite the gas below it, because at the place where the flame touches the gauze it is extinguished. The iron, which is a good conductor of heat, robs the flame of so much, that it cannot exist, and is therefore extinguished.

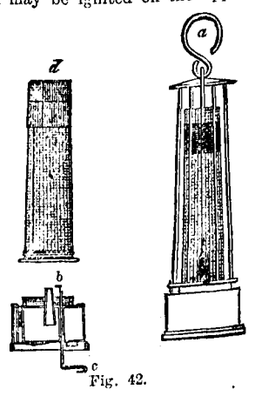


Fig. 42.

The *Davy lamp* owes its value to this fact. Fig. 42*a* shows that the common oil-lamp, *b*, is supported by a frame of iron wire, while the flame is entirely enclosed in a cylinder of iron wire gauze, *d*.

The "fire-damp" passes through the gauze, and is ignited by the flame. An explosion occurs in the lamp, which extinguishes the light; but the cooling power of the gauze prohibits the flame from passing out to ignite the mine. Thus the miner is warned of his danger. Even if the flame of the lamp be allowed to come in contact with the cylinder, it cannot do more than make it red-hot, and as fire-damp cannot be ignited unless by a white heat, there is no danger.

The cylinder is fastened down to the body of the lamp by a lock, the key of which is kept by the clerk of the mine. The miner trims his wick by the wire *c*, which passes through the oil in a tube, as the section shows.

The gauze cylinder greatly darkens the light, and the miner is much tempted to work with a naked flame; and to this recklessness may be traced almost all colliery explosions.

The results of the combustion of fire-damp are water, which condenses on the sides of the mine, and carbonic acid—choke-damp.

LESSONS IN FRENCH.—XXXIX.

SECTION LXXXVII.—IDIOMS RELATING TO PRONOUNS, ETC.

1. The pronouns subject, **je, tu, il, elle, nous, vous, ils, elles,** must be repeated, when the first verb of the sentence is negative, and the second affirmative, when the verbs are in different tenses, and when the different clauses are connected by conjunctions other than **et, ou, ni, mais** [§ 96, 2]:—

Il ne lit pas; il écrit.	*He does not read; he writes.*
Elle ne viendra pas; elle est partie.	*She will not come; she is gone.*

2. The pronouns of the third person are often omitted before the second verb in cases not coming within the above rule. The other nominative pronouns are also, sometimes, omitted. We should, however, not advise the student to omit the latter pronouns. It is always correct to repeat the nominative pronouns.

3. The student will bear in mind that the objective pronouns must always be repeated.

4. **Connaître à** answers to the English expression, *to know by*:

Je le connais à sa démarche.	*I know him by his walk (carriage).*

5. **Connaître de nom, de visage, de vue,** mean, *to know by name, by sight.*

Se connaître à quelque chose, or **en quelque chose,** corresponds in signification to the English expression, *to be a judge of something*:—

Vous vous connaissez en pierreries.	*You are a judge of precious stones.*

MISCELLANEOUS EXAMPLES.

Je le connais, je l'aime, et je lui rends justice. GRESSET.	*I know him, love him, and do justice to him.*
Il s'écoute, il se plaît, il s'adonise, il s'aime. J. B. ROUSSEAU.	*He listens to himself, is pleased with himself, adorns himself, loves himself.*
À quoi connaissez-vous ce monsieur?	*By what do you know that gentleman?*
Je le connais à son habit noir.	*I know him by his black coat.*
Je le connais de vue.	*I know him by sight.*
J'ai reconnu ma mère à la voix.	*I recognised my mother by her voice.*
À quoi vous connaissez-vous?	*Of what are you a judge?*
Je me connais en marchandises.	*I am a judge of goods.*
Je ne m'y connais pas.	*I am not a judge of it (of them).*
Il ne s'y connaît point du tout.	*He is not the least judge of it (of them).*
Il s'y connaît mieux que moi.	*He is a better judge of it (of them) than I.*
Je m'y connais aussi bien que lui.	*I am as good a judge of it (of them) as he.*

EXERCISE 169.

Artisan, m. *mechanic.*	Étoffes, *cloths of all kinds.*	Gracieux, se, *graceful.*
Blond, e, *light.*	Fabricant, m. *manufacturer.*	Grain, m. *grain.*
Bouclé, e, *curled.*	Forgeron, m. *blacksmith.*	Œuvre, f. *work.*
Chevelure, f. *head of hair.*	Gestes, m. p. *gestures.*	Orfèvre, m. *goldsmith.*
Cheveux, m. p. *hair.*		Poésie, f. *poetry.*
		Tout, *quite.*

1. Ne reconnaissez-vous point votre amie? 2. Je la reconnais à sa chevelure blonde. 3. À quoi reconnaissez-vous cette demoiselle? 4. Je la reconnais à sa démarche gracieuse. 5. N'auriez-vous point reconnu votre ami à la voix? 6. Je l'y aurais reconnu. 7. A l'œuvre on connaît l'artisan (LA FONTAINE). 8. Ne le reconnaîtrez-vous point à ces marques? 9. Je l'y reconnaîtrai. 10. Cet orfèvre ne se connaît-il point à cela? 11. Il ne s'y connaît point du tout. 12. Vous y connaissez-vous aussi bien que le forgeron? 13. Je m'y connais tout aussi bien que lui. 14. Ne vous connaissez-vous point en poésie? 15. Je ne m'y connais guère. 16. Le fabricant se connaît-il aussi bien en étoffes qu'en grain? 17. Il se connaît beaucoup mieux à celles-là qu'à celui-ci. 18. Ne connaissez-vous pas ce monsieur à ses gestes véhéments? 19. Je le connais à ses cheveux bouclés. 20. Ne vous êtes-vous pas fait connaître (*told your name*)? 21. Je me suis fait connaître. 22. Ne nous ferons-nous pas connaître? 23. Vous vous ferez connaître. 24. Ils se feront connaître par leurs vertus (*they will make themselves known*).

EXERCISE 170.

1. Do you not know that man? 2. Yes, Sir; I know him by his large (*grand*) hat. 3. By what do you recognise me? 4. I recognise you by your walk. 5. Do you recognise my friend by his gestures? 6. No, Sir; I recognise him by his black coat. 7. Do you know him well? 8. I know him by sight, but I have never spoken to him. 9. Are you a judge of iron? 10. No, Sir; the blacksmith is a judge of iron. 11. By what will you know your book? 12. I shall know it by those marks. 13. Have you not known your friend by her voice? 14. No, Madam; I knew her by her light hair. 15. Have you told your name? 16. I have not told my name. 17. Did you know your sister's friend by her curled hair? 18. I knew her by it. 19. Is the merchant a good judge of cloth? 20. He is a better judge than I. 21. Is he a better judge of it than the manufacturer? 22. He is quite as good a judge as he. 23. Is not the goldsmith as good a judge of precious stones as you? 24. He is a better judge of them than I. 25. Of what are you a judge? 26. I am a judge of nothing. 27. Are not your sisters good judges of poetry? 28. They are not the least judges of it. 29. Do you not know that young lady by her dress (*robe*)? 30. I know her by her graceful carriage. 31. Have they made themselves known? 32. They have made themselves known by their merit (*mérite*). 33. Is not the workman known by his work? 34. The workman is known by his work. 35. He is a judge of it.

SECTION LXXXVIII.—PECULIAR IDIOMS.

1. **Quelque,** *whatsoever, however, some, any,* followed by a noun, takes the form of the plural. It is invariable when it is followed by an adjective or an adverb [§ 94 (1) 2, 3]:—

Quelques livres que vous ayez.	*Whatever books you may have.*
Quelque bons qu'ils soient.	*However good they may be.*

2. **Quel que,** followed by the verb **être,** or some other verb preceding **être,** is written in two words, the first (*quel*) agreeing in gender and number with the subject of the verb [§ 94 (1) 1]:—

Quelles que soient vos vertus.	*Whatever your virtues may be.*
Quelle que puisse être sa résolution.	*Whatever his resolution may be.*

3. The above examples show that **quelque—que** and **quel—que** govern the subjunctive.

4. **Tout,** meaning *entirely, quite, nothing but,* though an adverb, takes the mark of the feminine and of the plural when it precedes an adjective or past participle feminine commencing with a consonant or an *h* aspirate:—

L'espérance *toute* trompeuse qu'elle est, sert au moins à nous mener à la fin de la vie par un chemin agréable. (LA BRUYÈRE.)	*Hope, deceitful as it is, serves at least to conduct us to the termination of life by an agreeable road.*

5. The word **gré,** signifying *consent, will, meaning,* &c., forms a number of idioms:—

Je lui sais [savoir, 3. ir.] bon gré de cette action.	*I am thankful to him* (i.e., *owe him good-will*) *for that action.*
Il nous sait mauvais gré de cela.	*He is displeased with us for that.*

MISCELLANEOUS EXAMPLES.

Ne le ferez-vous pas de bon gré?	*Will you not do it willingly?*
Il s'est marié contre le gré de ses parents.	*He married against the will of his parents.*
Sa chevelure voltige au gré du vent.	*His hair flutters at the will of the wind.*
Je sais mauvais gré à votre frère de vouloir se mêler de mes affaires.	*I am displeased with your brother for wishing to interfere with my affairs.*
Je lui en sais bon gré.	*I am thankful to him for it.*
J'espère que vous ne me saurez pas mauvais gré, si je ne vous écris pas.	*I hope that you will not be displeased with me, if I do not write to you.*
C'est à mon gré le meilleur enfant du monde.	*He is, to my thinking, the best child in the world.*

EXERCISE 171.

Bon gré, mal gré, *willing or not willing.*	Men-er, 1. *to take, to lead.*	Recommand-er, 1. *to recommend.*
Chambre, f. *room.*	Nou-er, 1. *to tie, to fasten.*	Secret, m. *secret.*
Gard-er, 1. *to keep.*	Oblig-er, 1. *to oblige.*	Silence, m. *silence.*
Lit, m. *bed.*	Offre, f. *offer.*	Suite, f. *consequence.*
Malgré, *in spite of.*		Vol-er, 1. *to fly.*

1. Savez-vous mauvais gré à votre oncle de ce qu'il a dit? 2. Je ne lui en sais aucun mauvais gré (VOLTAIRE). 3. Ne me sauriez-vous pas bon gré de vous emmener avec moi? 4. Je vous en saurais le meilleur gré du monde. 5. Ne leur savez-vous pas bon gré d'avoir gardé ce secret? 6. Je leur sais bon gré de l'avoir gardé. 7. Ne leur avez-vous pas recommandé de garder le silence? 8. Je leur ai recommandé de le garder. 9. Ce malade garde-t-il encore le lit? 10. Il ne garde plus le lit, mais il est encore obligé de garder la chambre. 11. Votre chevelure est-elle bien nouée? 12. Non, Monsieur, elle vole au gré du vent. 13. Garderez-vous votre domestique? 14. Je le garderai, il fait tout à mon gré. 15. Quelques offres qu'on lui fasse, il ne veut pas me quitter. 16. Quelque bonnes que soient ces dames, elles ne sont pas à mon gré. 17. Quelles que soient les suites de cette affaire, je vous sais bon gré de vos intentions. 18. Toute belle qu'elle est, elle n'est pas à mon gré. 19. L'avez-vous fait malgré vous? 20. Non, Monsieur; je l'ai fait de bon gré. 21. Bon gré, mal gré, il partira. 22. Me garderez-vous le secret? 23. Je vous le garderai. 24. Il change d'opinion au gré des événements.

EXERCISE 172.

1. Will he marry against his father's consent? 2. He will not marry against his parent's consent. 3. Why are you displeased with me? 4. I am not displeased with you. 5. Is your little girl's hair tied? 6. It is not tied; it waves (*flotte*) with the wind. 7. What do you think of my book? 8. It is, in my opinion, the best book that I have read [Sect. 74, 3, 4].

*

9. Will you not be displeased with me, if I do not come to-day? 10. I shall not be displeased with you. 11. Will you not read that letter? 12. However well written it may be, I will not read it. 13. Are those ladies handsome? 14. However handsome and good they may be, they do not strike my fancy. 15. Are you displeased with my brother? 16. No, Sir, I am thankful to him for his intentions, whatever may be the consequences of his conduct. 17. Will you keep this secret (for me)? 18. I will keep it willingly. 19. Does your sister keep her bed willingly? 20. She does not keep her room willingly. 21. Willingly or not, she must keep her room when she is ill. 22. Will you keep silent on this point? 23. I will willingly. 24. I am thankful to you for your good intentions. 25. Are you thankful to him for this (*de cela*)? 26. I am thankful to him for it. 27. Will the judge keep his servant? 28. He will keep him. 29. Does he do his work to his fancy? 30. He does it to his fancy. 31. Is your brother obliged to keep in the house? 32. He is obliged to keep his bed. 33. Has he not left his room? 34. He has not yet left his room; he is too ill to leave it. 35. I should be under the greatest obligations in the world to you, if you would do this.

KEY TO EXERCISES IN LESSONS IN FRENCH.

Exercise 62 (Vol. I., page 251).

1. Avez-vous froid ce matin? 2. Je n'ai pas froid, il fait chaud ce matin. 3. Fait-il du brouillard ou du vent? 4. Il ne fait ni brouillard ni vent, il pleut à verse. 5. Va-t-il pleuvoir ou neiger? 6. Il va geler, il fait très froid. 7. Il fait* du vent et du brouillard. 8. Y a-t-il quelqu'un chez M. votre frère aujourd'hui? 9. Mon frère est à la maison, et ma sœur est à l'église. 10. Y a-t-il de la viande au marché? 11. Il y a de la viande et de la volaille. 12. Fait-il trop chaud ou trop froid dans cette chambre pour Mlle votre sœur? 13. Il ne fait pas si chaud dans cette chambre que dans la bibliothèque de M. votre frère. 14. Y a-t-il de bons livres anglais dans la bibliothèque de Mlle votre sœur? 15. Il y en a de bons. 16. Y a-t-il des pêches et des prunes dans votre jardin? 17. Il y en a beaucoup. 18. Restez-vous chez M. votre frère quand il neige? 19. Quand il neige nous restons à la maison. 20. Y a-t-il des dames chez Mme votre mère? 21. Vos deux sœurs y sont aujourd'hui. 22. Avez-vous le temps d'aller les chercher? 23. Je n'ai pas le temps ce matin. 24. Votre cheval est-il à l'écurie? 25. Il n'y est pas, il est chez mon frère. 26. Grêle-t-il ce matin? 27. Il ne grêle pas, il gèle. 28. Quel temps fait-il ce matin? 29. Il fait un temps superbe. 30. Fait-il trop chaud? 31. Il ne fait ni trop chaud ni trop froid. 32. Va-t-il geler? 33. Il va neiger. 34. Neige-t-il tous les jours? 35. Il ne neige pas tous les jours, mais il neige très souvent.

Exercise 63 (Vol. I., page 251).

1. Are you still writing the same lesson? 2. I no longer write the same, I write another. 3. Does your clerk write rapidly? 4. He writes very well, but he does not write quickly. 5. Have you not money enough to buy that estate? 6. I have money enough, but I intend to make a journey to France. 7. There is your book, do you want it? 8. I do not want it, I have another. 9. Do you still want my penknife? 10. I do not want it any more, I am going to return it to you. 11. Does our cousin live in the city? 12. He lives no longer in the city, he lives in the country. 13. Does he like to go hunting? 14. He does not like to go hunting. 15. He goes fishing every day. 16. Is our partner in Paris or in Rouen? 17. He is in Marseilles. 18. Where do you intend to conduct (*take*) your son? 19. I am going to take him to Italy. 20. Do you live in Milan or in Florence? 21. I live neither in Milan nor in Florence, I live in Turin. 22. Does your friend live in Switzerland? 23. He lives no longer in Switzerland, he lives in Prussia. 24. Is your servant at church? 25. No, Sir, he is at school.

Exercise 64 (Vol. I., page 251).

1. Votre commis écrit-il aussi bien que M. votre fils? 2. Il écrit passablement bien, mais pas si bien que mon fils. 3. Avez-vous assez de livres dans votre bibliothèque? 4. Je n'ai pas assez de livres, mais j'ai l'intention d'en acheter encore. 5. Voilà la lettre de Mlle votre sœur, voulez-vous la lire? 6. J'ai l'intention de la lire. 7. M. votre fils aime-t-il à aller à la pêche? 8. Il aime à aller à la pêche et à la chasse. 9. Quand aime-t-il à aller à la pêche? 10. Quand je suis à la campagne. 11. Que faites-vous quand vous êtes à la ville? 12. Quand je suis à la ville, je lis et j'apprends ma leçon. 13. Avez-vous l'intention d'aller en France cette année? 14. J'ai l'intention d'aller en Allemagne. 15. Voulez-vous aller à la ville, s'il pleut? 16. Quand il pleut, je reste toujours à la maison. 17. Combien d'amis avez-vous à la ville? 18. J'y ai beaucoup d'amis. 19. Y a-t-il beaucoup d'Anglais en France? 20. Il y a beaucoup d'Anglais en France et en Italie. 21. Y a-t-il plus d'Anglais en Allemagne qu'en Italie? 22. Il y a plus d'Anglais en Italie qu'en Allemagne. 23. Fait-il beau temps en Italie? 24. Il y fait très beau temps. 25. Y gèle-t-il souvent? 26. Il y gèle quelquefois, mais pas souvent. 27. Cette demoiselle lit-elle aussi bien que sa sœur? 28. Elle lit mieux que sa sœur, mais sa sœur lit mieux que moi. 29. Y a-t-il quelqu'un chez vous? 30. Mon père est à la maison.

Exercise 65 (Vol. I., page 252).

1. Do they bring you money every day? (*Is money brought to you every day?*) 2. It is not brought to me every day. 3. Do they furnish you clothes when you want them? 4. They furnish me some every time that (*whenever*) I want them. 5. Do we want (*need*) money when we are sick? 6. When we are sick we want it much. 7. Have you heard from my son? 8. I have not heard from him. 9. Is it not said that he is in Africa? 10. It is said that he is to go to (*to leave for*) Algiers. 11. When is he to commence his journey (*or voyage*)? 12. It is said that he is to commence it next month. 13. Does that marriage take place to-day or to-morrow? 14. We are told that it is to take place this afternoon. 15. It will take place at half-past five. 16. Have you a desire to come, instead of your brother? 17. My brother is to come instead of our cousin. 18. Do you intend to tell him what he is to do? 19. He knows what he is to do. 20. Do you know anything new (*the current news*)? 21. There is nothing new. (*Nothing new is reported.*) 22. Is much gold found in California? 23. Much is found there. 24. Do they also find diamonds? 25. They find none, they find only gold.

Exercise 66 (Vol. I., page 252).

1. Que dit-on de moi? 2. On dit que vous n'êtes pas très attentif à vos leçons. 3. Dit-on qu'on trouve beaucoup d'or en Afrique? 4. On dit qu'on trouve beaucoup d'or en Californie. 5. Vous apporte-t-on des livres tous les jours? 6. On m'apporte des livres tous les jours, mais je n'ai pas le temps de les lire. 7. Que doit-on faire quand on est malade? 8. On doit envoyer chercher un médecin. 9. Envoyez-vous chercher mon frère? 10. Je dois l'envoyer chercher ce matin. 11. Recevez-vous tous les jours des nouvelles de M. votre fils? 12. Je reçois de ses nouvelles toutes les fois que M. votre frère vient. 13. La vente a-t-elle lieu aujourd'hui? 14. Elle a lieu cette après-midi. 15. À quelle heure a-t-elle lieu? 16. Elle a lieu à trois heures et demie. 17. J'ai envie d'aller, mais mon frère est malade. 18. Que dois-je faire? 19. Vous devez écrire à M. votre frère, qui, dit-on, est très malade. 20. Doit-il partir pour l'Afrique? 21. Il doit partir pour Alger. 22. Venez-vous au lieu de M. votre père? 23. Je dois écrire au lieu de lui. 24. Le concert a-t-il lieu ce matin? 25. Il doit avoir lieu cette après-midi. 26. Savez-vous à quelle heure? 27. A cinq heures moins un quart. 28. M. votre frère vient-il? 29. Mon frère ne vient pas, il n'a pas le temps. 30. Êtes-vous fâché contre votre frère? 31. Je ne suis pas fâché contre lui. 32. Dit-on quelque chose de nouveau. 33. Il n'y a rien de nouveau. 34. Que dit-on de lui? 35. On ne dit rien de lui.

Exercise 67 (Vol. I., page 271).

1. What is that gentleman's name? (*How does that gentleman call himself?*) 2. I do not know his name. (*I do not know how he calls himself.*) 3. Is not that lady called L.? 4. No, Madam, she is called M. 5. Is your father well this morning? 6. He is much better. 7. Is it fine weather to-day? 8. It is very beautiful (*magnificent*) weather, are you not going to take a walk? 9. We have neither horse nor carriage. 10. Can you not walk? 11. I am too weary to walk. 12. Do you not take a ride every morning? 13. I take a walk every morning. 14. How do you go? 15. Sometimes on foot, and sometimes in a carriage. 16. To whom do you apply when you want money? 17. I apply to my banker. 18. Will you not sit down? 19. We are much obliged to you.

Exercise 68 (Vol. I., page 271).

1. Mlle votre sœur se promène-t-elle tous les jours? 2. Elle se promène tous les matins. 3. Elle aime à aller à cheval et en voiture (*à se promener à cheval, etc.*). 4. Comment cette petite fille s'appelle-t-elle? 5. Elle s'appelle L. 6. Ce Monsieur ne s'appelle-t-il pas L.? 7. Non, Monsieur, il s'appelle G., et son cousin s'appelle H. 8. Comment se porte M. votre frère? (*Comment M. votre frère se porte-t-il?*) 9. Mon frère se porte très bien, mais ma sœur ne se porte pas bien. 10. Comment vos deux filles se portent-elles? 11. Elles se portent passablement bien aujourd'hui. 12. Messieurs, ne voulez-vous pas vous asseoir? 13. Nous vous sommes bien obligés, Madame, nous n'avons pas le temps. 14. Ce livre se vend-il bien? 15. Il se vend très bien. 16. Combien cette soie se vend-elle le yard? 17. Elle se vend six francs le yard. 18. Fait-il beau temps aujourd'hui? 19. Il fait très beau temps, ne voulez-vous pas aller vous promener? 20. Je n'ai pas le temps d'aller me promener. 21. À qui M. votre frère s'adresse-t-il? 22. Il s'adresse à son banquier. 23. Son frère est-il à la maison? 24. Non, Monsieur, il est à Paris. 25. Quand a-t-il l'intention d'aller en France? 26. Il a l'intention d'aller en France dans un mois. 27. Mlle votre sœur, doit-elle partir demain matin? 28. Elle doit partir aujourd'hui, s'il fait beau temps. 29. Que dit-on de ceci (*cela*)? 30. On n'en dit rien. 31. Êtes-vous trop fatigué pour marcher? 32. Je ne suis pas trop fatigué, mais je n'ai pas envie de me promener. 33. Aimez-vous à marcher, ou à aller à cheval? 34. J'aime à aller à cheval, quand j'ai un bon cheval. 35. Je n'aime pas à marcher.

* When the word *weather* precedes the verb in English, the verb is rendered in French by *être*: *Le temps est beau*, the weather is fine.

LESSONS IN BOOKKEEPING.—XVI.

THE JOURNAL—(*continued*).

(5)

Date.	Fol.	May, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
29	1	Cash Dr.	1679	7	2			
		To Sundries, as per C. B. fol. 2.				550	0	0
20	3	To London and Westminster Bank				1031	19	2
29	2	To Bills Receivable				97	8	0
27	5	To Brown and Smith						
30		Sundries Dr.				1661	13	3
	1	To Cash, as per C. B. fol. 2	327	5	0			
3	2	Bills Payable	10	0	0			
11	2	Petty Cash	500	0	0			
30	3	London and Westminster Bank	823	6	0			
25	8	Perkins and Co.	1	2	3			
,,	4	Interest	2132	8	10			
31	2	Bills Receivable Dr.				791	6	10
		To Sundries, as per B. R. B. fol. 1.				217	18	10
14	7	To Thomas Jones				299	17	2
9	8	To Lloyd and Co.				823	6	0
15	8	To Powell and Co.						
31	8	To Perkins and Co.						
27		Sundries Dr.				856	9	2
	3	To Cotton	217	18	10			
2	8	Lloyd and Co.	241	5	2			
4	7	Thomas Jones	299	17	2			
5	8	Powell and Co.	97	8	0			
27	5	Brown and Smith						
16	8	Perkins and Co. Dr.	21	5	10			
	4	To Charges				21	5	10
		£	6351	4	3	6351	4	3

(6)

JOURNAL.

Date.	Fol.	June, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
30	1	Cash Dr.	1800	11	4			
		To Sundries, as per C. B. fol. 2.				1700	11	4
30	2	To Bills Receivable				100	0	0
3	3	To London and Westminster Bank						
30		Sundries Dr.				1815	18	9
	1	To Cash, as per C. B. fol. 2	135	18	9			
3	2	Bills Payable	10	0	0			
5	2	Petty Cash	1650	0	0			
30	3	London and Westminster Bank	20	0	0			
15	1	Private Account	308	5	0			
11	2	Bills Receivable Dr.				308	5	0
	8	To Powell and Co., as per B. R. B. fol. 1	308	5	0			
1	8	Powell and Co. Dr.				308	5	0
	3	To Cotton Account	57	8	9			
30	4	Charges Dr.				57	8	9
	2	To Petty Cash						
		£	4290	8	10	4290	8	10

(7)

JOURNAL.

Date.	Fol.	General Balance in June, 1881.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
30	1	Stock Account Dr.	59	0	0			
	1	To Private Account, for Personal Expenses				59	0	0
		£	59	0	0	59	0	0

(7) JOURNAL. (7)

Date.	Fol.	General Balance in June, 1881.	Dr. £	s.	d.	Cr. £	s.	d.
30	9	Balance Account Dr.	2654	17	10			
		To Sundries, for my Assets, as per Ledger A.						
	1	To Cash				2	14	3
	2	To Petty Cash.				2	11	3
	2	To Bills Receivable				308	5	0
	3	To Cotton				75	1	6
	3	To London and Westminster Bank				2245	0	0
	8	To Perkins and Co.				21	5	10
30		Sundries Dr.						
	9	To Balance Account, for my Liabilities, as per Ledger A.				2654	17	10
	2	Bills Payable	772	6	7			
	1	Stock Account, for my *Real Worth*	1882	11	3			
30		Sundries Dr.						
	9	To Profit and Loss Account, for my Gains				782	8	7
	3	Three per Cents.	12	10	0			
	3	Cotton	769	18	7			
30	9	Profit and Loss Account Dr.	40	17	4			
		To Sundries, for my Losses						
	4	To Interest				1	2	3
	4	To Charges				39	15	1
30	9	To Profit and Loss Account Dr.	741	11	3			
	1	To Stock Account, for my *Net Gain*				741	11	3
		£	6874	12	10	6874	12	10

THE LEDGER.

We have already said so much on *the Ledger*, and the manner of posting *the Journal* into it, in Lessons VI., VII., and VIII., pages 32, 96, and 139, Vol. II., that we have now only to refer our students to that lesson again for the proper explanations, before commencing the study of the Ledger. We shall here, however, repeat emphatically what was there taught in another form, in order to impress their minds with the simplicity of the method of keeping Books by *Double Entry*.

When an entry in the Journal contains only a single Dr. and a single Cr., the rule is to *Debit* the Dr. and *Credit* the Cr.; this has been explained at page 368, Vol. I. When an entry in the Journal contains a single Dr. and a number of Crs., included in the word *Sundries*, the rule is to *Debit* the Dr. and *Credit* each of the Crs. When an entry in the Journal contains a number of Drs., included under the word *Sundries*, and a single Cr., the rule is to *Debit* each of the Drs. and *Credit* the Cr. Now, as nothing can be more simple than these rules, we proceed to explain the method of striking a *General Balance*, that is, of finding out a Merchant's *Assets* and *Liabilities*, and consequently whether he has gained or lost by trade.

In commencing the process of balancing the Ledger by *Double Entry*, the first thing is to *close up* all accounts in it, of which the two sides, Dr. and Cr., when added up, are perfectly equal, or balanced by the settlement of account. This will generally be the case in a great number of the *personal accounts* at the end of a given period, say the close of the year, or at Midsummer. To *close up* such accounts is merely to add up the sums on each side, to draw lines under the sums exactly opposite each other, to put down the totals, and to draw lines under them also. If there be any space left in the folio under an account thus closed, it may be used for the entry of new transactions under the same account, or with the same party.

All the self-balancing accounts being closed up, the Trial Balance is now to be made out; this consists of a list of all the unbalanced accounts in the Ledger, with the total sums of all the entries on each side inserted in Dr. and Cr. columns, for the purpose of easy reference in making out the General Balance, and for the immediate object of ascertaining the accuracy of all the entries in the Ledger. The latter object is at once obtained by adding up both sides of the Trial Balance, namely, the Dr. side and the Cr. side; for if the sum of both sides be the same, the strong presumption is that the Ledger is correct; and, of course, the Journal, and all the subsidiary Books, equally so. We say the strong presumption only, because there sometimes occurs in a Ledger such a thing as a *balance of errors*, that is, when a wrong entry on the Dr. side of the Ledger is balanced by a wrong entry of the same amount on the Cr. side.

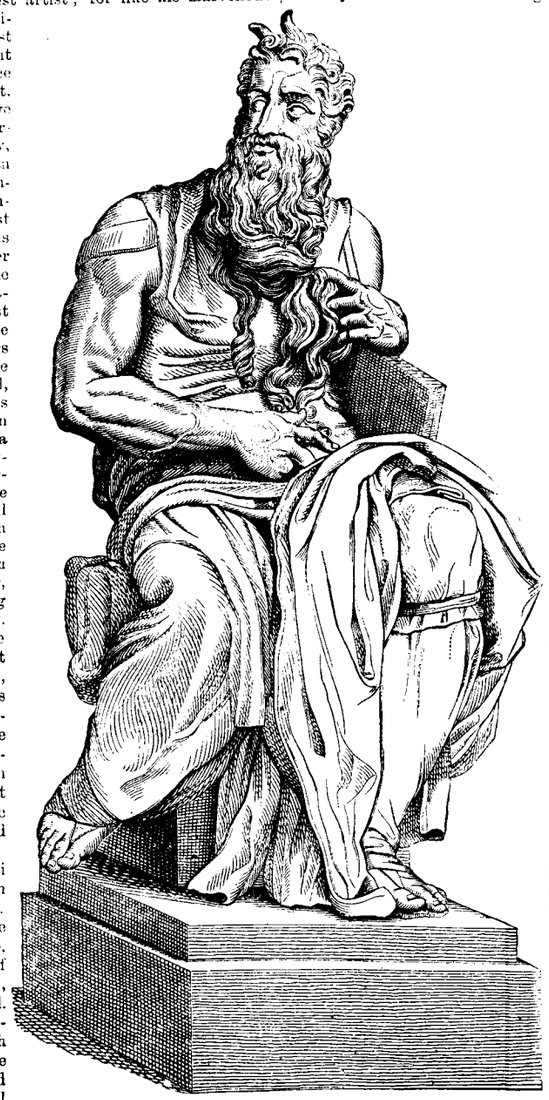
In *Balancing the Books*, as the phrase is, very great trouble is saved in making out the *Balance Sheet* and *Check* by *Double Entry*, in consequence of the admission into the *Ledger* of all the *Property* and *Profit* and *Loss* Accounts, and indeed of every account in any manner affecting the business. In conducting this process, as shown at the end of the *Journal* in our last lesson, two new accounts are opened in the Ledger, the one being called *Balance Account*, which is to be considered the converse of *Stock Account* as to its Dr. and Cr. sides; for on the Dr. side are contained all the *Assets*, and on the Cr. side all the *Liabilities*; the other being called *The Profit and Loss Account*, which contains on the Dr. side the amount of all the *Losses* experienced in business, and on the Cr. side the amount of all the *Gains*. By means of these two accounts, all the unclosed accounts in the Ledger are balanced, and the *Real Worth* of the Merchant, as well as the *Net Gain* of the business, is ascertained, independently of every book but the Ledger.

In order to effect this purpose, the *Balance Account* is now to be *debited* to every *Personal* or *Property Account* on which there is a balance in favour of the Merchant, such balances forming what are called his *Assets*; and *Balance Account* is next to be credited by every *Personal* or *Property Account* on which there is a balance against the Merchant, such balances forming what are called his *Liabilities*. Consequently, on the principles of *Double Entry*, as soon as these entries are made, the accounts of both kinds must be balanced, that is, the sums of both the Dr. and the Cr. sides will be alike, and the accounts themselves may be *closed up* in the same manner as those accounts formerly mentioned which balanced without further entries. The two sides of *Balance Account* thus constitute the *Balance Sheet* of the Merchant, and their difference constitutes his *Real Worth* at the time when the *Balance* is made in the manner we have described. For this difference, or *Real Worth*, *Stock Account* is made Dr. to *Balance Account*, and thus the *Balance Account* is *closed up* just in the same way as other accounts in which both Dr. and Cr. sides are alike; the amount for which *Stock Account* is debited showing the Merchant's *Real Worth* at the time the Balance is taken.

THE HISTORY OF ART.

XI.—MICHEL ANGELO.

If Raffael was the greatest painter of the Italian Renaissance, Michel Angelo may perhaps be reckoned as the greatest man, possibly even as the greatest artist; for like his marvellous contemporary, Lionardo, Michel Angelo essayed almost every style and department of art. He was at once painter, sculptor, architect, and even poet. While we remember Raffael as the perfection of grace and beauty, the exquisite flower of Italian art, we remember Michel Angelo mainly as the pure embodiment of power, the fullest expression of the Italian genius on its manlier and stronger side. The very faces of the two men, in the representations with which we are most familiar, seem to strike the key-note of their characters and their relations to one another. The young Raffael, as we see him in the famous portrait painted by his own pencil, appears before us as a youth of delicate and sweetly-moulded features, with a certain touch of almost feminine loveliness about his graceful mouth and eyes. His smooth young face speaks out the pure and beautiful soul within—the soul of a real creator, who lives and moves among the beings of his rich fancy. But Michel Angelo, as we oftenest see him, stands out as a grey and bearded man, full of dignity and conscious greatness, with an eye saddened by contact with the world and bespeaking a certain ineffable yearning, yet on the whole rather a great practical thinker and artistic genius than a dreamer and idealist.



MOSES. (*By Michel Angelo.*)

Michel Angelo Buonarotti was born of a gentle family in Tuscany, March 6th, 1475. He was thus twenty-three years the junior of Lionardo, and eight years the senior of Raffael, the latter of whom, however, he long outlived. His ancestors had for centuries been connected with Florence, and ever since the days of Giotto, Florence had remained the artistic as well as the commercial capital of cultivated Italy. The great family of the De Medici had gradually raised their city to the first place among the Italian commonwealths; and Lorenzo the Magnificent, who then stood at the head of the republic as virtually despotic ruler, was the most powerful as well as the most enlightened member of his house. Under his rule, Florence became the centre of that great upheaval of mediæval thought which we call the Renaissance. Greek philosophy revived in his Platonic Academy; Politiano and Pico della Mirandola, the two profoundest and most universal scholars of their day, were his intimate friends; and Pope Leo X., the real founder of the artistic supremacy of Rome, was his son, Lorenzo endeavoured to make Florence into the most beautiful and the most polished town of all Italy, and he found the material ready to his hand. All the greatest painters, poets, scholars, and thinkers were attracted to his court.

It was in the midst of this vivid and eager artistic and literary world that Michel Angelo grew up; it was by such influences that his character and his aspirations were moulded. Great art only springs out of great epochs. It is the result and outcome of a general ferment and movement, of which the individual great artist is but the fullest exponent. This was notably the case with young Buonarotti, as with all the other leaders in the Renaissance. He lived in the midst of a society eagerly welcoming every fresh advance in art, in science, or in thought. Florence was all astir with the new learning. Macchiavelli, the historian and political philosopher, was then writing his famous works on statecraft; Savonarola, the fiery religious reformer and ascetic, was stirring up the minds of the people with his vehement and enthusiastic eloquence; Lorenzo was polishing the Italian language in his Tuscan verses; Lionardo was decorating the walls of palaces and convents with his startling and beautiful frescoes. The old conventional mediæval life was fast fading away; philosophy, politics, religious thinking, and art, were all beginning to assume their modern guise. And the position of the Buonarotti family in Florence threw young Michel Angelo from the first into the very thick of this vast movement and upheaval of the human mind.

Like all other great artists, Michel Angelo was born, not made. From his boyhood he showed great aptitude for drawing, and his relations placed him as a pupil in the studio of Domenico Ghirlandajo, a Florentine painter of what may be called the Transitional school. Ghirlandajo had been a goldsmith in his youth, and to the last a love for decorative effects, for rather overloaded ornament, and for such accessories in pictures as carved furniture, chased metal-work, gilding, and mosaic, pervaded his handicraft. Yet, in spite of this and some other peculiarities of the older types, Ghirlandajo had great merits of his own, and aided immensely in forwarding the emancipation of painting from its mediæval crudity and stiffness. In his studio, Michel Angelo learnt not only the technical mastery of colour and form, but also much that was good in composition, in fancy, and in freedom of conception. Lorenzo de Medici noticed the young artist's promise, and gave him commissions for frescoes in his palace. But on Lorenzo's death he was involved in the political troubles which were almost chronic in these small Italian republics, and, though still but a lad, he

found it necessary to retire to Venice, where his artistic tastes must even then have received many fresh impulses. Already he had turned his attention to sculpture, which was always perhaps his own favourite art, and certainly the one which gave most colour to his peculiar genius. At that time, sculpture was just beginning to revive after its long condemnation to wooden figures of saints during the Middle Ages; and original works in marble or bronze were once more being produced in Florentine studios. Excavations were largely carried on among Roman ruins by the De Medici and others, and every new statue or fragment of a statue recovered from the *débris* of the Empire was hailed as a treasure by the critics and connoisseurs of the new school. Michel Angelo had thus formed his tastes in sculpture upon Greek and Roman models, whose immense superiority to all other statuary he immediately perceived. This leaning toward plastic art undoubtedly helped in giving his mind its distinctly classical twist. He framed his ideas in great part upon the torsos of the Roman world. His "Sleeping Cupid" was his first great success as a sculptor, and soon after the production of this work he betook himself to Rome, and received a warm welcome. There, the antique paintings on the Thermæ of Titus, which produced so deep an effect upon the style of Raffael, also aided in confirming his admiration for the classical spirit. From that time forward he stands forth decidedly as the chief leader in the revived classicist movement which was destined to sweep everything before it. Yet the principal work of his first Roman period was not a classical figure at all, but a *Pietà*, or group of the Dead Christ and His Mother, a subject of a sort derived from mediæval usage, but treated from his own new point of view. Indeed, the infusion of the classical spirit into Christian art may be regarded as the special and distinctive aim of the great sculptor's life.

The thirty years of Michel Angelo's full manhood were mainly passed at Florence, where he was chiefly employed at work as a painter; but he also often went to Rome. To this period belong his frescoes on the ceiling of the Sistine Chapel, drawn from the principal passages of Scripture history, and ranking among his greatest masterpieces. But in 1530 he was called upon to undertake a very different task, which strikingly shows the width of range and the versatility of the Renaissance Italians. He became for a time a practical military engineer. Like Lionardo, in fact, Michel Angelo had studied engineering as part of his artistic profession. He was a painter and a sculptor before everything; but in a country and age when painting was still largely subordinated to architecture—being employed for the most part as a means of decoration for the walls of churches and palaces—every painter and sculptor, from Giotto downward, had also been an architect; and every architect is of course to some extent almost necessarily an engineer as well. In fact, the line between industrial life and artistic life was not yet so tightly drawn as it is at present. Every man busied himself with a greater number of occupations, and moved more freely over a wider range, than in our modern subdivided societies, with their infinite gradations of function. So, when the Emperor Charles V. threatened siege to Florence in his great Italian war (1530), Michel Angelo was set to overlook the defences of the San Miniato Fort. But even so he did not give up his taste as a sculptor, going from the works at the fort to his studio, and never wholly relinquishing his own occupations even in the midst of such warlike preparations. During the peace which followed, Michel Angelo began his colossal fresco of the Last Judgment, in the Sistine Chapel, which kept him steadily at work for eight years. This vast design may be considered the greatest monument produced by his magnificent genius. It has in it something of the grand proportions of the man himself, for Michel Angelo delighted in greatness, physical as well as intellectual; and his statue of David, the strong young man rejoicing in his youth and vigour, and with great brawny yet well-proportioned limbs, may be set beside his picture of the Last Judgment as the measure of his highest moods, the one in sculpture, the other in painting.

After the completion of his great fresco, Michel Angelo was invited to Rome in 1546, to become the architect of the largest and, in its way, the grandest building upon earth. He was given charge of the vast cathedral of St. Peter's, whose completion in its present form had been commenced by Pope Leo X., the son of his old patron, Lorenzo de Medici. Leo had brought with him from Florence to Rome the artistic, philosophic, and literary tastes of his father's court; and during his Papacy, the capital of still united Christendom became also the chief centre for the new thought and revived handicraft of the Renaissance. Leo himself had long been dead, but his successors continued the work he had begun, and for the most part kept up the artistic traditions of his time. It was to design and superintend the erection of the vast dome of St. Peter's that Michel Angelo, now in the ripe maturity of his genius, at seventy years of age, was called to the Papal city. He held the post of chief architect to the day of his death, outliving no less than five Popes. The dome itself, one of the grandest architectural achievements of the world, still stands as the final monument of its designer's magnificent ideas. No other equals it in size or technical points of construction. St. Peter's as a whole, though overwhelming from its enormous dimensions and mere mass, does not now strike the fancy or the imagination so much as the more solemn, varied, and beautiful cathedrals of mediæval times, with their pointed arches, their rich decorations, their splendid towers, their noble lanterns, and their exquisitely graceful windows. In fact, it is now generally felt that the artistic revival of the fifteenth and sixteenth centuries, immense as was the good it wrought in painting and sculpture, was a misfortune so far as architecture was concerned. The one great art which had flourished with native originality through the Middle Ages was the art of building. Here alone had the mediæval intellect struck out a line for itself, and by slow and tentative efforts developed a style of ecclesiastical architecture admirably adapted both to the tone of mind of the builders and to the purposes of the existing creed. The Renaissance artists, on the other hand, in their revulsion from everything mediæval, and their reverence for everything classical, were disposed to cast over almost all that had been done in this the one truly progressive art, and to return almost strictly to classical models, so far, at least, as these could be accommodated to the uses of the Christian religion or the needs of modern European life. But while the gloom, the richness, and the variety of the so-called "Gothic" cathedrals suit admirably the genius of mediæval thought, it must be allowed that the breadth, the light, the vastness, and the large open spaces of St. Peter's and the other Renaissance buildings harmonise far better with the temper and the wants of their contemporary artists. The great painters needed room to cover with their splendid frescoes, open ground to view their colossal works of sculpture, and light to fall upon their decorative designs. For such purposes the Sistine Chapel, St Peter's, and the corridors of the Vatican were admirably adapted; and thus it was that Michel Angelo and his contemporaries turned naturally from the glories of mediæval architecture to the broader, freer, and more open style of the classical or pseudo-classical revival.

The great painter and sculptor lived to see art pass wholly from its mediæval into its modern stage within his own lifetime. He died at Rome in his eighty-ninth year, February 18th, 1564. His remains were carried to his native city of Florence, and were there interred. Throughout his life, Michel Angelo was distinguished above everything by the massive, grandiose, masculine character of his work. Whatever he did, he did with characteristic energy, thoroughness, and mastery. Unlike Lionardo, he finished what he began. His studies were universal, at least in everything that directly or indirectly bore upon art. Following Lionardo, he went deeply into anatomy, which he made the basis of all his work in sculpture. He was the first statuary since the Greco-Roman period who always correctly represented the muscles of his subject in every attitude. In pure intellectual greatness, too, Michel Angelo was almost as grand as in the artistic sphere. His sonnets are striking poems of a unique and remarkable kind, full of the calm grandeur and sublime power of the man. His artistic work was so almost exclusively decorative, however, that it is for the most part entirely confined to Italy, being mainly composed of frescoes, sculptured ornaments, and other adjuncts to special buildings; so that he cannot be judged of at first hand except by those who can visit Rome and Florence for themselves. Nor does his style easily lend itself even to engraving; his pictures and sculptures are for the most part too wholly subordinated to the necessities and harmonies of their particular positions. Hence Michel Angelo remains for the world at large scarcely more than a great name: he is far more praised than known and admired.

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LESSONS IN GERMAN.—XXXV.

SECTION LXVIII.—VARIOUS IDIOMS (*continued*).

The word eigen (own) is often used with an article, as also with a pronoun preceding, as:—Er hat ein eigenes Pferd, he has (an own horse) a horse of his own. Eigen has also the kindred signification, "peculiar, singular;" as:—Er ist ein eigener Mensch, he is a "peculiar" man, etc.

1. Finden (to find) often answers to our verbs "to think" or "consider," as:—Ich finde den Wein sehr gut, I (find) *think* the wine very good. Ich finde es unrecht, daß er das gethan hat, I *think* or *consider* it wrong that he has done that.

2. Halten (to hold), with its proper case, followed by für, has, like finden, the sense "to think" or "consider;" as:—Er hält mich für seinen Feind, he thinks me (literally, *holds me for*) his enemy. Followed by auf, halten also means "to esteem, regard;" as:—Ich halte viel auf ihn, I think much of him. For Aufhalten, to hinder, see Sect. XXXVII.

VOCABULARY.

Ab'weichen, to deviate, diverge.
Acht, *f.* care; sich in Acht nehmen vor, to beware of.
Bekom'men, to get, receive, obtain.
Berei'sen, to travel over.
Eben, so eben, even, just.
Frage, *f.* question.
Hüten, to guard, keep watch.
Interessant', interesting.
Je, ever, always.
Jedenfalls, in any case, at all events.
Merk'würdigkeit, *f.* remarkableness, curiosity.
Miethen, to hire, rent.
Ob, whether.
Schließen, to shut, lock, close.
Unterschei'den, to distinguish, discriminate, discern.
Verbess'ern, to improve.
Vergess'en, to forget.

RÉSUMÉ OF EXAMPLES.

Nichts ist so sehr unser eigen, als unsre Gedan'ken; alles An'dere ist außer uns.
Nothing is so much our own, as our thoughts; all else is exterior to us.

Die meisten Menschen sind von Empfin'dung ihres eignen Werths aufgeblasen, weil sie nicht wissen, was der wahre Werth des Menschen ist.
Most men are puffed up by a feeling of their own worth, because they do not know what the true worth of man is.

Wer hat je den herben Trank des Schicksals gern und willig genom'men?
Who has ever cheerfully and voluntarily taken the bitter cup of fate?

Der Graf kommt so eben mit seinem Gefol'ge von der Jagd.
The count is just coming, with his retinue, from the chase.

Halte ja fest an dem Glauben an Gott, den Lenker deines Schicksals.
Hold (Sect. XLIII. 4) fast to thy (the) faith in God, the disposer of thy destiny.

Wir beur'theilen die Menschen in vielen Fällen nur nach dem Schein, und halten manche für klug—weil sie anmaßend, und an'dere für unwissend, weil sie bescheiden sind.
We estimate men in many cases only by the appearance, and regard many as wise because they are assuming, and others as ignorant because they are modest.

EXERCISE 130.

1. Sagen (Sect. LXXXII. 1) Sie mir, ob das Ihr eigenes Pferd ist? 2. Haben diese Kinder viel eigenes Vermögen? 3. Ihre Eltern waren sehr reich. 4. Ich finde es sehr eigen, daß er nicht seine eigenen Pferde benutzt, sondern mit andern fährt. 5. Ich habe kein eigenes Haus. 6. Ist dies sein eigener Wagen, oder hat er ihn nur gemiethet? 7. Diese Frage finde ich sehr eigen. 8. Es ist dies (Sect. XXXV. 3) meine eigene Ueberzeugung, nach der ich handle. 9. Dieser alte Kaufmann ist ein sehr eigener Mensch. 10. Jeder Mensch hat seine eignen Fehler. 11. Sind Sie je in diesem Hause gewesen? 12. Ich bin nie da gewesen. 13. Ich halte es für meine Pflicht, mich nicht über ihn aufzuhalten. 14. Ich werde nie von meinen Grundsätzen abweichen. 15. Sind Sie noch nicht bei meinem Bruder gewesen? 16. Ich habe ihn so eben gesehen. 17. Ist Deine Tochter schon in meinem Garten gewesen? 18. Sie ist noch nicht ausgegangen. 19. Haben Sie je ein so interessantes Land bereist? 20. Ich habe schon viel Schönes gesehen, aber nie vergesse ich die reizende Schweiz. 21. So eben habe ich schon wieder einen Brief bekommen. 22. Sind Sie so früh gekommen, daß Sie schon wieder gehen? 23. Gehen Sie ja (Sect. XLIII. 4) nicht zu nahe an das Feuer. 24. Kommen Sie ja bald zurück. 25. Ja, ich werde es jedenfalls thun. 26. Wagt es ja nicht, ohne Begleitung in den Wald zu gehen. 27. Ich werde mich ja hüten, ihm Geld zu leihen. 28. Diese Merkwürdigkeit will ich ja sehen. 29. Hast Du die Thüre ja gut geschlossen? 30. Nehmen Sie sich vor diesen Leuten ja in Acht. 31. Unterscheiden Sie ja das Wahre vom Falschen. 32. Ich habe mich längere Zeit in Berlin und Leipzig aufgehalten. 33. Er hat mich über eine halbe Stunde bei meiner Arbeit aufgehalten. 34. Meine Freunde halten viel auf mich, weil ich mich über Niemand aufhalte.

EXERCISE 131.

1. The reflecting man never deviates from the path of virtue. 2. Have you ever travelled over such a beautiful country as Italy or Switzerland? 3. No, but I shall never forget the beautiful valleys of the Rhine. 4. Do not believe everything they tell you. 5. The father is just coming with his son and the uncle from their journey. 6. Does the teacher think much of his scholars? 7. Yes, he considers them very good. 8. He thinks much of a comfortable life. 9. This man regards his abilities too much. 10. John is his enemy, but he thinks he is his friend. 11. I have a house of my own, and my brother has none. 12. Is this your own invention? 13. Yes, it is; but I consider this a very singular question. 14. This man has a peculiar notion. 15. Do you not find your friend a peculiar man? 16. Yes, I do; he finds fault with everybody. 17. Have you ever been in the museum? 18. Yes, I have been there several times. 19. Have you already been in the garden of my uncle? 20. To procure repose to others, he sacrifices his own. 21. My friends hindered me very much in my employment. 22. A prince can improve the laws of his forefathers as well as his own.

SECTION LXIX.—VARIOUS IDIOMS (*continued*).

Wer (he who), as a relative, stands at the head of its clause; the word which it represents always coming *after*; as:—Wer zufrieden ist, der ist glücklich, he who is contented is happy. Generally, however, the demonstrative is left out in the principal clause, as:—Wer auf dem Wege der Tugend wandelt, ist glücklich, he who walks in the path of virtue is happy. Wer dich genau kennt, muß dich verlassen, he who knows thee well must quit thee. (Byron.)

1. Was is employed like the corresponding English word; as:—Was schön ist, kann auch schlecht sein, what is beautiful can also be bad. Er ist, was ich sein möchte, he is what I would (wish to) be.

2. *After* an antecedent, used in a general and indefinite sense, was is often employed as a simple relative; as:—Er glaubt Alles, was er hört, he believes all *that* he hears. Ich thue Alles, was ich kann, I do all *that* I can. Er glaubt nur das, was er sieht, he believes, only that *which* he sees. When, however, the antecedent is particularly specified, welches (not was) is to be employed; as:—Das Buch, welches Sie mir geliehen haben, the book which you have lent me.

3. Was is, likewise, sometimes used instead of warum, as:—Was lachen Sie? why (warum) do you laugh? *or*, what are you laughing at?

4. Gebürtig and geboren correspond commonly to our words "native" and "born;" as:—Er ist ein geborner Deutscher, he is a *native* German. Woher sind Sie gebürtig? where were you born? Ich bin aus Berlin gebürtig, I was born in Berlin. Er ist ein geborner Fürst, he is a prince by birth. Frau N. war eine geborne G., Mrs. N. was a Miss G.

VOCABULARY.

Amerika'nerin, *f.* American (woman). (See § 14. 1.)
Auszeichnung, *f.* distinction.
Beistand, *m.* assistance, succour, support.
Blutgerüst, *n.* scaffold.
Darin, therein, in it.
Ebenbild, *n.* image, exact likeness.
Eintritt, *m.* entrance.
Erfech'ten, to win in fight, conquer.
Erlei'den, to suffer.
Finster, dark.
Gebo'ren, born.
Gebür'tig, native. (See 4.)
Göttlich, divine.
Hochverrath, *m.* high treason.
Kleinigkeit, *f.* trifle, small matter.
Lustig, merry, sportive.
Musik'lehrer, *m.* music-master.
Narr, *m.* fool.
Niederlage, *f.* discomfiture, defeat.
Nordame'rika, *n.* North America.
Schlüssel, *m.* key.
Spiegel, *m.* looking-glass, mirror.
Stehlen, to steal.
Stemmen, to resist, oppose, stem.
Streiten, to fight, combat.
Umkommen, to perish.
Unbedeutend, unimportant, insignificant.
Unklug, imprudently.
Unterdrücken, to oppress.
Verzwei'feln, to despair.
Wiese, *f.* meadow.
Zweifeln to doubt.

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Résumé of Examples.

Wer das Gute liebt, der liebt auch Gott und verachtet Alles, was ihn nicht zur Vollkommenheit befördert	He that loves goodness, also loves God, and contemns all that does not advance him towards perfection.
Was quälen Sie mich mit Ihrer Gelehrsamkeit? (Gellert.)	Why do you torment me with your erudition?
Der Mensch glaubt leicht, was er hofft, und sieht leicht, was er sehen will.	Man easily believes what he hopes, and sees easily what he wishes to see.
Das große Haus, welches (not was) Sie dort sehen ist (Sect. LVIII. 1) unser.	The large house, that you see yonder, belongs to us.
Einige meiner Freunde sind aus Dresden gebürtig	Some of my friends are natives of Dresden.
Dieser Mann ist ein geborner Amerikaner.	This man is a native American.

Exercise 132.

1. Wer sich das Göttliche will und das Höchste im Leben erfechten, scheue nicht Arbeit und Kampf (Körner). 2. Wer gewinnen will, muß wagen. 3. Dieses Buch ist mir lieb; wer es stiehlt, der ist ein Dieb. 4. Wer nichts lieben will, als sein Ebenbild, hat außer sich nichts zu lieben. 5. Wer zweifelt, verzweifelt. 6. Wer gegen sein Vaterland streitet, ist ein Verräther. 7. Wer sich in Gefahr begiebt, kommt darin um. 8. Wer dem Unterdrückten nicht beispringt, verdient auch keinen Beistand. 9. Wer sich gegen das Schicksal stemmen will, ist ein Narr. 10. Sind Sie ein geborner Engländer oder Amerikaner? 11. Ich bin keins von beiden (Sect. XXXII. 2), ich bin ein geborner Deutscher. 12. Wer ist Ihre Freundin? 13. Sie ist eine Amerikanerin, gebürtig aus New York. 14. Woher ist Ihr Freund gebürtig? 15. Er ist aus England gebürtig. 16. In welchem Lande wurden Sie geboren? 17. Ich bin in den Vereinigten Staaten von Nordamerika geboren. 18. Ich mache mich über diesen Mann lustig. 19. Sie sollten sich nicht über ihn lustig machen. 20. Er macht sich über Jedermann lustig. 21. Es giebt auch Narren, welche sich über Andere lustig machen. 22. Dieser Mensch hält sich über jede Kleinigkeit auf (Sect. XXX.) 23. Es ist unklug, sich über eine unbedeutende Sache aufzuhalten oder lustig zu machen. 24. Wer zu viel anfängt, vollendet wenig. 25. Ich freue mich über meinen artigen Neffen. 26. Der römische Kaiser Augustus war in Verzweiflung über die Niederlage, welche Varus von den Deutschen erlitten hatte. 27. Er hat mit mir über diesen Gegenstand gesprochen. 28. Wer aus Liebe zu Gott der Menschheit Pflichten entsagt—sitzt im Finstern, und hält immer den Spiegel vor sich.

Exercise 133.

1. He who assists the poor will receive divine assistance. 2. He who would have entrance everywhere, must have golden keys. 3. He who fights for his country deserves distinction. 4. He who wishes to learn German, must give himself some trouble. 5. He who dies for his king, dies with glory. 6. He who commits high treason, dies mostly upon the scaffold. 7. They are born under a happy star. 8. In which country were those ladies born? 9. They were born in Italy, in the year 1795, but their mother was born in England. 10. Are these ladies natives of Germany? 11. No, they are natives of France. 12. Our music-master is a native of Italy, and was born in Florence. 13. I will do what I have promised. 14. Show me what you have found. 15. What enhances the glory of this hero, is his modesty. 16. Let us grant him what we at first refused. 17. Thou hast never told us what they have trusted you with. 18. Why do you make yourself merry at the misery of the oppressed? 19. The fruits which we saw in the garden of our neighbour were not so good as those which grew in yours.

KEY TO EXERCISES IN LESSONS IN GERMAN.

Exercise 44 (Vol. I., page 245)

1. Where is the brother-in-law? 2. He is at the table. 3. Where is the confectioner going? 4. He is going into the bakehouse. 5. Where is his friend, the actor? 6. He is at the opera-house. 7. Where is his friend, the ropemaker, going? 8. He is going into his workshop. 9. Where is the shepherd? 10. He is on the mountain. 11. Where is the shepherd going? 12. He is going on the mountain. 13. Where is our old neighbour going? 14. He is now in the little garden, but he is going into the large garden soon. 15. His wife is in this house, but his cousin is going into that picture-gallery. 16. I stand at the window, and you are coming to the window. 17. The knight already sits upon his good horse, and the servant also is just now jumping upon his good horse. 18. The man sits at the table, and the book lies upon the table. 19. I have no hat on my head. 20. Where is the soldier going? 21. The soldiers are going to the field; they are already on the field. 22. The frog leaps into the river and swims in the river, and the goose swims in the pond. 23. I have read these words somewhere. 24. I can find my cap nowhere, although it must be somewhere in this room.

Exercise 45 (Vol. I., page 245).

1. Wo ist die Bildergallerie dieser Stadt? 2. Wo war dieser Herr geboren? 3. Er war in Böhmen geboren. 4. Wo wohnt Ihr Freund, der Schauspieler? 5. Er wohnt in der Stadt. 6. Wo gehen diese Auswanderer hin? 7. Woher kommen diese Einwanderer? 8. Sie kommen von Frankreich. 9. Wo viel gegeben ist, wird viel verlangt. 10. Hier dringt nicht die Rache und der gewetzte Dolch eines Verräthers;—unter den Schatten dieses Baumes kommt kein König. 11. Er warf das Buch vor mir nieder. 12. Wohin gehst du? 13. Ich gehe zu meinem Schwager. 14. Werden diese Auswanderer nach Amerika gehen? 15. Nein, sie werden hier bleiben. 16. Da (or es) ist Wasser im Teiche. 17. Woher kommt sie? 18. Sie kommt von Deutschland.

Exercise 46 (Vol. I., page 245).

1. The soldiers are here, and the commander-in-chief is coming hither also. 2. The enemy is already there, and our brave brothers must proceed thither. 3. When are you going to Spain? 4. I do not mean to go there at all, but my father will travel thither next week. 5. Have you been there already? 6. No, but one of my acquaintances was there, and will never go there again. 7. We are going upon the mountain; will you go with us? 8. Does the Russian mean to send his servant to the town? 9. He has already sent him thither. 10. Will the troops come hither? 11. They will not come hither. 12. Where do these strangers come from? 13. They are immigrants, and come from Bohemia. 14. Is this ship from Bremen or Havre? 15. It is neither from Bremen nor from Havre, it is from Venice. 16. Are these French immigrants going to Milwaukee? 17. A part of them are going there, the others remain in New York. 18. The immigrants to America are emigrants from Europe, and from other parts of the Old World. 19. When do you mean to go into the field? 20. I have been already in the field, and cannot go there again; but I must now soon go into the garden, because my teacher is there and wishes to see me. 21. Why will this Italian not speak English? 22. He would like to speak it, but he does not know it yet; he speaks only Italian and Spanish. 23. How many languages can you speak? 24. I speak only two, but I mean to learn others besides.

Exercise 47 (Vol. I., page 245).

1. Wann lebte er? 2. Er lebte im vierzehnten Jahrhundert. 3. Mein Freund sagte mir, er würde nie wieder dahin gehen. 4. Gehen Sie nach Spanien? 5. Nein, ich werde nicht dahin gehen. 6. Der Feldherr hat seine Truppen dahin geschickt, wo die größte Gefahr war. 7. Ist dieses Schiff von Spanien oder von Havre? 8. Nein, es ist weder von Spanien, noch von Havre; es kommt von Hamburg. 9. Diese Einwanderer gehen nach Milwaukee, und sind Auswanderer von Böhmen und Venedig. 10. Können Sie über jenes Thor springen? 11. Ich konnte es, als ich jung war. 12. Er bat mich, dahin zu gehen, damit er mit mir darüber sprechen könne.

Exercise 48 (Vol. I., page 246).

1. Have you seen my friend? 2. Yes, he has gone down the street. 3. Will you go into the cabin? 4. No, I am going down below deck. 5. Are you going over to Mainz to-day by the steamboat? 6. Yes, and this evening I shall come over by the railroad over the new bridge of boats. 7. Our course is up and down. 8. The roe leapt down while the hare ran up the hill. 9. The soldiers sprang out of the barracks, as the enemy rushed into the town. 10. As the watchman stepped into the house, the terrified thief hastened down-stairs. 11. I cannot get out of the crossways of this garden. 12. Do you not know how this bird got in? 13. Yes, but he does not know where he can get out again. 14. The young Swiss looked towards the blue mountains of his native country. 15. Are you not coming down to-day? 16. Yes, if my uncle comes up, I shall go down. 17. Have you seen this man already? 18. Yes, he entered the door as I went out. 19. The friend went over the river and back again in one hour. 20. The stream falls down the rock with great roaring.

Exercise 49 (Vol. I., page 246).

1. Der Sohn eilte hinunter, seinen Vater zu empfangen. 2. Seine Reise dauerte über zwei Stunden. 3. Das Reh sprang aus seinem Verstecke hervor. 4. Werden Sie heute mit dem Dampfboote nach Frankfurt hinübergehen? 5. Nein, ich werde mit der Eisenbahn hinübergehen, und mit dem Dampfboote zurückkommen. 6. Gehen Sie nicht über den Kreuzweg hinaus. 7. Ich sah Ihren Freund hereinkommen, als Ihr Oheim hinausging. 8. Diese Leute, welche über jene Brücke gehen, sind in Gefahr ihres Lebens. 9. Werden Sie heute mit Ihrem Freunde hinausgehen? 10. Von diesem Hügel können wir nach unserm Vaterlande hinübersehen. 11. Wie ist der Dieb in Ihr Haus gekommen? 12. Eduard stürzte sich von dem Felsen hinab. 13. Ich werde diesen Morgen an Ihrem Hause vorbeikommen, und werde hineinkommen, ohne daß Sie mich bitten, solches zu thun.

Exercise 50 (Vol. I., page 259).

1. Will the aged soldier go to-day in the forest? 2. He will go, but he cannot to-day, because he has much to do. 3. The man-servant is gone into the market to fetch meat. 4. To remain healthy, one must live orderly and temperately. 5. The woodcutter has gone into the forest to cut wood. 6. The butcher goes from one village to the other to buy oxen. 7. He goes from one village to the other, but can find no oxen. 8. What does he want with the oxen? 9. He means to kill them; we must indeed have meat. 10. The peasant has two horses, which the brewer wishes to buy. 11. I go to the city to buy a hat or a cap. 12. He has books to read, and an exercise to write. 13. Where does your brother's friend wish to go? 14. He wishes to go nowhere, he wishes to remain with his uncle. 15. Will you go upon the high mountain? 16. I shall go there, but not to-day. 17. Can you go to-morrow into the country? 18. I can go there, but I will not. 19. When does your father want his horses back again? 20. He must have them to-morrow morning, because he wishes to drive to-morrow evening to Frankfort. 21. Why will he not ride there? 22. Because he has no good saddle-horse, and the weather is very cold.

Exercise 51 (Vol. I., page 259).

1. Es ist heute zu kalt für ihn, um nach Frankfurt hinüberzugehen. 2. Dort läuft der Hase über den Berg. 3. Da fährt Ihr Bruder. 4. Der Zuckerbäcker ist in die Backstube gegangen, um Brod zu backen. 5. Der Metzger geht auf den Markt, um Schafe zu kaufen. 6. Ihr Kutscher hat mich schnell hierher gefahren. 7. Sehen Sie jenen Mann auf dem Pferde, welches wir gestern sahen? 8. Die Soldaten reiten auf schönen Pferden. 9. Man sagt, in diesen Kutschen fährt man bequem. 10. Wir sind in Ihrem Wagen gefahren, um unsere Kisten abzustatten. 11. Übertritt nicht das Gesetz. 12. Das neue Dampfboot fährt heute zum ersten Male den Fluß hinunter.

Exercise 52 (Vol. I., page 260).

1. This hunter has a fine dog, mine is finer, and yours is the finest of all. 2. The earth is smaller than the sun, and the stars are more distant than the moon. 3. Virgil is a more agreeable writer than Ovid. 4. The city of Canton is larger than Paris. 5. Alexander the Great had less prudence than courage. 6. We find much more copper than silver, and more iron than tin. 7. This girl prattles more than she works. 8. The air in the towns is more impure than the country air. 9. France is not so fertile as Germany. 10. This youth has not as much understanding as his brother, but neither has he as much vanity. 11. The rose is one of the finest flowers in the world. 12. Those are commonly the least proud, whose minds are the most educated. 13. The manners of those with whom we have intercourse are commonly influential upon us. 14. The benefits that we are worthy of are more agreeable to us than those we are unworthy of. 15. He is the richest man whose children are virtuous. 16. The Lord has no pleasure in those people who have no love to their brothers. 17. The apple-tree has a thick trunk, the beech has a thicker trunk, and the oak has the thickest trunk. 18. The more he has, the more he wants. 19. Florence is finer than Parma.

LESSONS IN ENGLISH.—XXVI.

GREEK STEMS (*concluded*).

In this lesson is given another list of Greek stems, showing the influence of the Greek language on our own tongue.

GREEK STEMS.

Greek Words.	*Pronunciation.*	*Meaning.*	*Stems.*	*English Words.*
Παρα	par'-a	*beside, i.e., by the*	*para*	parallel.
Αλληλων	al-lee'-lone	*of one another*	*allel*	parallel.
Ολιγος	ol'-i-gos	*few*	*olig*	oligarchy.
Οπτεσθαι	op-tos'-thai	*to see*	*opt*	optics.
Ορνις	or'-nis	*a bird*	*ornith*	ornithology.
Παις	pais *or* pice	*a boy*	*ped*	pedagogue.
Παθος	path'-os	*feeling*	*path*	*apathy*, antipathy.
Α (*negative*)	a	*not*	*a*	apetalous.
Αντι	an'-ti	*in opposition to*	*anti*	antichrist.
Χριστος	chris'-tos	*anointed*	*Christ*	*Christ*-tian.
Πεντε	pen'-te	*five*	*pent*	pentagon.
Πετρος	pet'-ros	*a stone*	*petri*	petrifaction.
Φωνη	pho'-ne	*sound*	*phony*	euphony.
Φθογγος	phthon'-gos	*a sound*	*phthong*	diphthong.
Δις	dis	*twice*	*di*	didymus.

GREEK STEMS (*continued*).

Greek Words.	*Pronunciation.*	*Meaning.*	*Stems.*	*English Words.*
Πολεμος	pol'-e-mos	*war*	*polem*	*polemical*.
Πολις	pol'-is	*a city*	*polis*	metro*polis*.
Μητηρ	me'-teer	*a mother*	*metro*	*metropolitan*.
Ψευδειν	pseu'-dein	*to deceive*	*pseudo*	*pseudo*-apostle.
Αποστελλειν	ap-os-tel'-lein	*to send out*	*apostol*	*apostolic*.
Πυρ	pure	*fire*	*pyro*	pyrometer.
Σαρξ	sarks	*flesh*	*sarco*	*sarco*phagus.
Σκοπειν	skop'-ein	*to see*	*scop*	telescopic.
Τελος	tel'-os	*the end*	*tele*	telescope.
Στρεφειν	streph'-ein	*to turn*	*stroph*	*strophé*.
Τεκτων	tek'-tone	*art*	*techn*	technical.
Θαπτειν	thap'-tein	*to bury*	*taph*	epi*taph*.
Θεος	the'-os	*God*	*the, th*	atheist, enthusiast
Τοπος	top'-os	*a place*	*topo*	topography.
Ζωον	zo'-on	*an animal*	*zoo, zo*	zoology.

Parallel speaks of things that are, or run, *by the side* one of another. Two lines are called *parallel* when they are drawn equally distant from each other in all their extent.

> "Yet shall this graceful line forget to please,
> If bordered close by sidelong *parallels*,
> Nor duly mixt with those opposing curves
> That give the charm of contrast."—*Mason.*

In the relation of such lines, the idea of equality is obviously involved; whence, *to parallel* is *to equal*.

> "Tell me, gentle boy,
> Is she not *parallelless*? Is not her breath
> Sweet as Arabian winds when fruits are ripe?"
> *Beaumont and Fletcher.*

But parallel lines are *opposite* to each other; hence para, from signifying *side by side*, came to signify *opposite, contrary to*. Thus a *paradox* is something opposed to common opinion; and a *paralogism* is an unsound argument.

"In their love of God men never can be too affectionate; it is as true, though it may seem a *paradox*, that in their hatred of sin, men may sometimes be too passionate."—*Sprat.*

"If a *syllogism* agree with the rules given for the construction of it, it is called a true argument; if it disagree with these rules, it is a *paralogism* or false argument."—*Watts.*

The idea of equality may lead to the idea of general excellence or even of superiority; accordingly, the word *paragon*, which we derive through the Italian, signifies something supremely excellent, a model.

> "An angel! or if not,
> An earthly *paragon*."—*Shakespeare.*

Division, too, is implied in equality, and so *paragraph* in a book signifies a division. A paragraph is a portion of writing consisting of one or more, generally several, sentences.

"I call that by bookes and chapters which the Greeke book divideth by chapters and *paragraphes*."—*Ascham.*

These illustrations of the applications of the Greek preposition *para* may serve to assist the student in forming a correct acquaintance with the nature and power of language. Let him endeavour for himself to ascertain the acceptation of other forms of para, as *paradigm*, *paraphrase*, etc., and let him not confound with such forms the words *paradise* and *parade*. Of these the former is of Persian origin, and signifies an *enclosure, a park, a garden*; and the latter is of Latin origin (from paratum, signifying *prepared*), and comes to us through the French, denoting *preparedness*; hence, proof of preparedness; and hence again, *show* and *display*, such as soldiers on *parade* present.

The word metropolis, literally *mother-city*, originally had reference to the Greek system of colonisation, and was equivalent to our term *mother-country*—that is, the country to which each colony belonged. Properly, then, metropolis is the *mother-country* (in German, *father-land*), and the counterpart was *colony*. Here, metropolis retains its etymological signification, for Athens, for instance, was the mother of the colonies she planted. But now the metropolis of England, namely, London, stands in no strictly maternal relation to the provinces or even to the colonies of the empire; and its claim to bear the name metropolis arises almost exclusively from the fact that it is the centre of the empire, and the seat of its central government. So marked an instance of the departure of a word from its primitive meaning may teach you how cautious you should be in the etymological study of words, and how necessary it is in such studies to call in the aid of history and general knowledge.

Our word *pyre* is from the Greek word πυρ, pronounced pure.

"When his brave son upon the fun'ral *pyre*
He saw extended, and his beard on fire."—*Dryden.*

From pyr and latreia (λατρεια, *worship*) is formed pyrolatry, or *fire-worship*, and from the same, with manteia (Gr. *divination*), is formed pyromancy, or *divination by fire*.

"Divination was invented by the Persians, and is seldom or never taken in good sense; there are four kinds of divination, *hydromancy, pyromancy, aeromancy, geomancy.*"—*Aylife.*

These four kinds you ought now to be able to make out for yourself, if I tell you in addition that *aer* is the Greek for *air*, the two terms being different forms of the same word.

From pyr we have also *pyrotechnics, the art of making fire-works*. *Pyramid* is derived from the same, as appears from the following instructive quotation:—

"The seven *pyramids* that are become wonders of the world; which in how long a time and with what difficulty they were brought up so high, Herodotus sheweth; towers they be, erected to such an height as exceedeth the handywork of man; of a huge breadthe in the bottome, and rising to a most sharp-pointed top; which figure in geometry is learned *pyramis*, for that [like] *to the flame of fire*, it cometh to be small in the head, in fashion of a cone or pine-apple."—*Holland.*

Sarcophagus, or *flesh-devourer*, the Greek name for coffin, had its origin in the fact that a stone (alumen schisti) was employed for the purpose, which had the quality of accelerating decomposition. According to Pliny, bodies put into such coffins were, except the teeth, totally destroyed within forty days. Perhaps from religious considerations the Greeks took means to hasten the breaking up of the frame, as is instanced in their practice of burning the dead.

Strophé, which properly signifies *a turning*, was the portion of a song which was sung in the Greek theatre while the chorus moved from one side of the stage to the other; when they began to move in the opposite direction, they sang the *anti*strophé, or *opposite* strophé.

To some it may not appear that enthusiast comes from Θεος (the'-os), God; in the Greek original, however, the derivation is clear. Enthusiasm, according to its derivation, denotes the presence of God in the soul, and enthusiast was one who had God in his soul. Hence, anciently, enthusiasm was the same as inspiration. By degrees the word fell into bad odour, as may be seen in these words:—

"I mean *enthusiasm*, which, laying by reason, would set up revelation without it. Whereby in effect it take*s* away *both* reason and revelation, and substitutes in the room of it the ungrounded fancies of a man's own brain, and assumes them for a foundation both of opinion and conduct."—*Locke.*

The word is, however, also taken in a good sense, and then has for its inferior partner fanaticism:—

"He comes! he comes! the saviour of the land!
His drawn sword flames in his uplifted hand,
Enthusiast in his country's cause."—*Logan.*

Zoology is *the science of life*, that is, of animal life, as may appear in the quotation:—

"*Zoology* is the noblest part of natural history, as it comprehends all sensitive beings, from reasonable man, through every species of animal life, till it descends to that point where sense is wholly extinct, and vegetation commences."—*Pennant*, "*British Zoology.*"

Azote, literally *life-less*, is also the name of the gas called nitrogen, in which animal life cannot be sustained.

The Greek *a* privative is found in several other words which form part of our language. It appears in *azymes*, mentioned in the "Douay Bible," of which the New Testament was printed at Rheims in 1582, and the Old Testament at Douay in 1610. The word is made up of α (a), *not*, and ζυμη (zu'-me), *leaven*.

I subjoin several translations of the words found in Matt. xxvi. 17:—

"In the first days of *theyr* loaves."—*Wiclif*, 1380.
"The fyrst daye of *swete* breed."—*Tyndale*, 1534.
"The fyrst daye of *sweete* breed."—*Cranmer*, 1539.
"On the fyrst day of the feast of *enleavened* bread."—*Geneva*, 1557.
"The first day of the *Azymes*."—*Rheims*, 1582.
"The first day of the feast of *unleavened* bread."—*Authorised*, 1611.

The *a* privative is found also in asbestos (α, a, *not*; and σβεννυμαι, sben-nu'-mai, *I burn*), literally *unburnable*. Asbestos is a species of fossil stone which may be split into threads and filaments from one inch to ten inches in length, very fine, brittle, yet somewhat tractable, silky, and of a greyish colour: also endued with the property of remaining unconsumed in fire. This stone is said to be found in Anglesey and in Aberdeenshire. Out of it the ancients made the cloth which is known under the same designation. By enveloping the body in a covering of asbestos, the ancients, in burning corpses, kept the ashes of the corpse separate from the ashes of the fuel, and so had the former for preservation in funereal urns.

Exercises in Composition.

Words with their Prepositions to be formed into sentences.

	Foreign Representatives.
Ballot for,	Fr. ballotte, *a little ball.*
Banish from,	Fr. bannir, *to banish.*
Bare of,	Sax. bare, *naked.*
Bargain for,	Fr. barguigner, *to haggle, chaffer.*
Bear up, on, with,	Sax. beoran, *to carry.*
Beguile of,	Fr. guiller, *to conceal.*
Believe in,	Gr. glauben, *to believe.*
Belong to,	Gr. belungen, *to belong to.*
Bereave of,	Sax. bereafian, *to take away from.*
Bestow on,	Sax. bestandan, *to give.*
Betray to,	Fr. trahir, *to betray.*
Betroth to,	Sax. treoth, *fidelity.*
Bigoted to,	Sax. bigan, *to bow, to worship.*
Bind to, in, up, on,	Sax. bindan, *to surround with cord.*
Blame for,	Fr. blamer, *to blame.*
Blush at,	Sax. blosen, *to be red.*
Boast of,	Welsh, bostio, *to brag.*
Border on,	Fr. border, *to edge.*
Brag of,	Welsh, bragio, *to swell.*

Exercises for Parsing.

Gratitude is a virtue that is not much cultivated by man. This great change can hardly be effected without bloodshed. The general is described by those who know him as being destitute of military ability. It has seldom happened that a dynasty has been so universally condemned that none have been found to lift up their hands in its favour. The effect of the earthquake was felt at the Sandwich Islands. The fluctuations exhibited by these tables are highly significant.

GREAT BOOKS.

X. ROBINSON CRUSOE.

In the month of September, 1704, a certain Scotch sailor, named Alexander Selkirk, who had been leading a semi-piratical life in the American seas, quarrelled with his captain, and, at his own request, was set ashore on the uninhabited island of Juan Fernandez, in the South Pacific Ocean, with a few books, his nautical instruments, a knife, a boiler, an axe, a gun, and some powder and ball. Here he remained in utter solitude for nearly four years and a half, but was at length taken off by Captain Woods Rogers, in February, 1709. A few particulars of his life on the desert island are given in an account of Captain Rogers's voyage, published in 1712, from which it appears that he existed after a very primitive fashion, and was compelled to feed, house, and clothe himself by the exercise of his personal ingenuity. At first he was terrified and depressed by the loneliness that spread around him, but in time he got the better of his melancholy, and found a sufficient diversion in the labours of each succeeding day. He built for himself two huts, one of which served for a kitchen, the other for a dining-room and bed-chamber. These were constructed of pimento-wood, which supplied him also with fire and candle. The island abounded in goats, which Selkirk shot as long as his ammunition lasted, and which he afterwards ran down by sheer speed of foot. His food consisted mainly of the flesh of these animals; their skins furnished him with rough but serviceable garments, and added to the comfort of his dwelling. Of the young kids he made playfellows; and these gamesome creatures, together with some cats, which had been left by passing ships before his arrival, formed his only companions during the long term of his isolation from humankind. When at last rescued, he had almost forgotten the use of speech, and the ordinary ways of civilisation were strange to him. Captain Rogers made him his mate, and he returned to England in 1711. Some years after, he became lieutenant of H.M.S. *Weymouth*, and died in that capacity in 1723, at the early age of forty-seven.

The chief title of Selkirk to remembrance consists in the fact that his experiences are the groundwork of the most popular story in the English language. It has been thought

that the Scotch seaman made the acquaintance of Defoe, and furnished him with materials which he worked up into the fiction of "Robinson Crusoe." Some have even endeavoured to detract from the merit of the novelist, by suggesting that he actually plagiarised his famous production from some manuscript committed to his care by Selkirk; but for this charge there is no foundation. Nothing more can be said than that Defoe derived the general idea of his story from the life of Selkirk on the island where he was put ashore by his captain. A few details such as those about the huts, the goats, the cats, and the devices to supply the want of clothes, may have been adopted by the former from the account of Captain Rogers's voyage, but these are matters which go for but little. The real creator of "Robinson Crusoe" was Defoe.

The first volume of the fictitious narrative, now universally acknowledged as one of the most remarkable works in the English language, was published in April, 1719, with the rather effusive title of "The Life and Strange Surprising Adventures of Robinson Crusoe, of York, Mariner: Who lived Eight-and-Twenty Years all alone in an Uninhabited Island on the Coast of America, near the Mouth of the great River of Oroonoque; having been cast on shore by Shipwreck, wherein all the Men perished but himself. With an Account of how he was at last as strangely delivered by Pyrates. Written by Himself." The story is prefaced by a short address to the reader, in which the so-called editor professes his belief that the work is "a just history of fact," in which there is no "appearance of fiction." This is intended to keep up the pretence of the book having been written by Crusoe himself—a species of device from which Defoe was never averse when it suited his purposes. "If ever," he wrote in this address, "the story of any private man's adventures in the world were worth making public, and were acceptable when published, the editor of this account thinks this will be so. The wonders of this man's life exceed all that (he thinks) is to be found extant; the life of one man being scarce capable of a greater variety." It is stated by Chalmers, though without any evidence in support of the assertion, that the manuscript of this great work was offered to one bookseller after another, until a purchaser was at length found in one William Taylor, of Paternoster Row. The amount paid for it is unknown; but those were days in which authors were never very splendidly remunerated, and it is certain that Defoe's share in the profits was small indeed in comparison with that of Taylor.

Never did a work leap more suddenly into public favour than this story of the shipwrecked mariner. The second edition was printed only seventeen days after the first; twenty-five days later, a third edition followed; and a fourth was published on the 8th of August in the same year. On the 20th of August, a second volume was issued under the title of "The Further Adventures of Robinson Crusoe; being the Second and Last Part of his Life, and of the Strange Surprising Accounts of his Travels round Three Parts of the Globe. Written by Himself To which is added a Map of the World, in which is delineated the Voyages of Robinson Crusoe." These two parts completed the narrative; but in 1720 Defoe published a sequel to the work, which he called, "Serious Reflections during the Life and Surprising Adventures of Robinson Crusoe: with his Vision of the Angelick World." This division was far less successful than the two former parts, and it is not generally included in the popular editions of the story. Defoe was fifty-eight years of age when he wrote "Robinson Crusoe." It was his first work of fiction, and he lived to compose many others, but none of equal fame.

LESSONS IN BOTANY.—XXV.

SECTION XLIX.—BIGNONIACEÆ, OR BIGNONIADS.

Characteristics.—Calyx free; corolla hypogynous, monopetalous, usually irregular; stamens inserted upon the tube of the corolla; ovary one, or two, or four celled; fruit capsular, valves two, dissepiment formed from the axile placenta, seeds usually horizontal and winged; embryo dicotyledonous, straight.

The *Bignoniaceæ* derive their name from the genus *Bignonia* or trumpet-flower, dedicated to the Abbé Bignon, librarian to Louis XIV., and a great promoter of botany. They are generally ligneous vegetables, frequently climbers or creepers, having opposite and stipulate leaves; flowers complete, usually irregular; calyx monosepalous, quinquepartite, bilabiate, or biparti te; corolla a short tube terminating in a large throat; limb ordinarily bilabiate, imbricated in æstivation; stamens alternate with the divisions of the corolla, rarely five in number, ordinarily four.

The annexed engraving of the *Jacaranda mimosifolia*, or mimosa-leaved jacaranda, a Brazilian plant (Fig. 194), illustrates the general aspect and bearing of members belonging to this natural order.

Individuals of this family belong exclusively to the tropics. Many species of *Bignoniaceæ* furnish useful principles. The wood of some and the flexible branches are applied by the American Indians to many useful purposes. The catalpa of North America (*Catalpa syringifolia*) and the catalpa of the West Indies (*Catalpa longissima*) are members of the natural order *Bignoniaceæ*. The wood of the former is as hard as oak, and possesses the good quality of not becoming subject to the attacks of worms. The *Bignonia Chica* is a climbing plant, which affords a red dye, called chica or carajura, used by the Indian tribes that live along the banks of the Orinoco for staining the handles of their weapons and for painting their bodies.

SECTION L.—PEDALIACEÆ, OR PEDALIADS.

Characteristics.—These plants are generally herbaceous, hairy, sometimes viscous; the leaves are simple and without stipules; flowers complete, irregular, axillary; calyx five-partite; corolla bilabiate, imbricated in æstivation; stamens didynamous, included in the tube of the corolla; ovary furnished at its base with a glandular disc, and composed of two or four carpels, forming by their different degrees of introflexion either two, four, or eight cells; placentæ parietal; the ovules are reflexed; style simple, terminal; stigma bilaminated; fruit dry or fleshy, sometimes horny at the summit by the desiccation of the carpels.

The species of this natural order are not very numerous, and are dispersed over tropical regions. The *Pedalium Murex*, an Indian plant, diffuses an odour of musk, and when agitated with water, causes the latter to become viscous like the white of egg. The genus *Martynia*, an example of which, the *Martynia proboscidea* or proboscis-like Martynia, is given in Fig. 195, furnishes many species, all of which are annuals, bearing flowers like those of the foxglove in general aspect.

SECTION LI.—ACANTHACEÆ, OR ACANTHADS.

Characteristics: Calyx free; corolla hypogynous, monopetalous; stamens inserted upon the tube of the corolla, four didynamous or sometimes two; ovary bilocular; capsule loculicidal and bivalvular; seed dicotyledonous, albuminous; radicle inferior and centripetal.

The *Acanthaceæ* are herbaceous or ligneous plants, with branching, knotty articulated stems; leaves opposite or verticillate, simple, and devoid of stipules; flowers complete, rarely solitary, each accompanied with a large bract and two bracteoles; calyx four to five partite, sometimes truncated; corolla ordinarily bilabiate, contorted in æstivation; ovules curved; style simple, terminal; stigma ordinarily bifid; embryo usually curved; cotyledons large and orbicular.

The greater number of the Acanthus order are natives of the tropics; but a few, and that one which is the most celebrated, are indigenous to Italy, Greece, and other Mediterranean regions. It is the *Acanthus mollis*, or soft acanthus, a representation of which is given in Fig. 196.

The picturesque beauty of the leaves of this species arrested the attention of the painters, sculptors, and architects of antiquity. The capitals surmounting the columns of the Corinthian order are formed on the general basis of an acanthus leaf. Virgil alludes to the beauty of the acanthus leaf in his third eclogue, in which he makes his shepherd praise two gobiets carved in wood for him by Alcimedon, and the handles of which were ornamented with acanthus leaves:—

"Et nobis idem Alcimedon duo pocula fecit,
Et molli circum est ansas amplexus acantho."

SECTION LII.—SELAGINACEÆ, OR SELAGIDS.

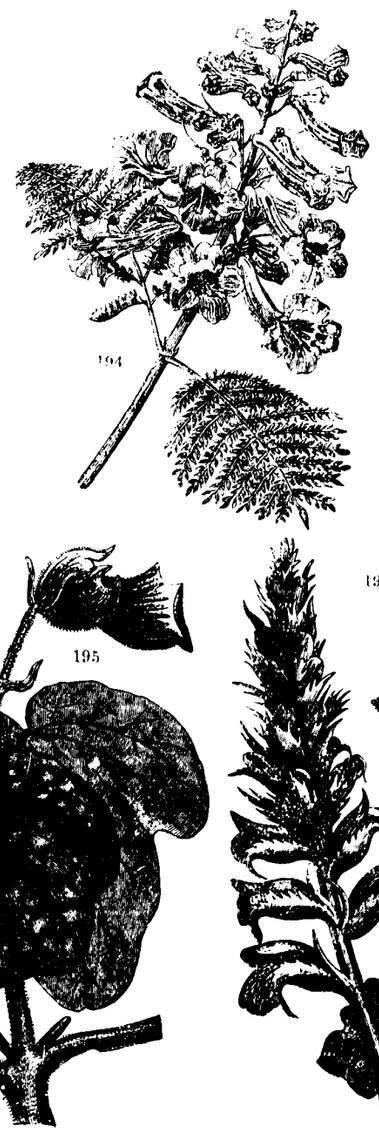
Characteristics: Calyx free; corolla hypogynous, monopetalous, sub-regular, or one or two lipped; stamens two or four inserted upon the tube of the corolla; achænia two; seed

inverted, dicotyledonous; embryo straight, corresponding with the axis of fleshy albumen; radicle superior.

The *Selaginaceæ*, so named after the genus *Selago*, are ow shrubs, rarely herbs, having alternate or fasciculated leaves, simple and without stipules; their flowers are complete and generally irregular, either disposed in a corymb or a spike; calyx persistent, tubular, or spathose; corolla with four or five divisions, imbricated in æstivation; the anthers are unilocular: the ovary is composed of two uniovulate cells; ovules pendent, reflexed. Most of the *Selaginaceæ* inhabit the Cape of Good Hope. This family does not possess marked properties, nevertheless many species are odorous. The *Hebenstretia dentata*, cultivated in our gardens, is a shrub about two feet high, with pinnatifid leaves in the lower, dentated leaves in the upper part of the plant. The flowers have a tubular corolla, one single lip, marked with a roseate purple spot; the flowers are inodorous in the morning, but strong and disagreeable at mid-day, whilst in the evening they exhale a delicious perfume. The *Selago spuria* has small oblong leaves and light-blue flowers. The stem of the *Selago Gillii* is flower-bearing and branched, having its flowers, which are of a pale rose-colour, disposed in the form of a loose spikelet. A representation of this plant is appended in Fig. 197.

The *Globulariæ* form a genus of the natural order *Selaginaceæ*. They are shrubs, or undershrubs, or perennial herbs; their flowers are alternate, simple, entire, devoid of stipules; flowers complete, irregular, united into a capitulum upon a convex receptacle, covered with hair, and surrounded with an involucrum; the anthers are first bilocular, and in the young flower become unilocular by the confluence of their cells; ovary unilocular, uniovulate, pendent, reflexed; the caryopsis is enveloped by the calyx, sharply pointed with the persistent base of the style.

The *Globulariæ* are inhabitants of Southern Europe. The bitter leaves of certain species are employed in medicine. The *Globularia Alypum* (Fig. 198) was formerly denominated *Frutex terribilis*, in consequence of the belief that it was violently drastic. Its leaves are the "wild senna" of Germany, and are frequently used to adulterate the genuine senna.



194. MIMOSA-LEAVED JACARANDA (JACARANDA MIMOSIFOLIA). 195. PROBOSCIS-LIKE MARTYNIA (MARTYNIA PROBOSCIDEA). 196. SOFT ACANTHUS (ACANTHUS MOLLIS).

SECTION LIII.—UTRICULARIÆ.

Characteristics: Calyx free; corolla hypogynous, monopetalous, irregular; stamens two, inserted upon the tube of the corolla; fruit capsular; placenta parietal, free; seeds numerous, exalbuminous; radicle straight; all aquatic herbs.

The *Utricularieæ* derive their name from their principal genus *Utricularia*, which is so called from the presence of abundant aërial vesicles distributed over the surface of their subaqueous leaves. These utriculi are rounded in shape and furnished with a kind of movable aperture. Whilst the plant is young these little bladders are filled with mucus a little heavier than water, which, acting as a weight, cause the plant to descend to the bottom of the water. As the period of flowering arrives, the utriculi secrete a gas which fills them, makes them specifically lighter, and thus, by lessening the specific gravity of the leaves, causes them to rise to the water's surface. No sooner has the period of flowering terminated, than the vesicles begin once more to secrete the heavy mucous fluid, and the leaves again sinking, the plant arrives at its original situation, and deposits its seeds in the subaqueous mud, there to remain until they germinate and produce young plants. (Fig. 199, 200, 201.)

This family is distributed over the entire world, although chiefly found in tropical regions of the old continents.

SECT. LIV.—PLANTAGINACEÆ, OR RIBWORTS.

Characteristics: Calyx free; corolla hypogynous, monopetalous; stamens inserted upon the corolla or upon the receptacle alternate with the petals; ovary one or two celled, uni- or multi-ovulate; fruit one or many seeded; seed dicotyledonous; embryo straight or but slightly curved in the axis of a fleshy albumen; radicle inferior.

The plantains are perennials, generally herbaceous; leaves sometimes radical, sometimes cauline, simple, without stipules; flowers complete, sometimes monœcious, arranged sometimes in the form of a spike, sometimes solitary, or almost solitary; calyx monosepalous, persistent, with four divisions, the divisions almost equal with each other; corolla tubular or urceolate, its limb four partite, regular or almost regular, persistent; imbricated in æstivation; stamens four in number. The ovary is composed of a single carpel, but apparently two or four-celled; ovule simple, erect, reflexed.

The *Plantaginaceæ* are not banished from any climate, though they especially inhabit the temperate regions of the northern hemisphere, principally the Mediterranean region and North America. Only few species grow in the low countries of the torrid zone, although not unfrequent upon the mountains.

The root and leaves of the plantains are slightly bitter and astringent, occasionally a little saline. The long-spiked plantain (*Plantago major*), of which a representation is given in Fig. 202, seed dicotyledonous; embryo straight, in a farinaceous albumen radicle superior.

The *Plumbaginaceæ* are herbs or shrubs, having leaves which are radical, fasciculated, or alternate, cauline, and ex-stipulate. The flowers are complete, disposed in spike, or panicle, or dense involucrum. Calyx monosepalous, tubular, arranged in five folds, or else five-partite, persistent. The corolla is composed of five petals, sometimes free, or nearly free, occasionally aggregated, contorted, or imbricated in æstivation. The five stamens are opposite to the petals; ovary with five carpels, joined by their edges into one single cell; ovule reflexed, pendent from a funiculus, or slender thread, springing from the lower part of the cell; style divided into five stigmas; fruit sometimes dividing into five valves at its summit, sometimes opening at its base.

A representation of the *Statice imbricata*, a native of Teneriffe, is given in Fig. 203. The little plant called thrift, frequently used as an edging instead of box, is a member of this natural order.



197. GILL'S SELAGO (SELAGO GILLII). 198 WILD SENNA (GLOBULARIA ALYPUM) 199 SPRIG OF UTRICULARIA. 200. LEAF OF UTRICULARIA (MAGNIFIED). 201 VESICLE OF UTRICULARIA (MAGNIFIED) 202 LONG-SPIKED PLANTAIN (PLANTAGO MAJOR). 203. IMBRICATED SEA LAVENDER (STATICE IMBRICATA). 204. FLOWER OF STATICE IMBRICATA.

And other species, were formerly remedies of great repute in the treatment of intermittent fever, but they have now fallen into disuse. The stag-horned plantain (*Plantago Coronopus*) was formerly employed by the ancients as a remedy for hydrophobia, but it is only now used in certain parts of Europe as a salad.

SECTION LV.—PLUMBAGINACEÆ, OR LEADWORTS.

Characteristics: Calyx free; corolla hypogynous, monopetalous, or polypetalous; stamens inserted upon the receptacle of the monopetalous species, and upon the petals of those which are polypetalous; ovary unilocular, styles five; ovule solitary, pendent;

READING AND ELOCUTION.—XXV.

EXERCISES ON EXPRESSIVE TONE (*concluded*).

THE following is an extract from a debate for young speakers, and forms a useful exercise in elocution:—

XIX. CHARACTER OF JULIUS CÆSAR.

FIRST SPEAKER.—"Was Cæsar a great man?"—What revolution has taken place in the first appointed government of the universe—what new and opposite principle has begun to direct the operations of nature—what refutation of their long-established precepts has deprived reason of her sceptre, and virtue of her throne, that a character which forms the noblest theme that ever merit gave to fame, should now become a question for debate?

No painter of human excellence, if he would draw the features of that hero's character, need study a favourable light or striking attitude. In every posture it has majesty; and the lineaments of its beauty are prominent in every point of view.

It is a generally-received opinion, that uncommon circumstances make uncommon men: Cæsar was an uncommon man in common circumstances. The colossal mind commands your admiration, no less in the pirate's captive, than in the victor at Pharsalia. Who but the first of his race could have made vassals of his savage masters, mocked them into reverence of a superior nature, and threatened, with security, the power that held him at its mercy? Of all the striking incidents of Cæsar's life, had history preserved for us but this single one, it would have been sufficient to make us fancy all the rest—at least, we should have said, "Such a man was born to conquest, and to empire!"

To expatiate on Cæsar's powers of oratory, would only be to add one poor eulogium to the testimony of the first historians. Cicero himself grants him the palm of almost pre-eminent merit; and seems at a loss for words to express his admiration of him. His voice was musical, his delivery energetic, his language chaste and rich, appropriate and peculiar. And it is well presumed that, had he studied the art of public speaking with as much industry as he studied the art of war, he would have been the first of orators. Quintilian says, he would have been the only man capable of combating Cicero; but granting them to have been equal in ability, what equal contest could the timid Cicero—whose nerves fail him, and whose tongue falters when the forum glitters with arms—what equal contest could he have held with the man whose vigour chastised the Belgæ, and annihilated the Nervii, that maintained their ground till they were hewn to pieces on the spot?

His abilities as a master of composition were undoubtedly of the first order. How admirable is the structure of his Commentaries! What perspicuity and animation are there in the details! You fancy yourself upon the field of action! You follow the development of his plans with the liveliest curiosity! You look on with unwearied attention, as he fortifies his camp or invests his enemy, or crosses the impetuous torrent! You behold his legions, as they move forward from different points to the line of battle! You hear the shout of the onset, and the crash of the encounter; and, breathless with suspense, mark every fluctuation of the awful tide of war!

As a politician, how consummate was his address!—how grand his projections!—how happy the execution of his measures! He governs his province with such equity and wisdom, as add a milder but a fairer lustre to his glory, and by their fame prepare the Roman people for his happy yoke. Upon the very eve of his rupture with Pompey, he sends back, on demand, the borrowed legions; covering with rewards the soldiers that may no longer serve him, and whose weapons on the morrow may be turned against his breast—presenting here a noble example of his respect of right, and of that magnanimity which maintains that gratitude should not cease, though benefits are discontinued. When he reigns sole master of the Roman world, how temperate is his triumph!—how scrupulous his respect for the very forms of the laws! He discountenances the profligacy of the patricians, and endeavours to preserve the virtue of the state by laying wholesome restraints upon luxury. He encourages the arts and sciences, patronises genius and talent, respects religion and justice, and puts in practice every means that can contribute to the welfare, the happiness, and the stability of the empire.

It is unnecessary to recount the military exploits of Cæsar. Why should I compel your attention to follow him, for the hundredth time, through hostile myriads, yielding at every encounter to the force of his invincible arms? As a captain, he was the first of warriors; nor were his valour and skill more admirable than his abstinence and watchfulness, his disregard of ease and his endurance of labour, his moderation and his mercy. Perhaps, indeed, this last quality forms the most dominant feature in his character: and proves, by the consequences of its excess, that virtue itself requires restraint, and has its proper bounds, which it ought not to exceed—for Cæsar's moderation was his ruin!

That Cæsar had a heart susceptible of friendship, and alive to the finest touches of humanity, is unquestionable. Why does he attempt so often to avert the storm of civil war? Why does he pause so long upon the brink of the Rubicon? Why does he weep when he beholds the head of his unfortunate rival? Why does he delight in pardoning his enemies—even those very men that had deserted him?

It seems as if he lived the lover of mankind, and fell—as the bard expresses it—vanquished, not so much by the weapons as by the ingratitude of his murderers.

If a combination of the most splendid talents for war with the most sacred love of peace—of the most illustrious public virtue with the most endearing private worth—of the most unyielding courage with the most accessible moderation, may constitute a great man, that title must be Cæsar's!

SECOND SPEAKER.—No change has taken place in the first appointed government of the universe; the operations of nature acknowledge now the same principle that they did in the beginning; Reason still holds her sceptre, Virtue still fills her throne; and the epithet of great does not belong to Cæsar!

I would lay it down, as an unquestionable position, that the worth of talents is to be estimated only by the use we make of them. If we employ them in the cause of virtue, their value is great; if we employ them in the cause of vice, they are less than worthless—they are pernicious and vile. Now let us examine Cæsar's talents by this principle, and we shall find, that neither as an orator nor as a politician—neither as a warrior nor as a friend—was Cæsar a great man!

If I were asked, "What was the first, the second, and the last principle of the virtuous mind?" I should reply, "It was the love of country." It was the love of parent, brother, friend!—the love of MAN!—the love of honour, virtue, and religion! the love of every good and virtuous deed! I say, then, if I were asked, "What was the first, the second, and the last principle of the virtuous mind?" I should reply, "It was the love of country!" Without it man is the basest of his kind!—a selfish, cunning, narrow speculator!—a trader in the dearest interests of his species!—reckless of every tie of nature, sentiment, affection! What was Cæsar's oratory?—How far did it prove him to be actuated by the love of country? It justified for political interest the invader of his honour!—sheltered the incendiary!—abetted treason!—flattered the people into their own undoing!—assailed the liberties of his country, and bawled into silence every virtuous patriot that struggled to uphold them! He would have been a greater orator than Cicero! I question the assertion—I deny that it is correct! He would have been a greater orator than Cicero! Well!—let it pass—he might have been a greater orator, but he never could have been so great a man. Which way soever he directed his talents, the same inordinate ambition would have led to the same results; and had he devoted himself to the study of oratory, his tongue had produced the same effects as his sword, and equally desolated the human kingdom.

But Cæsar is to be admired as a politician! I do not pretend to define the speaker's idea of a politician; but I shall attempt to put you in possession of mine. By a politician, I understand a man who studies the laws of prudence and of justice as they are applicable to the wise and happy government of a people, and the reciprocal obligations of states. Now, how far was Cæsar to be admired as a politician? He makes war upon the innocent Spaniards, that his military talents may not suffer from inaction. This was a ready way to preserve the peace of his province, and to secure its loyalty and affection! That he may be recorded as the first Roman that had ever crossed the Rhine *in a hostile manner*, he *invades the unoffending Germans*, lays waste their territories with fire, and plunders and sacks their country. Here was a noble policy!—that planted in the minds of a brave and formidable people the fatal seeds of that revenge and hatred which finally assisted in accomplishing the destruction of the Roman empire! In short, Cæsar's views were not of that enlarged nature which could entitle him to the name of a great politician; for he studied not the happiness and interest of a community, but merely his own advancement, which he accomplished by violating the laws and destroying the liberties of his country.

That Cæsar was a great conqueror, I do not care to dispute. His admirers are welcome to all the advantages that result from such a position. I will not subtract one victim from the hosts that perished for his fame; or abate, by a single groan, the sufferings of his vanquished enemies. But I will avow it to be my opinion, that the character of a great conqueror does not necessarily constitute that of a great man; nor can the recital of Cæsar's victories produce any other impression upon my mind than what proceeds from the contemplation of those convulsions of the earth, which in a moment inundate with ruin the plains of fertility and the abodes of peace; or, at one shock, convert whole cities into the graves of their living population!

But Cæsar's munificence, his clemency, his moderation, and his affectionate nature, constitute him a great man! What was his munificence, his clemency, or his moderation? the automaton of his ambition! It knew no aspiration from the Deity. It was a thing from the hands of the mechanician!—an ingenious mockery of nature! Its action seemed spontaneous—its look argued a soul—but all the virtue lay in the finger of the operator. *He* could possess no real munificence, moderation, or clemency, who ever expected his gifts to be doubled by return—who never abstained, but with a view to excess; nor spared, but for the indulgence of rapacity.—*Knowles.*

The following tract on the mission and duty of the man of learning affords a fitting conclusion to our Lessons in "Reading and Elocution:"—

XX. THE SCHOLAR'S MISSION.

The wants of our time and country, the constitution of our modern society, our whole position—personal and relative—forbid a life of mere scholarship or literary pursuits to the great majority of those who go out from our colleges. However it may have been in other times, and other lands, here and now, but few of our educated men are privileged—

> "From the loopholes of retreat
> To look upon the world, to hear the sound
> Of the great Babel, and not feel its stir."

Society has work for us, and we must forth to do it. Full early and hastily we must gird on the manly gown, gather up the loose leaves and scanty fragments of our youthful lore, and go out among men, to act with them and for them. It is a practical age; and our Wisdom, such as it is, "must strive and cry, and utter her voice in the streets, standing in the places of the paths, crying in the chief place of concourse, at the entry of the city, and the coming in at the doors."

This state of things, though not suited to the tastes and qualities of all, is not, on the whole, to be regretted by educated men as such. It is not in literary production only, or chiefly, that educated mind finds fit expression, and fulfils its mission in honour and beneficence. In the great theatre of the world's affairs, there is a worthy and a sufficient sphere. Society needs the well-trained, enlarged, and cultivated intellect of the scholar in its midst!—needs it, and welcomes it, and gives it a place, or, by its own capacity, it will take a place of honour, influence, and power. The youthful scholar has no occasion to deplore the fate that is soon to tear him from his studies, and cast him into the swelling tide of life and action. None of his disciplinary and enriching culture will be lost, or useless, even there. Every hour of study, every truth he has reached, and the toilsome process by which he reached it; the heightened grace or vigour of thought or speech he has acquired—all shall tell fully, nobly, if he will give heed to the conditions. And one condition, the prime one, is, that he be a true man, and recognise the obligation of a man, and go forth with heart and will, and every gift and acquirement dedicated, lovingly and resolutely, to the true and the right. These are the terms; and apart from these there is no success, no influence to be had which an ingenuous mind can desire, or which a sound and far-seeing mind would dare to seek.

Indeed, it is not an easy thing, nay, it is not a possible thing, to obtain a substantial success, and an abiding influence, except on these terms. A factitious popularity, a transient notoriety, or, in the case of shining talents, the doom of a damning *fame*, may fall to bad men. But an honoured name, enduring influence, a sun brightening on through its circuit, more and more, even to its serene setting—this boon of a true success goes never to intellectual qualities alone. It gravitates slowly but surely to weight of character, to intellectual ability rooted in principle.—*George Putnam.*

HISTORIC SKETCHES.—XXV.

THE GORDON RIOTS.

"MY Lord George, do you really mean to bring your rascally adherents into the House of Commons? If you do, the first man of them that enters, I will plunge my sword, not into his body, but into yours." Strong language, certainly, especially for the House of Commons, and yet never was speech spoken more earnestly or significantly than this, and the unusual character of it passed without rebuke from the Speaker. The person addressed was Lord George Gordon, the man who addressed him was his own kinsman, Colonel Murray; the date of the speech was Friday, the 2nd June, 1780, and the occasion on which it was delivered will be set forth in the following sketch of what are known as the "No Popery" Riots. To understand the subject fully, however, it will be necessary to glance back at a state of things more than two centuries before.

Soon after the death of Henry VIII., in 1547, the policy or impolicy, the religious zeal or the intolerant spirit—which you will—of the English Government, deemed it necessary that those who lately had been subject to systematic persecution for their religious opinions should change places with their persecutors. Laws of the most stringent kind were passed by the Protestant king, Edward VI., against Papists, as the professors of the Roman Catholic faith were then commonly called, and by them it was made an offence punishable with heavy fine and imprisonment, and in certain cases capitally, for a man to hold the faith in which he had been educated. Queen Mary, in 1553, repealed these laws, but they were re-enacted with fresh rigours by Elizabeth when she came to the throne in 1558. At the time these laws were made, it was not contemplated that there could be such a thing as dissent from the newly-established Church of England, but when the Puritans arose—the men who fought the battle of religious and political freedom against a Tudor queen, and against all the Stuart kings—fresh laws were framed to check them, and fetters the most oppressive and the most harassing were forged for them as they had been forged for the Roman Catholics. Every one within the realm was ordered to go to church on Sunday, or to be fined twelvepence—a sum in those days equal to more than two days' wages for a labouring man—and those who did not go for a month were fined £20. Subsequently, in the reign of Charles II. (1660-1685), it was ordered that no one should be admitted to office in any corporate town who had not within a year previously taken the Lord's Supper according to the rites of the Church of England, and certain oaths were prescribed to persons elected which no Romanist could take. The Book of Common Prayer was ordered to be used in every place for public worship, and no one was allowed to be a schoolmaster, or to have anything to do with the instruction of youth (dancing, for instance), unless he had signed a declaration of conformity to the Liturgy. Meetings of more than five persons for the purpose of worshipping God otherwise than by using the Prayer Book were liable to be broken up by force, and the preachers fined. The Test Act, passed in the twenty-fifth year of Charles II., required all civil and military officers, and all persons in the service of the Crown, to take the oaths of allegiance and supremacy, to declare their disbelief in the doctrine of transubstantiation, and to receive the sacrament in the Church of England; and another law of the same king forbade any one to sit in Parliament or to vote for a member until he had taken such oaths as no Romanist could possibly take.

William and Mary (1688-1702) assented to a law granting Protestant dissenters the right of meeting for public worship if the place of meeting were duly registered; but the laws which gave this and certain other privileges to Protestants, welded yet closer the rivets of intolerance on the unfortunate Catholics, who were still forbidden to meet, or to celebrate the Mass. Statutes of George I. (1714-1727) and George II. (1727-1760) confirmed the odious Test Act, and extended it. Not only were all officers in the army and navy, and all persons in public posts still compelled to desecrate the sacrament of the Lord's Supper, and to take startling oaths, but all ecclesiastical and collegiate persons, all preachers, teachers, schoolmasters, lawyers, and high constables were compelled, under pain of deprivation, fine, and forfeiture, to take the oaths of supremacy and allegiance, and to abjure the Pope and the Pretender.

In 1779, the year before the words at the beginning of this article were spoken, an Act was passed relieving the Protestant dissenters from almost all their disabilities, those created by the Test Act and Corporation Act excepted. But the people thus enfranchised could not bear that a slight concession made the year before to Romanists, and allowing them to meet for worship under certain restrictions, should remain unrepealed. It was not enough that the Romanist should be shut out from every post of every kind in the public service, that he should be precluded from getting a living by instructing in any branch of knowledge, and that he should be unable to practise at the bar; the lately persecuted felt they could not enjoy their freedom if their fellow-sufferers by the law were also relieved, though only in part.*

A number of organisations, calling themselves Protestant Associations, had been formed in England and Scotland for the purpose of obtaining the removal of disabilities from Protestant dissenters. They chose Lord George Gordon for their chief, and had they searched the whole country over they could not have found a representative more thoroughly unsuited to guide

* It was not till 1829 that the Catholic Emancipation Act allowed Roman Catholics to sit in Parliament, or to vote at elections, nor was it till the present reign that a full measure of freedom was meted out to the professors of all religions, including the Jewish religion, and that the law both in principle and practice ceased to persecute.

them to their legitimate aspirations, though it must be confessed there was no fitter incarnation of their weaknesses and their folly. They were indignant at the slight concession given to their fellow-Christians, and they resolved, if possible, to procure the repeal of it, and if that was not to be, then they would do whatever their too ready hands might find to do. At the suggestions of Lord George, petitions were got up and numerously signed, begging the Legislature to deliver the land from the guilt of allowing certain of the inhabitants to pray together. Every means were taken to make the petition from the Protestants of London a "monster petition." Advertisements were issued, speeches were made to inflame the public mind, and personal entreaties were not wanting to induce the people to add their names.

Towards the end of May, 1780, a crowded meeting was held in Coachmakers' Hall, where Lord George spoke at length, addressing the people in a highly inflammatory harangue. He promised to present their petition to the House of Commons, of which he was a member, if they would attend him with not less than 20,000 persons, on the 2nd June. Resolutions were passed pledging the Association to meet with as many friends as they could muster on that day in St. George's Fields; and in order the better to distinguish those of the "true Protestant" party, it was agreed that the petitioners and their friends should wear blue cockades in their hats.

On Friday, the 2nd of June, Lord George Gordon met his followers, some 60,000 strong, in St. George's Fields, and after addressing them in a foolish speech, full of intolerant and strife-stirring words, marched them, six abreast, over London Bridge, up Fleet Street and the Strand to Palace Yard, of which they took riotous possession. The Houses had not yet met when the processionists arrived; there were not any police to keep order, and the troops had not any instructions.

Very soon the disposition of the assemblage was apparent. Thousands had only availed themselves of the Protestants' petition to indulge their natural instincts to commit robbery and violence, and as soon as the members of either House of Parliament began to arrive, these persons commenced to be natural. Earl Mansfield, one of the most upright and able Chief Justices England ever had, had agreed to preside over the House of Lords instead of Lord Chancellor Thurlow, who was ill at Tunbridge. As soon as his carriage came into Palace Yard it was attacked, the windows were broken, the body was much damaged, and the venerable old man with difficulty escaped into the House, with torn robes and disordered wig. The Archbishop of York was subjected to like violence, and the Bishop of Lincoln, whose carriage was literally demolished, was taken fainting into a house, whence he escaped in disguise over the leads. The Duke of Northumberland was pulled out of his carriage and robbed of purse and watch; the Lord President of the Council and other peers were also so roughly handled that they could hardly get into Westminster Hall. The Lords continued to arrive, and business commenced; but little progress had been made when Lord Montfort rushed in to say that Lord Boston was in the hands of the mob, and in imminent danger of his life. One who was present says:—"At this instant it is hardly possible to conceive a more grotesque appearance than the House exhibited. Some of their lordships with their hair about their shoulders; others mutted with dirt; most of them as pale as the ghost in 'Hamlet;' and all of them standing up in their several places, and speaking at the same instant. One lord proposing to send for the Guards, another for the justices or civil magistrates, many crying out, 'Adjourn, adjourn!' while the skies resounded with the huzzas, shoutings, or hootings in Palace Yard."

Lord Boston escaped from the crowd just as the House of Lords were proposing to go out and rescue him; but it being impossible to go on with business, the House adjourned at eight o'clock, and its members managed to get away unperceived by side ways and passages.

Some 200 members of the House of Commons assembled, but the noise of the Protestant rioters almost drowned their voices in debate. Lord George Gordon presented the monster petition, and moved that the House should consider it in committee forthwith. An amendment was moved that it should not be considered till the 6th instant (four days on), but the sense of the House could not be taken, because the rioters had possession of the lobbies, whence they kept up a cry of "No Popery!" "Repeal, Repeal!" Lord George constantly went out to encourage the people to persevere, bade them keep up the demonstration, and compel the House to listen to them at once. The uproar was tremendous.

Within the House there was wisdom and dignity, and some anger. One member was for sending Lord George Gordon instantly to Newgate, others were for refusing to consider anything in connection with the petition while the House was under intimidation, and Colonel Murray, when the rioters were actually knocking at the door of the House, addressed to his kinsman the words which appear at the head of this paper. Lord North, however, the Prime Minister, sat serenely in his place, and by his conduct succeeded in infusing a spirit of confidence into the wavering members. Privately he sent for a detachment of the Guards, and these coming about nine o'clock in the evening, the rioters dispersed, the House divided, and rejecting Lord George's motion, adjourned till June the 6th.

With the exception of the burning of the chapels of the Bavarian and Sardinian ministers, which were utterly destroyed, no great damage was done by the rioters in London that night. The magistrates thought the disturbances were over, but on Sunday, June the 4th, the Roman Catholic chapels in Moorfields, and the houses belonging to Romanists in that district, were attacked and gutted. Next day the like fate befel the chapels and houses of the obnoxious religionists in other quarters; and the rioters growing bold at the non-interference of authority, resolved to attack the house of Sir George Savile, who originated the slight measure of toleration which had been granted to the Catholics. Savile House in Leicester Fields, now Leicester Square, was accordingly besieged, carried by storm, and destroyed with all that was in it.

On June the 6th the House of Commons met under the protection of a body of soldiers, and Lord George Gordon appeared with a blue cockade, the sign of the rioters, in his hat. Colonel Herbert drew the attention of the House to the cockade, and recommended Lord George to remove it, adding that if he did not, he (Colonel Herbert) would step across the House and remove it for him, upon which Lord George put the obnoxious sign into his pocket. While the debate was going on, a mob attacked the official residence of the Prime Minister in Downing Street, but made off at the appearance of some soldiers. During the afternoon a vast multitude assembled before Newgate, and demanded the release of their friends who had been committed a few days before. The demand being refused by the governor, an attack was made on the gaol; fire and levers, pickaxes and crowbars were freely applied, and in the course of a few hours the prison, which had lately been rebuilt at great cost, was a smoking ruin, portions of the stone walls alone being left. The liberated prisoners increased the number and the audacity of the mob, who proceeded to break open the prison at Clerkenwell, and to liberate the prisoners there; and the houses of several obnoxious persons were destroyed in open day. Towards night, however, the mob, drunk with success and with liquor also, grew bolder. At midnight they congregated in front of Lord Mansfield's house, in Bloomsbury Square, and burned it with its contents, including a library of inestimable value, and a priceless collection of materials for history. Lord and Lady Mansfield escaped by a side entrance.

From six-and-thirty different places the fire and smoke went up, promoted by the efforts of incendiaries; but for magnitude, perhaps, the worst fire was that which finally caused the Government to act decisively against the offenders—the fire at the distillery in Holborn. The distillery at the time belonged to Mr. Langdale, a Roman Catholic, and this fact, coupled with the attraction caused by the stores of spirit, was sufficient to draw the attention of the rioters. The place was sacked and then fired. Hundreds of drunken wretches perished in the flames, the gin ran down the gutters in a blaze, and the flames from the burning premises lighted the sky over all London.

There were no police. The officers in command of troops were afraid to fire upon the people, doubts having been raised whether by so doing, even at the bidding of a magistrate, they did not render themselves liable to prosecution for murder. But the danger increased. The king, in council, had the question of military interference debated, and upon the Attorney-General giving it as his opinion that under the circumstances which then existed the soldiers might legally be called upon to act, the king announced that there was at least one magistrate (meaning himself) in the country who was determined to do his duty. Soldiers were forthwith ordered to take military possession of the town, and the instructions to their officers were that if the people would not disperse on being summoned, they should be fired upon.

Upon these orders the officers acted. Troops marched through the streets, and in some houses they were quartered as garrisons. Unhappily, the march of the soldiers was not unimpeded, though it can scarcely be said to have been resisted. The people would not disperse, the soldiers fired, and the gutters which lately ran gin now ran blood. Two hundred persons were shot dead in the streets, besides those who perished in the flames of the distillery, and 250 more were sent wounded to the hospitals. A few hours served to replace the authorities in possession of London, and "on the morning of Thursday, June the 8th, no trace was to be seen," says Lord Mahon (Earl Stanhope), "of the recent tumults, beyond the smouldering ruins, the spots of blood upon the pavements, and the marks of shot upon the houses."

On Friday, June the 9th, Lord George Gordon was arrested and sent to the Tower, but subsequently escaped trial in consequence of some technical flaw in the legal proceedings. His followers were not so fortunate. Out of a large number condemned to death at the July Assizes, many experienced the king's mercy, but twenty-one were hanged for the part they had had in the Gordon Riots.

*

Synopsis of the Life and Reign of George III.

George III. was the son of Frederick, Prince of Wales, and the Princess Augusta of Saxe-Gotha. His father was the eldest son of George II. He was the thirty-second monarch of Great Britain and Ireland after the Norman Conquest, and the third of the Hanoverian Dynasty, or House of Brunswick. He married the Princess Charlotte of Mecklenburg, by whom he had nine sons and six daughters.

Born in London . June 4,	1738	Partition of Poland . . .	1795
Death of Frederick, Prince of Wales	1751	War with Spain	1796
Began to reign . . Oct. 25,	1760	Battle of Cape St. Vincent Feb. 14,	1797
Married . . . . Sept. 8,	1761	Suspension of Cash Payments . . . Feb. 25,	1797
Stamp Act for American Colonies	1765	Mutiny at the Nore, June,	1797
Tax on Tea Imported into American Colonies enforced by Lord North . .	1770	Bat. of Camperdown, Oct. 11,	1797
Royal Marriage Act passed .	1772	Irish Rebellion commenced May 4,	1798
Riot at Boston. American Colonists meet at Philadelphia	1773	Battle of the Nile . Aug. 1,	1798
Boston Port Bill passed . .	1774	Capture of Seringapatam (India) . . . . May 4,	1799
Revolt of the American Colonies	1775	Legislative Union of Great Britain and Ireland Jan. 1,	1801
Bat. Bunker's Hill, June 17,	1775	Bombardment of Copenhagen . . . . April 2,	1801
Declaration of Independence by the American Colonies, which are now called the "United States," July 4,	1776	Peace of Amiens	1802
Death of Earl Chatham May 11,	1778	Renewal of War with France	1803
"No Popery" Riots . . .	1780	War with Spain	1804
Siege of Gibraltar	1782	Bat. of Trafalgar and Death of Nelson . . . Oct. 21,	1805
Independence of the American Colonies acknowledged Nov. 30,	1782	Death of William Pitt Jan. 23,	1806
Peace of Versailles . . .	1783	The "Delicate Investigation:" an Inquiry into charges against the Princess of Wales . May 22,	1806
William Pitt, Prime Minister	1783	Death of Charles James Fox Sept. 13,	1806
Warren Hastings impeached for misdemeanour in India	1788	Abolition of the Slave Trade procured by Wilberforce .	1807
Temp. Insanity of the King	1788	Peninsular War begins . .	1808
Commencement of the French Revolution. Destruction of the Bastile July 20,	1789	Battle of Vimeira . Aug. 21,	1808
Louis XVI. of France and Marie Autoinette beheaded	1793	Convention of Cintra. Aug. 22,	1808
Declaration of War against England by the French Republic	1793	Bat. of Corunna and Death of Sir John Moore, Jan. 16,	1809
Lord Howe's Victory off Ushant. . . . June 1,	1794	Riots and Arrest of Sir Francis Burdett, April 6,	1809
		Battle of Talavera . July 27,	1809
		Expedition to Walcheren Aug. 10,	1809
		Battle of Busaco . Sept. 27,	1809
		Return of the Insanity of the King . . . . Nov	1809
		Regency of the Prince of Wales	1811
		Battle of Fuentes de Onore May 5,	1811
		Battle of Albuera . May 16,	1811
		Capture of Ciudad Rodrigo Jan. 19,	1812
		Storming of Badajos, Apr 6,	1812
		Assassination of Mr. Perceval, then Prime Minister May 11,	1812
		Battle of Salamanca, July 22,	1812
		Burning of Moscow, Sep. 14,	1812
		War with United States .	1812
		Battle of Vittoria . June 21,	1813
		Battle of Pyrenees . July 28,	1813
		Defeat of Napoleon at Leipsic . . . . . Oct. 16	1813
		Paris in the hands of the Allies . . . . Mar. 31,	1814
		Abdication of Napoleon, who is banished to Elba April 5,	1814
		Capture of Washington, United States . Aug. 24,	1814
		Congress of Vienna Nov.	1814
		Peace with United States Dec. 24,	1814
		Return of Napoleon from Elba	1815
		Battles of Ligny, Quatre Bras and Waterloo, June 16-18,	1815
		Napoleon sent to St. Helena Aug. 8,	1815
		Marriage of Princess Charlotte . . . May 2,	1816
		Bombardment of Algiers Aug. 27,	1816
		Resumption of Cash Payments . . . . Sept. 22,	1817
		Death of Princess Charlotte Nov. 6,	1817
		Death of Queen Charlotte Nov. 17,	1818
		Currency Bill introduced .	1819
		Reform Meeting at Manchester. . . . Aug. 16,	1819
		Sir Francis Burdett committed to the Tower . .	1819
		Death of the King . Jan. 29,	1820

Sovereigns Contemporary with George III.

Austria, Emperor of.

Francis I. (*formerly Francis II. of Germany*) 1804

Bavaria, King of.

Maximilian Joseph I. . . . 1805

Denmark, Kings of.

Frederick V. . . 1746
Christian VII. . 1766
Frederick VI. . 1808

France, Rulers of.

Louis XV. . . 1715
Louis XVI. . . 1774
[*The son of Louis XVI. under the title of Louis XVII. was King of France* de jure *from the death of his father, 1793, till 1795, when he died in prison.*]
French Republic declared . . . 1792
Napoleon *First Consul* . . . 1799
Napoleon I. *Emperor* . . . 1804
Louis XVIII. May 3, 1814

Germany, Emperors of.

Francis I. . . 1745
Joseph II. . . 1765
Leopold II. . . 1790
Francis II. (*see Austria*) . . 1792
[*These Emperors of Germany were also Kings of Hungary.*]

Italy, King of.

Napoleon, from 1805 to . . . 1814

Naples, Kings of.

Joseph Bonaparte 1806
Joachim Murat . 1808

Netherlands, Stadtholder of.

William VI. . . 1751
Holland and Belgium merged in French Republic 1795

Netherlands, Kings of.

Louis Bonaparte 1806
Holland United to France . . . 1810
William I. . . 1815

Poland, Kings of.

Frederick Augustus II. . . . 1733
Interregnum . . 1763
Stanislas II. . . 1764
[*This monarch abdicated in 1795, and died in 1798.*]

Portugal, Kings of.

Joseph Emmanuel 1750
Maria and Peter III. 1777
Maria (alone) . 1786
[*This monarch quitted Portugal in consequence of the invasion of the kingdom by the French, and retired to Brazil, from which he returned in 1821. Owing to his mother's mental derangement, he was Regent of Portugal from 1792 till his accession.*]

Prussia, Kings of.

Frederick II. . 1740
Frederick William II. . . 1786
Frederick William III. . . 1797

Rome, Popes of.

Clement XIII. . 1758
Clement XIV. . 1769
Pius VI. . . . 1774
Pius VII. . . . 1800

Russia, Emperors of.

Elizabeth . . . 1741
Peter III. . . 1762
Catherine II. . 1762
Paul 1796
Alexander I. . . 1801

Sardinia, Kings of.

Charles Emmanuel I. . . . 1730
Victor Amadeus II. 1773
Charles Emmanuel II. . . . 1796
Victor Emmanuel I. . . . 1802
Sardinia merged in the kingdom of Italy from 1805 to 1814.
Victor Emmanuel I. (*restored*) 1814

Spain, Kings of.

Charles III. . . 1759
Charles IV. . . 1788
Ferdinand VII. . 1808
Joseph Bonaparte 1808
Ferdinand VII. (*restored*) . . 1814

Sweden, Kings of.

Adolphus Frederick 1751
Gustavus III. . 1771
Gustavus IV. . 1792
Charles XIII. . 1809
Norway annexed to Sweden by the Treaty of Kiel . 1814
Charles XIV. (Bernadotte) . 1818

Turkey, Sultans of.

Mustapha III. . 1757
Abdul Ahmed . 1774
Selim III. . . 1789
Mustapha IV. . 1807
Mahomed VI. . 1808

Two Sicilies (Naples and Sicily) Kings of.

Ferdinand IV. . 1758
This monarch is King of Sicily only from 1806 to 1815, when he again becomes King of the Two Sicilies, under the title of
Ferdinand I. . 1815

United States, Presidents of.

George Washington 1789
John Adams . . 1797
Thomas Jefferson 1801
James Madison 1809
James Monroe . 1817

*

LESSONS IN LATIN.—XXV.

ON PARSING.

In the following Latin exercises ascertain, write down, and imprint on your memory the parts of the several verbs—that is, the mood, tense, person, and number—together with the exact English meaning; at the same time tell the person, tense, and mood endings, as well as give the stems. This you should do very completely with each lesson in succession. You thus make a commencement in what is called parsing, that is, telling or assigning the parts (in Latin, pars, *a part*). Parsing applies to nouns and adjectives, as well as to verbs, indeed, to all parts of speech; it is also concerned with syntax, or the combination of words into sentences; so that you cannot parse your lessons completely until they are terminated. But you have now advanced far enough to begin parsing, and would be rewarded if every day, before you attempt a new lesson, you were to take "a back lesson," and parse it carefully; that is, go over again from the first what you have done with the strictest regard to the forms and rules.

I will give you an example of what I mean by parsing:—

Let us take the short Latin sentence—

Tullia patrem amat.

The first thing I have to do is to construe it, or put it into corresponding English words. On looking at it I see that *Tullia* is in the nominative case. Consequently, *Tullia* is the subject, and with it I must begin. But *patrem* comes next: am I to take *patrem* in the second place? This I cannot do; for *patrem* is in the accusative case, and consequently must be dependent on some verb. The verb is there. *Amat* then, comes after Tullia. Putting the two together, I have *Tullia amat*, Tullia loves. What does Tullia love? Patrem, *her father*. The whole then is, *Tullia loves her father*. Here you see a departure in the English from the Latin idiom. With such deviations you should familiarise your mind by constant and careful observation. The departure here is this, that to make good or idiomatic English, I am obliged to add the pronoun *her*, "*her* father," there being in the Latin no word corresponding to *her*. Do not hence suppose that it would be bad Latin to say "Tullia amat patrem *suum*," *her* father; but it is not customary to employ the pronoun in such cases, except it is wanted for the sake of emphasis.

Having translated the sentence, I must now parse it. I shall take each word in its grammatical order.

Tullia, Tulliæ, a noun feminine of the first declension, nominative case, the subject to the verb *amat*.

The stem is Tulli (thus Tullia, genitive Tulliæ, the æ of the genitive being removed, Tulli remains as the stem).

After giving the parts and relations of a noun as above, you should "go through" or decline the noun. So with all nouns, pronouns, verbs, and adjectives.

Amat, from *amo*, is a verb transitive of the first conjugation, indicative mood, present tense, third person singular, agreeing with its subject *Tullia*, according to the rule, "a subject must agree with its verb in number and person." The four chief parts of *amo* are *-amo, amavi, amatum, amare*. The stem of *amo* is *am*, the stem of the present tense is *ama*, the person-endings are *-o, -as, -at, -amus, -atis, -ant*. *Amao* is contracted into *amo*. Then go through the tense uniting the stem with the person-endings. You would act wisely if, in addition, you made *amat* the subject of inquiry; thus, what would *amat* be in the subjunctive mood? In the passive voice? In the subjunctive passive? By what change is *amat* made plural? What is the corresponding second person singular? Plural? What does *amat* become in the future tense? In the pluperfect indicative? Go through the imperfect of *amo*. Give the perfect subjunctive first person singular; third person plural.

These things may seem minute and troublesome to you: they would, however, be required by any good teacher; and attention to them is, I assure you, requisite to make a sound scholar; it is also requisite for that mental discipline which the study of language may give, and which, in its perfect form, is of very high value.

Another word remains—*patrem*; *patrem* from *pater, patris*, a parisyllabic noun, of the masculine gender, the third declension, consonantal stem *patr*, in the singular number, accusative case, being the object of the transitive verb *amat*, by which it is governed, according to the rule, "transitive verbs require their object to be in the accusative case."

Observe, that in thus setting before you a specimen of parsing, I have given you two rules in Syntax; thus:—

1. A subject must agree with its verb in number and person.

2. Transitive verbs require their object to be in the accusative case.

Of these rules you will forthwith have need to make constant application. Commit them to memory, and repeat them by heart whenever applied. A verbal and exact repetition of them, and of all rules, is desirable at first; afterwards, I wish that you should give the substance rather than the words of a rule, for if you express its substance you show that you understand its import.

VOCABULARY.

Compăro, 1, *I get together, acquire.*
Emigro, 1, *I go out, quit* (E. R. *emigration*).
Flo, 1, *I blow.*
Ingens, ingentis, *very great.*
Interitus, -ūs, m., *ruin.*
Intro, 1, *I go into, enter* (E. R. *entrance*).
Jam, adv., *already.*
Judico, 1, *I judge.*
Libero, 1, *I set free* (E. R. *liberation*).
Narratio, -ōnis, f., *a narrative.*
Numĕro, 1, *I number.*
Nuper, adv., *lately.*
Observo, 1, *I keep under my eye, observe.*
Occŭpo, 1, *I fall upon, take possession of* (E. R. *occupation*).
Latro, 1, *I bark.*
Placidus, -a, -um, *placid, tranquil.*
Terror, -ōris, m., *terror.*
Timor, -ōris, m., *fear* (E. R. *timid*).
Vehemens, vehementis, *eclamant, very strong.*
Ventus, -i, m., *wind.*
Vigilo, 1, *I watch, keep awake, guard* (E. R. *vigilant*).

EXERCISE 81.—LATIN-ENGLISH.

1. Ego te laudabam. 2. Tu me vituperabas. 3. Frater judicabat. 4. Ego te laudabo. 5. Tu me vituperabis. 6. Frater judicabit. 7. Ego ambulavi. 8. Tu vigilavisti. 9. Ventus flavit. 10. Ego ambulaveram. 11. Tu vigilaveras. 12. Ventus flaverat. 13. Ego te laudavero. 14. Tu me vituperaveris. 15. Frater judicaverit. 16. Quum milites urbem intrabant, omnes cives timoris pleni erant. 17. Quum in silva ambulabamus, vehemens ventus per altas quercus flabat, dum vos placidus somnus recreabat. 18. Vos vigilabatis. 19. Quamdiu eris felix, multos numerabis amicos. 20. Bonos semper laudabo, improbos semper vituperabo. 21. Si acriter pugnabitis, O milites, patriam interitu liberabitis. 22. Si virtutem amabis, omnes boni te amabunt.

Remark that sometimes an abbrevation takes place in the perfect tense, and the tenses formed from the perfect tense. Thus, instead of saying in full, vigilavisti, as above, the Latins shortened the word into vigilasti, leaving out the *vi*. This process is called syncopation, and verbs thus contracted (drawn together) are said to be syncopated. Other syncopated forms ensue; as laudasti for laudavisti; amasti for amavisti; amasse for amavisse: also in other conjugations, as complesti for complevisti; audieram for audiveram; audierunt for audiverunt.

I here resume the exercises, in which instances of syncopation will be found.

EXERCISE 82.—LATIN-ENGLISH.

1. Quia semper virtutis præcepta observastis (for observavistis) magnam vobis laudem comparastis. 2. Cur per totam noctem vigilasti? 3. Præceptores meos semper amavi, nonne amasti tuos? 4. Acriter contra hostes pugnastis. 5. Quum milites urbem intraverant, ingens terror omnium civium animos occupabat. 6. Narratio quam mihi nuper narraveras, vehementer me delectaverat. 7. Quum exercitus hostilis urbem oppugnaverat, nos jam emigraveramus. 8. Si animum virtutibus ornaveris (ornaris) semper beatus eris. 9. Quum hostes urbis nostræ agros devastaverint, urbem ipsam oppugnabunt.

EXERCISE 83. ENGLISH-LATIN.

1. We praised thee. 2. Thou didst blame me. 3. The father was judging. 4. Thou wilt praise me. 5. He will praise thee. 6. The father will judge us. 7. Thou hast walked (syncopated form). 8. I have watched. 9. The winds blew. 10. I will walk abroad. 11. Thou art watching. 12. The wind was blowing. 13. The soldiers will enter the city. 14. The soldiers were entering the city. 15. The soldiers are entering the city. 16. The soldiers have entered the city. 17. The soldiers had entered the city. 18. A very strong wind blows through the house. 19. Dost thou number many soldiers? 20. I have numbered many friends. 21. He has liberated (set free) his country from ruin. 22. Hast thou watched all night? 23. Love thy preceptors. 24. Let them love their parents. 25. O boys, love virtue. 26. The narrative delighted my brother. 27. The narrative delights the girls. 28. The narrative will delight father and mother. 29. Thou hast acquired fame by the narrative of the ruin.

VOCABULARY.

Acerrime, *very bravely.*
Adhibeo, 2, *I apply.*
Adhibere curam, *to take care.*
Advento, 1, *I come to, arrive at.*
Ægrotus, -i, *a sick man.*
Conscientia, -æ, f., *conscience.*
Evĕnit, *it happens.*
Exhilăro, 1, *I exhilarate, rejoice.*
Expugno, 1, *I capture.*
Gusto, 1, *I taste.*
Honestas, -ātis, f., *honesty, honour.*
Immaturus, -a, -um, *unripe.*
Immortalitas, -ātis, f., *deathlessness.*
Maturus, -a, -um, *ripe, mature.*
Medicus, -i, *a physician* (E. R. *medicine*).
Obtempero, 1, *I obey* (with the object in the dative).
Opto, 1, *I wish* (E. R. *option*).
Pecco, 1, *I sin.*
Rĕdămo, *I love again.*
Religiose, *conscientiously.*
Rogo, 1, *I ask.*
Sano, 1, *I heal* (E. R. *sanatory*).
Statio, -ōnis, f., *a station, a post.*
Supero, 1, *I surpass, overcome.*
Tolero, 1, *I endure, bear.*
Tracto, 1, *I handle, treat.*
Utilitas, -ātis, f., *utility.*
Uva, -æ, *a grape.*
Vide, *see thou.*
Vide ne, *see thou do not.*

Rule.—The conjunctions ut, *that, in order that, so that, so as*, and ne, *not to, so that not, to prevent*, require after them the subjunctive mood.

EXERCISE 84.—LATIN-ENGLISH.

1. Sæpe evenit ut utilitas cum honestate certet. 2. Vide ne pecces contra virtutis præcepta. 3. Omnes parentes optant ut filii literas diligenter tractent. 4. Ita vivere debemus ut in omni re rectam conscientiam servemus. 5. Medicus omnem curam adhibet ut ægrotum sanet. 6. Amo te ut me redămes. 7. Dux imperavit ut milites stationes suas servarent. 8. Heri ambulam ut tristem animum exhilarem.

EXERCISE 85.—ENGLISH-LATIN.

1. See that your son does not sin. 2. Dost thou sin against the precepts of virtue? 3. A wise father takes care that his children do not sin. 4. The generals take care that the soldiers keep their posts. 5. You take care to prevent your children from sinning (literally, *that they do not* (ne) *sin*). 6. Good mothers take care that their children obey their commands.

Rule.—After non dubito, the conjunction quin is used, requiring the subjunctive mood; thus, non dubito quin, *I doubt not but*, or *that*. In the same way, nemo dubitat quin, *no one doubts that*; quis dubitat quin? *who doubts that?* dubium non est quin, *there is no doubt that.*

EXERCISE 86.—LATIN-ENGLISH.

1. Non dubito quin milites nostri superaverint hostes. 2. Non dubitabam quin milites nostri hostes superavissent. 3. Non dubito quin milites nostri hostes superaturi sint. 4. Non dubitabam quin milites nostri hostes superaturi essent. 5. Non dubitabam quin vos patriam servitute liberaturi essetis. 6. Dubium non erat quin exercitus noster omnes labŏres et ærumnas facile toleraturus esset. 7. Quis dubitat quin Hannibal contra Romanos fortissime pugnavĕrit.

EXERCISE 87.—ENGLISH-LATIN.

1. No one doubts that you will fight bravely for the liberty of your country. 2. No one doubts that he fought bravely. 3. No one will doubt that he will fight bravely. 4. No one doubted that he had fought bravely. 5. Who doubts that the soldiers will capture the city? 6. There is no doubt that you endeavour (*studeo*) to preserve honour. 7. I do not doubt that my father will come.

Though non dubito quin requires the subjunctive mood in Latin, the verb must be Englished by an indicative mood; as may be seen in the English examples just given. In order to make this quite plain, I will give another instance:—

Non dubito quin bonus *sit* avunculus tuus.
I doubt not that thy uncle is good.

Here, then, you see the verb which in Latin must be in the subjunctive mood, must stand in the indicative mood in English. Such is by no means an unusual fact.

Rule.—With the imperative the negative ne is used, and not the negative non, as ne crede, *do not believe.*

EXERCISE 88.—LATIN-ENGLISH.

1. Diligenter cura, mi amice, valetudinem tuam. 2. Amate literas, O pueri! 3. Ne dubitato de animarum immortalitate. 4. Semper serva, mi fili, conscientiam rectam. 5. Discipulus amato præceptores. 6. Laudatote probos, vituperatote improbos. 7. Ne lauda malos pueros. 8. Omnes homines amanto Deum.

EXERCISE 89.—ENGLISH-LATIN.

1. My sons, take care of your mother. 2. Charles, do not doubt of the deathlessness of the good. 3. Preserve, children, an upright conscience. 4. Let children love (their) preceptors. 5. Do you, my friends, love God. 6. Do not blame thy sister, Charles.

Rule.—The first supine, that is, the supine in *um*, is used after verbs denoting motion; the second supine, that in *u*, is used after certain adjectives.

Remark.—The supines are supposed to have been nouns of the fourth declension, that in *um*, a noun in the accusative case; that in *u*, a noun in the dative case (*u* for *ui*).

EXERCISE 90.—LATIN-ENGLISH.

1. Parentes mei in urbem migraverunt habitatum. 2. Exercitus hostilis adventavit agros nostros devastatum. 3. Uva immatura est acerba gustatu. 4. Ærumnæ sunt duræ toleratu. 5. Sitis difficillima est toleratu. 6. Pira sunt dulcia gustatu.

EXERCISE 91.—ENGLISH-LATIN.

1. The soldiers approach to deliver (supine in *um*) the king. 2. The hostile army approaches to capture the city. 3. Ripe grapes are sweet to the taste (supine in *u*). 4. Unripe grapes are difficult to be endured. 5. They come to seize (fut. part. act. of *occupo*) the fields. 6. Birds by singing (gerund) delight the mind.

KEY TO EXERCISES IN LESSONS IN LATIN.

EXERCISE 79.—LATIN-ENGLISH.

1. I was praised, thou wast blamed. 2. The city was attacked. 3. I shall be praised, thou wilt be blamed. 4. The city will be attacked. 5. When the city was taken by the enemies, the minds of all the citizens were occupied with great fear. 6. The citizens were greatly disturbed by the enemies. 7. When the fight was most frightful, the sun was darkened by clouds. 8. The wicked after death will be punished with just punishment. 9. The city was attacked by the enemies. 10. The minds of all the citizens were occupied with great terror. 11. If we have (shall have) cultivated learning diligently, we shall be presented with beautiful rewards by our parents. 12. When the city was (had been) taken by the enemies, all the citizens were tortured with the most bitter grief. 13. If your children have been well educated by you, you will be praised. 14. Let the industrious scholar be praised, let the idle (scholar) be blamed. 15. Let the divine laws be conscientiously observed by men. 16. Be ye entreated, O my parents. 17. O my boy, take delight in the study of letters! 18. Be entreated, O judge! 19. Let the soldiers of a certain day be collected into the city. 20. Let not the citizens be contaminated by shameful deeds. 21. A certain peace is better than the hope of (a hoped) victory. 22. The changing of the country (the changed country) does not change the character. 23. Grief borne patiently is less bitter. 24. A good man ought to be praised. 25. Good parents take care that the manners of their children are amended. 26. Take care that in everything a pure conscience is preserved. 27. Thou art loved by me, that I may be loved again by thee. 28. I walked yesterday that my sad mind might be gladdened. 29. Our soldiers fought very vigorously that the city might be preserved from ruin. 30. See that you are not blamed by the teachers. 31. A good citizen takes care that the laws are not violated by him. 32. I doubt not that my friend will be released from sickness. 33. No one doubted that peace had been regained. 34. I know not wherefore peace has been disturbed.

EXERCISE 80.—ENGLISH-LATIN.

1. Pax recuperata est. 2. Pax recuperabitur. 3. Pax recuperabatur. 4. Non dubito quin illi pacem recuperaturi sint. 5. Pax turbata est. 6. Estne pax turbata? 7. Nonne pax turbata est? 8. Pax turbabitur. 9. Pax non turbanda est. 10. Ego laudabor, ille vituperabitur. 11. Ille vituperandus est. 12. Ille vituperatus est. 13. Urbs non expugnata est. 14. O pater, ab supplice filia tua exorare! 15. Mater exorabatur. 16. Sol nube obscuratur. 17. Sol heri nubibus obscurabatur. 18. Care fili, animus tuus terrore occupatur. 19. Meus animus dolore occupabatur. 20. Omnium civium animi timore et dolore occupabuntur. 21. Adolescentes, ne flagitiis contaminamini. 22. Ego te amo, ut ego a te redămer. 23. Pater amandus est. 24. Malus puer castigandus est. 25. Civitatis leges ab omnibus civibus sancte observantor. 26. Divinæ leges ab sanctis hominibus observantur. 27. Virtutisne præcepta ab urbis adolescentibus observata sunt?

LESSONS IN ARCHITECTURE.—IX.

ARCHITRAVES, ARCHES, AND VAULTED ROOFS.

In ancient times an *order*, the principal element of architecture, was connected with the adjacent buildings, which it was employed to ornament and to distinguish, by the architraves or horizontal pieces which constituted one of the important parts of its combination. Down to the period of the Greek architecture, we find no example of any deviation from this great principle of primitive construction. All the ancient edifices of Assyria and Babylonia, as well as of Egypt, Nubia, Abyssinia, and India, invariably show the mode of connecting one column with another, in horizontal lines, by means of a single piece, or solid *plate-band* or bressumer, as it may be fitly denominated. The Greeks, who worked out the ideas of the nations which preceded them in civilisation, and reduced them to system, as we have shown in former lessons, adopted the same principle of construction. Their edifices in Asia Minor, in Italy, in Sicily,

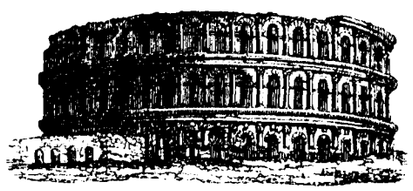
as well as in Greece itself, are all rigorously constructed upon this principle, as may be seen in the Parthenon at Athens, a representation of which was given in page 129 of this volume.

The Etruscans first carried the arts into Italy, and were the instructors of the Romans even before the Greeks. This ingenious people constructed the first Roman edifices, and built their arches and vaults as they still exist in the Cloaca Maxima, or Great Sewer of Rome, and the Mamertine Prison, which may be considered as the foundation of a style of architecture peculiarly Roman. Before the period of the Etruscans, the Pelasgians had attempted to construct arches; but they went no farther than the pointed arch, the difficulty of centering an arch having completely arrested their progress. In fact, their pointed arches, formed by successive courses of horizonal stones, could only be considered as the two abutments of a semi-circular arch approaching each other. This fact is established by an examination of the gate of Arpino, the buildings of Alba Fucensis, of Tiryns, and of the Treasury of Atreus at Mycenæ. The Romans, on the other hand, after the example of the Etruscans, entered fully into the construction of the semi-circular arch; and this new principle led to the grandest results. By this means, the architects and builders of old Rome were enabled to use materials which were of a moderate size, and easy to raise to great heights; and to construct immense vaults, which agreed with the arch in their circular form.



ROMAN AQUEDUCT.

The period of Roman invention is one of the most brilliant in the history of art. Of the many edifices with which the Romans covered their provinces, there still remains a sufficient number to prove the excellence of their architectural system, and the perfection to which they brought the science and skill of the practical builder. Arches and vaults raised by them of rough stone and bricks, and even of rubble, preserve their primitive solidity to this day. Their temples were constructed, like those of the Greeks, on the principle of the architrave; but the remains of their aqueducts, their baths, those edifices so imposing from their great extent, their triumphal arches, their circuses, and their theatres, show us how extensively the Romans employed the arch and the *vault* in their edifices. But of all their remarkable works, the amphitheatres were those in which the multiplied and varied use of these most frequently occur; those immense buildings in the elliptical form, with rows of seats placed round and round, and rising gradually above one another, in which the spectators assembled to witness their barbarous spectacles. The style of architecture employed in these buildings was of a vigorous and substantial character, adapted to its use. Two or three stories of immense arcades, or rows of arches, divided by piers ornamented with columns or pilasters, admitted light into the corridors or long passages which surrounded the edifice. Other galleries, more or less numerous, and parallel to the preceding, were constructed below the seats. From floors on a level with these galleries, or by numerous flights of steps, they were admitted to the seats by entrances so arranged as to prevent crowding and confusion. Four open passages disposed along the axes of the building, which, as we have said, was in the form of an ellipse, gave admittance to the arena from without; round the arena were placed the cells which contained the animals. Behind these cells were constructed, also, corridors or long passages communicating with every part of the building, and placed under the first row of arches, or the first row of seats for the spectators.



AMPHITHEATRE OF THYSDRUS, IN AFRICA.

The rain-water was carried off by water-courses and drains, which ran into an aqueduct passing under the arena; while other aqueducts were employed to inundate it when nautical entertainments were brought before the spectators. At the top of the building, and all round it outside, were placed consoles, or projecting ornaments in stone, fitted so as to receive vertical rods, upon which was spread a velarium or large curtain, covering the seats and the arena, in order to defend the spectators from the heat of the sun. Thus we see how the long corridors, the numerous flights of steps, the cells for animals, and the aqueducts, required arches and vaults of all dimensions and of all forms. These edifices are unquestionably such as do the greatest honour to the architectural and constructive genius of the Romans. Many of them still remain, and some are in such a high state of preservation as to enable us to examine their minutest details. The finest example is the famous Amphitheatre of Flavian at Rome, which was capable of containing more than 100,000 spectators; those of Pola, in Istria, of Nimes and Arles, in France, and of Thysdrus in Africa.

But although the Romans displayed their greatest science in the building of amphitheatres, they exhibited their greatest art in the construction of their public baths; for in these the building of arches and vaults was most extensively employed. In those of Diocletian and Caracalla at Rome, and that of Julian at Paris, we see arches of such large dimensions, and vaults of such great extent, that we are struck with astonishment and admiration at works so noble in structure and so bold in design.

As to the origin of the arch, we have attributed it to the Romans, or rather to their original instructors, the Etruscans. But it must be mentioned that brick arches are said to have been found buried in the tombs of Thebes, in Egypt; and that Mr. Hoskins describes one eight feet six inches in span, which was regularly formed. Among the ruins of Meroë, the capital of ancient Ethiopia, he found a semi-circular arch of stone covering a portico and at Gibel el Berkel a pointed arch, which was over the entrance to a pyramid. Under these circumstances, it appears remarkable that the use of the arch in building should not have passed from Ethiopia, or from Thebes itself, into the ordinary architecture of Egypt. As neither the latter country nor Greece adopted the arch in their constructions, the merit of introducing it into general architecture must still remain with the Romans; for although Pericles adorned the city of Athens with splendid edifices, it was left for the Romans to construct a stone arch over the small river Cephisus, upon the most frequented road to that city. It appears that the construction of the arch was also known to the Chinese long before it made its appearance in Europe. It covers the gateways in their great wall; it is seen in the construction of their sepulchral monuments; and it was employed in the construction of their bridges. Kircher, in his account of China, speaks of some three and four miles long, and of an arch of the incredible span of 600 feet.

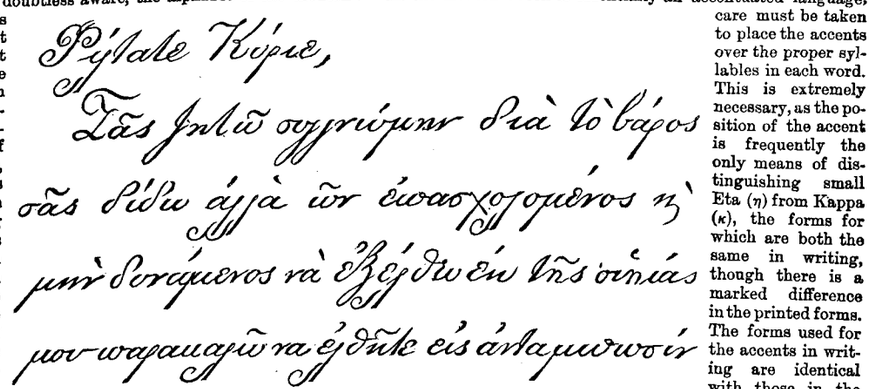
There are numerous specimens of Roman architecture in France, the ancient Gaul, which, by their stability and the excellence of their construction, have long survived the era of their architects. One of the finest of these is the bridge over the Vidourle, at Sommières, in the department of the Gard. It is composed of seventeen arches, of which nine have been encroached upon by the town, and are sunk under the principal street, so that the water now flows under eight arches only. Every pier is hollowed out into a small arch, in order to increase the water-way during floods. This bridge is supposed to have been built in the reign of Tiberius Cæsar.

The bridge of Ceret, over the Tech, in the department of the *Eastern Pyrenees*, is a remarkable specimen of the age in which it was supposed to be built, which ascends to the time of the Visigoths, and is still within the domain of ancient Roman history. The middle arch is about 154 feet, and the abutments are relieved by arches, which contribute to the elegance and beauty of the whole.

LESSONS IN PENMANSHIP.—XXXIV.

MODERN GREEK HANDWRITING.

IN bringing our Lessons in Penmanship to a conclusion in the present number, we take the opportunity to give a specimen of the handwriting in use among the modern Greeks. As many of our readers are doubtless aware, the alphabet of the modern Greek language is identical with that of the ancient tongue; but as the latter alphabet can only be written slowly, owing to the peculiar formation of many of the letters, the modern Greeks have adopted in their handwriting several of the forms of letters used in the current Italian hand, and have slightly modified the printed shapes of the others. Thus we find that the capital letters **A, B, E, I, K, M, N, O,** and **T,** as well as the small letters **a, b, o,** and **s** (final), are identical in form with those in use by us. The reader will also perceive that the sign for the capital letter Eta is the same as that for our English *H*, as in the printed characters, whilst that for the capital letter Rho is identical with that for *P*. Upsilon, both capital and small, is formed in the same manner as our *V*. Small **i** differs from our letter *i* only in having no dot. The other letters are all modifications of the ancient forms, which the student can easily acquire for himself by carefully imitating the copy we have given. It will be observed that, from the configuration of many of the letters, the joining together of every letter in a word, as is done in the Italian current hand, is quite impossible. The rules for the breaks thus occurring can only be acquired by practice, as they are quite arbitrary, each writer joining his letters as best suits the peculiar style of his own handwriting.



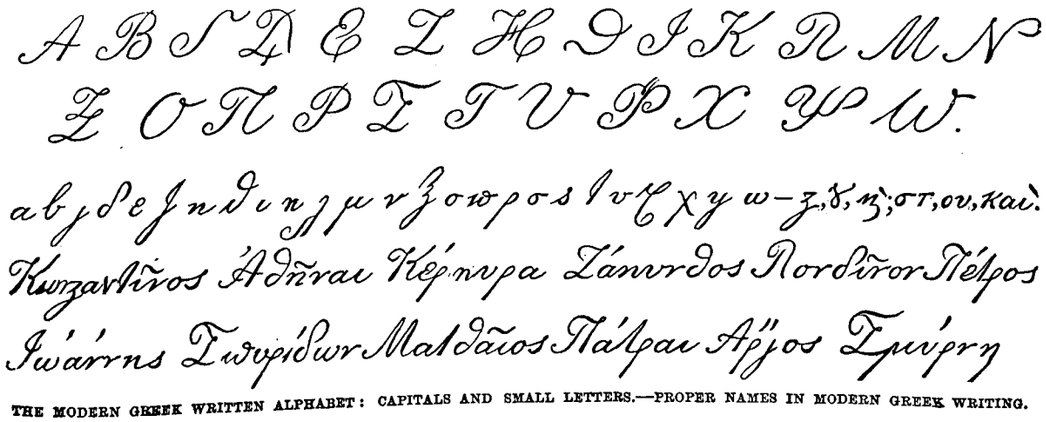
SPECIMEN OF A LETTER IN MODERN GREEK HANDWRITING.

We give the three principal abbreviations—viz., *στ, ου, και*. Many others are to be found in the correspondence of old men, but their use is gradually dying out, as hastily-written modern Greek is quite difficult enough to read without an admixture of almost arbitrary abbreviations.

The numerals in general use are the Arabic; the Greek and Roman numerals being only occasionally used for dates, or to distinguish paragraphs.

As the modern Greek is essentially an accentuated language, care must be taken to place the accents over the proper syllables in each word. This is extremely necessary, as the position of the accent is frequently the only means of distinguishing small Eta (*η*) from Kappa (*κ*), the forms for which are both the same in writing, though there is a marked difference in the printed forms. The forms used for the accents in writing are identical with those in the printed books—viz., the three accents (΄ ` ῀), the two breathings (᾽ ῾), the *iota subscription* ( ), and the diæresis (¨). To those who are acquainted with the Modern Greek pronunciation no difficulty will exist, as the sound of the voice alone is sufficient to indicate the place where the accent ought to fall. We can only refer those who have not this knowledge to the rules for the accentuation of ancient Greek, which obtain equally in the modern Greek grammar.

One word of warning to the student—write distinctly rather than rapidly. It is difficult enough to decipher the handwriting of many who write the ordinary Italian hand indifferently, but it is infinitely more troublesome to understand modern Greek when written hastily and illegibly.



THE MODERN GREEK WRITTEN ALPHABET: CAPITALS AND SMALL LETTERS.—PROPER NAMES IN MODERN GREEK WRITING.

We have thought it necessary to introduce the accompanying specimens of Modern Greek Handwriting for the benefit of such of our readers who may be in Greek mercantile houses in this country, or engaged in mercantile transactions with Greek firms abroad. We would recommend those, however, who are not likely to require a knowledge of Greek handwriting for

business purposes, but are merely studying Greek for the sake of availing themselves of the riches that lay heaped up in the storehouses of ancient Greek literature, to use the printed characters; as, although the writer's progress may be in a measure slow, when compared with the rate at which he writes his ordinary hand, the adoption of the ordinary printed forms will impart to his handwriting those most excellent and desirable qualities in handwriting of any kind—legibility, neatness, and distinctness.

The following is the letter as given in Greek handwriting in the preceding page, in printed characters, with the pronunciation under every word:—

Φίλτατε Κυριε
Phil'-ta-te Ku'-r-ie

Σας ζητῶ συγγνώμην διὰ τὸ βάρος σᾶς δίδω ἀλλὰ ὧν
Sas zee'-to sug-gno'-meen dí'-a toh bar'-ros sas dí'-do al'-la own
ἐπασχολομένο· καὶ μὴν δυνάμενος νὰ ἐξέλθω ἐκ τῆς οἰκίας
e-pas-ko-lom'-en-os kai meen du-nam'-en-os na ex-el'-tho ek tees oi-kí'-as
μου παρακαλῶ νὰ ἐλθῆτε εἰς ἀνταμπωσίν μου σήμερον τὸ
mou pa-ra-kal'-o na el-thee'-te eis an-tam-po'-sin mou see'-me-ron toh
ἑσπέρας περὶ τὰς ἑπτὰ ὥρας. Μένω Πρόθυμος.
hes'-per-as per'-ri tas hep'-ta ho'-ras. Me'-no Pro'-thu-mos.

The translation of the above letter in English is as follows:—

Dear Sir,

I beg pardon for the trouble I give you, but being unwell and unable to go out of my house, I request *(you to be good enough)* to come to visit me this evening at about seven o'clock.

I remain, yours obediently.

The following are the Greek proper names given after the alphabets of the capital and small letters in the preceding page, with their pronunciation and meaning:—

Κωνσταντῖνος (*kone-stan-stí'-nos*), Constantine; Ἀθῆναι (*a-thee'-nai*), Athens; Κερκυρα (*ker-ku'-ra*), Corcyra, *or* Corfu; Ζακυνθος (*za-kun'-thos*), Zante; Λονδῖνον (*lon-dí'-non*), London; Πετρος (*pet'-ros*), Peter; Ιωάννης (*i-o-an'-nees*), John; Σπιρίδων (*spi-rí'-done*), Spiridon; Ματθαῖος (*mat-thaí'-os*), Matthew; Πατραι (*pat'-rai*), Patras; Αργος (*ar'-gos*), Argos; Σμύρνη (*smur'-ne*), Smyrna.

LESSONS IN FRENCH.—XL.

SECTION LXXXIX.—PECULIAR IDIOMS *(continued)*.

1. Servir [2. ir.] is used in French in the sense of the English expression *to help to*:—

Que vous servirai-je?	*To what shall I help you?*
Vous servirai-je de la soupe?	*Shall I help you to some soup?*
Vous n'avez pas servi monsieur.	*You have not helped that gentleman.*

2. **Je vous remercie**, *I thank you*, said in answer to an offer, is in French always a refusal. This phrase is never employed like the English expression, *I thank you for* (*this* or *that*), to signify a request. The French make use of other forms:—**Oserai-je vous prier de .... Oserai-je vous demander .... Je vous prie de .... Je vous prierai de ....**:—

Oserai-je vous demander une aile de cette volaille, un morceau de ce rôti?	*I will thank you for a wing of that fowl, a slice of that roast meat.*

3. **S'il vous plaît**, corresponds to the English, *if you please*. The verb is used impersonally in that sentence and in the following:—

Comme il vous plaira.	*As you please.*
Il ne me plaît pas d'y aller.	*It does not suit* or *please me to go there.*

4. **Au plaisir de vous revoir, au revoir, adieu, jusqu'au revoir**, mean, *till I have the pleasure of seeing you again, till I see you again*, &c.:—

MISCELLANEOUS EXAMPLES.

Qu'aurai-je le plaisir de vous servir?	*To what shall I have the pleasure of helping you?*
Je vous demanderai un morceau de ce jambon.	*I will thank you, or I will trouble you, for a slice of that ham.*
Vous offrirai-je un morceau de ce rôti?	*Shall I offer you a slice of this roast meat?*
Je vous remercie, Monsieur; je prendrai de préférence une aile de cette volaille.	*I thank you, Sir; I would prefer a wing of that fowl.*
N'a-t-on pas encore servi?	*Is not the dinner yet on the table?*
Je vous souhaite le bonsoir.	*I wish you good evening.*
J'ai souhaité le bonjour à Madame.	*I have wished the lady a good morning.*
Prenez la peine de vous asseoir.	*Have the goodness to sit down.*
Messieurs, veuillez entrer.	*Gentlemen, have the kindness to walk in.*

EXERCISE 173.

Adieu, m. *adieu.*	Jambon, m. *ham.*	Remerci-er, 1. *to thank.*
Aile, f. *wing.*	Légume, m. *vegetable.*	Remerciment, m. *thanks.*
Attend-re, 4. *to wait for.*	Merci, *thank you.*	Rôti, m. *roast meat.*
Bouilli, m. *boiled meat, beef.*	Mett-re (se), ir. ref. 4. *to sit down.*	Soupe, f. *soup.*
Congé, m. *leave.*	Ortolan, m. *ortolan.*	Suffisamment, adv. *sufficiently.*
Côtelette, f. *cutlet, chop.*	Perdrix, f. *partridge.*	Tranche, f. *slice.*
	Pri-er, 1. *to beg, to desire.*	

1. Monsieur, qu'aurai-je le plaisir de vous servir? 2. Je vous demanderai une tranche de ce jambon. 3. Je vous prie de servir ces messieurs. 4. Oserai-je vous demander un morceau de ce bouilli? 5. Vous offrirai-je une tranche de ce rôti? 6. Je vous remercie, Monsieur; j'en ai suffisamment. 7. Mademoiselle, aurai-je l'honneur de vous servir une aile de cette perdrix? 8. Je vous remercie, Monsieur; je prendrai de préférence un de ces ortolans. 9. Monsieur, vous enverrai-je de la soupe? 10. Madame, je vous prie de servir mademoiselle. 11. Je vous en demanderai après. 12. Jean, présentez cette côtelette à monsieur. 13. Ces légumes sont délicieux. 14. Monsieur, je suis bien aise que vous les trouviez bons. 15. Monsieur, ne voulez-vous pas vous asseoir? 16. Mille remerciments, Monsieur, mon père m'attend à la maison. 17. Ne leur avez-vous pas souhaité le bonjour? 18. Je leur ai souhaité le bonsoir. 19. Leur avez-vous dit adieu? 20. J'ai dit adieu à mon frère. 21. J'ai pris congé d'eux. 22. Les avez-vous priés d'entrer? 23. Je les en ai priés. 24. Messieurs, on a servi. 25. Veuillez vous mettre ici.

EXERCISE 174.

1. Madam, to what shall I help you? 2. I will trouble you for a slice of that ham. 3. Shall I send you a wing of the fowl? 4. No, Sir, I thank you. 5. I thank you, Sir (*s'il vous plaît, Monsieur*). 6. Sir, shall I have the pleasure of helping you to a slice of this ham? 7. I thank you, Sir; I would prefer a slice of the partridge. 8. Shall I offer you a little of this boiled meat? 9. I thank you, Sir; I have some. 10. Madam, shall I send you a little of this soup? 11. Much obliged to you, Sir [*see* No. 16, *in the above exercise*]. 12. Sir, will you have the goodness to help this young lady? 13. With much pleasure, Sir. 14. John, take this soup to the gentleman. 15. These ortolans are delicious. 16. I am very glad that you like them. 17. Is the dinner on the table? 18. No, Sir; it is not yet on the table. 19. It is too early. 20. Does it please you to go there? 21. It does not please me to go to his house; but I will go, if you wish it. 22. Shall I go with you? 23. As you please. 24. Will not your friend sit down? 25. He is much obliged to you; he has not time to-day. 26. Have you wished your friend a good morning? 27. I wished him a good evening. 28. Have you not bid him farewell? 29. I have bid him farewell. 30. Have the goodness to sit down here? 31. I have taken leave of them. 32. I have taken leave of all my friends.

SECTION XC.—IDIOMS RELATING TO TENIR.

1. The verb **tenir** [2 ir.], *to hold*, often corresponds in signification to the English verb *to keep*; **tenir un hôtel**, *to keep an hotel*; **tenir table ouverte**, *to keep open table*; **tenir sa chambre propre**, &c., *to keep one's room clean*; **tenir la porte, les fenêtres ouvertes**, *to keep the door, the windows open*; **tenir les yeux ouverts, fermés**, *to keep one's eyes opened, shut*; **tenir la tête droite**, &c., *to keep one's head upright*; **tenir sa parole**, *to keep one's word*; **tenir compagnie à quelq'un**, *to stay* or *remain with some* or *any one.*

2. **Tenir un langage singulier, tenir des propos .... des discours** .... would be rendered into English by *to make use of singular language, to use peculiar expressions, to advance things*, &c.:—

Ce jeune homme tient des propos insensés.	*That young man says foolish things.*

3. **Tenir** is also used in the sense of *being attached to, to be tenacious of*:—

Je tiens à mon argent, à la vie.	*I value (i.e., hold to) my money, my life.*
Je tiens à mon opinion.	*I am tenacious of my opinion.*

4. **Tenir** is also used of a *colour* which is *fast* or *not*:—

Cette couleur tiendra ou ne tiendra pas.	*This colour is fast* (i.e., *holds*) *or not.*

5. **Faire tenir** is used in the sense of *to forward, to send*:—

Faites-lui tenir cet argent, cette lettre.	*Forward him this money, this letter.*

6. **Se tenir**, or **s'en tenir**, conjugated reflectively, may often be rendered by *to remain, to abide by, to be satisfied with*:—

Il se tient debout, assis.	*He remains standing, seated.*
Je m'en tiens à votre opinion.	*I am satisfied with your opinion.*

MISCELLANEOUS EXAMPLES.

M. L. tient un hôtel superbe.	*Mr. L. keeps a superb hotel.*
Votre petite fille ne tient pas sa chambre bien propre.	*Your little girl does not keep her room very clean.*
Pourquoi tenez-vous les portes ouvertes?	*Why do you keep the doors open?*
Il fait si chaud que nous tenons toutes les fenêtres ouvertes.	*It is so warm that we keep all the windows open.*
Tenez la tête droite et les yeux ouverts.	*Keep your head upright and your eyes open.*
Pourquoi ne tenez-vous pas votre parole?	*Why do you not keep your word?*
Tenez compagnie à votre sœur; elle est malade.	*Stay with your sister; she is ill.*
Votre ami tient des propos bien singuliers.	*Your friend makes use of very singular expressions.*
Vous tenez des discours bien légers.	*You use very light language.*
La couleur de votre drap tiendra-t-elle?	*Is the colour of your cloth fast?*
Lui avez-vous fait tenir ce livre?	*Have you sent him that book?*
À quoi vous en tiendrez-vous?	*What will be your decision?*
Je m'en tiendrai à ce que j'ai dit.	*I shall abide by what I have said.*

EXERCISE 175.

Cocher, m. *coachman.*	Indisposé, e, *indisposed.*	Recommand-er, 1. *to recommend.*
Debout, *standing.*	Insolent, e, *insolent.*	Regard-er, 1. *to look.*
Défend-re, 4. *to forbid.*	Lieu, *place.*	Rue, *street.*
De près, *closely.*	Malade, *ill.*	Sav-oir, 3. ir. *to know.*
En dehors, *out, outside.*	Parfaitement, *perfectly.*	S'enrhumer, 1. ref. *to get a cold.*
Gens, m. pl. *people.*	Préfér-er, 1. *to prefer.*	Vie, *life.*

1. Quel hôtel votre frère tient-il? 2. Il tient l'hôtel de l'Europe, rue de . . . 3. Votre petit garçon se tient-il bien propre? 4. Il se tient bien propre. 5. À quoi vous en tiendrez-vous? 6. Je m'en tiendrai à ce que je vous ai dit. 7. Ne savez-vous pas à quoi vous en tenir? 8. Je sais parfaitement à quoi m'en tenir. 9. Pourquoi vous tenez-vous debout? 10. Parce que nous n'avons pas le temps de nous asseoir. 11. N'avez-vous point défendu à ces jeunes gens de tenir de tels propos? 12. Je le leur ai défendu. 13. Votre cocher n'a-t-il pas tenu un langage bien insolent? 14. N'avez-vous pas peur de vous enrhumer, en tenant les portes ouvertes? 15. Nous préférerions les tenir fermées. 16. Votre maître vous recommande-t-il de tenir la tête droite? 17. Il me recommande de tenir les pieds en dehors. 18. Pourquoi votre ami ne vous tient-il pas compagnie? 19. Sa sœur est indisposée; il est obligé de rester avec elle. 20. Votre oncle ne vous a-t-il pas tenu lieu de père? 21. Il m'a tenu lieu de père et de mère.

EXERCISE 176.

1. Does that gentleman keep open table? 2. He keeps an hotel in Paris. 3. Why do you keep the windows open? 4. We keep them open because we are too warm. 5. Has not your friend kept his word? 6. He has kept his word; he always keeps his word. 7. Have you not told your scholar to keep his head upright? 8. I have told him to keep his head upright and his eyes open. 9. Why do you not stay with your sister? 10. Because I have promised to go to my cousin's this morning. 11. Have you forbidden your little boy to make use of these expressions? 12. I have forbidden him. 13. Does he make use of insolent language? 14. He does not. 15. What will be your decision? 16. I will abide by what I told your father. 17. Have you forwarded that money to your friend? 18. I have not yet forwarded it to him. 19. Will you forward it to him to-morrow? 20. I will forward it to him if I have an opportunity. 21. Why do you not keep standing? 22. Because I am weary. 23. Do you think that the colour of your coat is fast? 24. I think that it is fast; it (*elle*) appears very good. 25. Will you not look closely into your brother's affairs? 26. I shall not look closely into them. 27. I will be satisfied with your opinion. 28. Are you not tenacious of your opinion? 29. I am not too tenacious of it.

KEY TO EXERCISES IN LESSONS IN FRENCH.

EXERCISE 69 (Vol. I., page 275).

1. Does the hair-dresser cut his thumb? 2. No, Sir, he cuts his hair. 3. Does not the carpenter cut his hand? 4. He does not cut his hand, he cuts the wood. 5. Do you not remember that lady? 6. I remember that lady and those gentlemen. 7. With what do you occupy yourselves? 8. We occupy ourselves with our affairs. 9. Do you remember your father's guns? 10. I do not remember them at all. 11. Does not that little girl burn herself? 12. She does not burn herself, there is no fire in the stove. 13. Why does not the butcher warm himself? 14. Because he is not cold. 15. Do those children rise earlier than I? 16. They go to bed early, and rise every morning at six o'clock. 17. Will not your partner sit down? 18. He has no time to sit down. 19. Do you remember your promises? 20. I remember them perfectly. 21. Do you not warm yourself when you are cold? 22. I hardly ever warm myself. 23. Do we not go to bed when we are sleepy? 24. One goes to bed when one is sleepy, and eats when one is hungry. 25. When one is well, does one rise early? 26. When one is in good health, one should rise early.

EXERCISE 70 (Vol. I., page 275).

1. Vous levez-vous de bonne heure, quand vous vous portez bien? 2. Quand je me porte bien, je me lève tous les matins à cinq heures. 3. Vous rappelez-vous votre cousin L.? 4. Je me le rappelle parfaitement bien. 5. Vous couchez-vous de bonne heure? 6. Nous nous couchons à dix heures. 7. Le tailleur ne se brûle-t-il pas les doigts? 8. Il ne se brûle pas les doigts, son fer n'est pas chaud. 9. Le charpentier se coupe-t-il le pouce? 10. Il ne se coupe ni le pouce ni le main. 11. Pourquoi ne vous chauffez-vous pas? 12. Je ne me chauffe pas, parce que je n'ai pas froid. 13. Ne fait-il pas très froid aujourd'hui? 14. Il ne fait pas froid aujourd'hui, il pleut. 15. Votre perruquier se lève-t-il au lever du soleil? 16. Le charpentier se lève au lever du soleil, et il se couche au coucher du soleil. 17. Vous levez-vous de meilleure heure que moi? 18. Nous nous levons tous les matins au point du jour. 19. Vous coupez-vous souvent les cheveux? 20. Je me coupe les cheveux et les ongles, tous les mois. 21. Vous rappelez-vous ce monsieur? 22. Je me le rappelle très bien. 23. Je ne me le rappelle pas. 24. Vous coupez-vous les doigts, quand vous taillez une plume? 25. Je me coupe la main quand je travaille. 26. Vous souvenez-vous de ce que vous apprenez? 27. Je ne me souviens pas de tout ce que j'apprends. 28. Savez-vous si M. votre père se porte bien? 29. Il se porte fort bien aujourd'hui. 30. Mme votre mère ne se porte-t-elle pas bien? 31. Elle ne se porte pas très bien. 32. Vous souvenez-vous des malheurs de votre ami? 33. Je m'en souviens. 34. Je me rappelle cela.

EXERCISE 71 (Vol. I., page 276).

1. Do you like to live in the country? 2. I prefer the country to the city. 3. Do you often become weary of remaining in the country? 4. When I become weary of the country, I return to the city. 5. Do they hear from General L.? (*Is anything heard from General L.?*) 6. Nothing is heard of him. 7. Are you sometimes mistaken? 8. Everybody is mistaken sometimes. 9. Does the banker deceive his clients? 10. He deceives neither his clients nor his friends, he deceives nobody. 11. Are you not mistaken in this bill? 12. I am not mistaken. 13. Do you amuse yourself in reading or in writing? 14. I amuse myself in learning German and French. 15. Are you wrong to learn languages? 16. I am right to learn them. 17. Do you often become weary (*feel ennui*)? 18. I become weary when I have nothing to do. 19. How do you amuse yourself when you are in the country? 20. We walk in the morning, and work the remainder of the day.

EXERCISE 72 (Vol. I., page 276).

1. Ne vous trompez-vous pas? 2. Je ne me trompe pas. 3. Le banquier ne se trompe-t-il pas? 4. Il ne se trompe pas, mais son commis se trompe certainement. 5. Ne vous trompe-t-il pas? 6. Il ne me trompe pas, il ne trompe personne. 7. N'avez-vous pas tort de tromper votre père? 8. Je n'ai pas l'intention de le tromper. 9. Le marchand ne se trompe-t-il pas? 10. Il se trompe dans le mémoire qu'il écrit (*fait*). 11. Aimez-vous la campagne ou la ville? 12. Je préfère la ville, je m'ennuie bientôt à la campagne. 13. Cet enfant ne vous ennuie-t-il pas par ses questions? 14. Cette longue histoire ne vous ennuie-t-elle pas? 15. Elle ne m'ennuie pas, elle m'amuse. 16. Vous amusez-vous quand vous êtes à la campagne? 17. Je m'y amuse, j'apprends le français et l'italien. 18. Ne vous ennuyez-vous pas chez votre oncle? 19. Je ne m'y ennuie jamais. 20. M. votre frère se trompe-t-il souvent? 21. Tout le monde se trompe quelquefois.

LESSONS IN GEOGRAPHY.—XXVI.

CONSTRUCTION OF A MAP OF EUROPE (*continued*).

IN our last lesson we gave our readers ample instructions for making a conical projection of a map of Europe; and to enable them to finish the map by marking in the chief geographical features, and cities, and towns of this continent, we commence in the present lesson a list of the names of the principal places in Europe, the countries in which they are situated, and their respective latitudes and longitudes, so that the student may be enabled to fix for himself the proper position of each in his projection, and thus learn geography in the most effective manner possible, while he is at the same time acquiring the power of constructing maps in general.

The student must remember that the position of the point (marked M in Fig. 14, page 356, and F in Fig. 17, page 356) from which the concentric arcs are described which form the parallels of latitude in a conical projection, varies according to the *point* where the circumscribing cone is supposed to *touch* the sphere or the *points* where it is supposed to enter the sphere. For example, it is only for the map of Europe, or for any part of the zone that surrounds the sphere between the parallels of 35° and 75° N. latitude, that the point from which the parallels of latitude are described can be taken at 5° beyond the pole for projections on a small scale—or, more accurately, at 4° 30′ 30″ for projections on a large scale; because, in the construction of a projection for any part of the sphere lying in the zone included between these parallels north and south, and bounded by any two meridians east and west, the circumscribing cone on which the portion of the sphere to be drawn is projected, is supposed to enter the sphere in the parallels of 45° and 65° N. latitude, two parallels equidistant from the parallels that bound the zone on the north and south. If the student will take the trouble to draw for himself a quadrant of a circle graduated from 0° to 90° in spaces of 5°, as in Fig. 14 (page 356), and then draw a series of straight lines, like L M, entering the sphere at pairs of points, 5, 10, 15, or 20 degrees distant from each other, as he may determine, he will find that the nearer to the pole are the points in which the circumscribing cone enters the sphere, the less is the distance beyond the pole of the point from which the concentric arcs representing the parallels of latitude are to be described, and that this point becomes farther and farther removed from the pole as the points through which the circumscribing cone enters the sphere approach nearer and nearer to the equator. It is evident, then, that when we are making a conical projection of any portion of the sphere near the equator, or any portion in higher latitudes on a large scale, it would be a difficult matter to draw the arcs representing the parallels of latitude from the point representing the common centre of the circles of whose circumferences these arcs form a part, owing to the great length of the radii with which the arcs must be described. It would be perfectly practicable, it is true, if we had our paper pinned down at the end of a long table or board several feet in length, and also had a beam compass wherewith to describe the required arcs representing the parallels of latitude; but as these appliances are too costly to be bought by any but professional draughtsmen and map engravers, a method has been found by which parallels of latitude can be represented by a number of short straight lines, arranged in such a manner as to correspond very nearly with the circular arcs that would properly represent the parallels of latitude. Our readers shall be put in possession of this method of drawing parallels of latitude when we show them how to make a projection for the whole or any part of the British Isles.

We will now show our readers a way by which they may fix the position of any place on their projections, according to its latitude and longitude, with great accuracy, and without the trouble of making separate measurements for each place. That this method may be clearly understood, we must ask our readers to turn to Fig. 17 (page 356).

The reader must suppose the figure in question to represent the projection that he has made of a map of Europe, and on which he is desirous of fixing the position of places given in our list. First, a strip of cartridge-paper or thin Bristol board must be taken, such as is represented by A B C D in Fig. 18, and in this an open space, *a b c d*, must be cut out with a sharp penknife, equal in length to *nine* spaces of five degrees each of the length assumed in the projection to be equal to five degrees, and just wide enough to include the whole of a strip of the map from north to south contained between any two contiguous meridians, which, it will be remembered, have been traced on the meridian at the distance of five degrees of longitude apart.

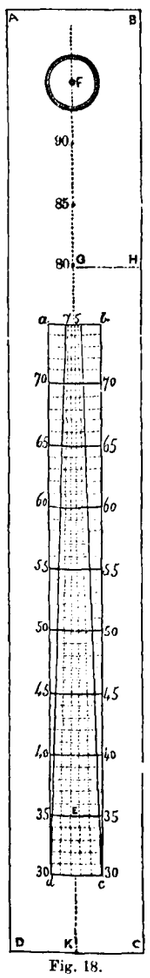


Fig. 18.

Having done this, paste at the back of the cardboard a strip of tracing-paper, taking care to strain it tightly; and then place the strip over the projection, so that the line *a b* in Fig. 18 falls exactly on the line G H in Fig. 17; the line F E in the former coinciding with the line F E in the latter. Now, thrust a drawing-pin through the coinciding points, F, F, in each figure, and moving the strip a little to the right or left, so as to get the meridians of 15° and 20°, or the meridians of 20° and 25°, in Fig. 17, showing through the clear tracing-paper in the position shown by the two thick meridian lines in Fig. 18, trace the parallels from 75° to 30°, and then subdivide the whole, as shown by the dotted parallels and meridians in the figure. The strip of cardboard will turn about the point F as a centre, and on being turned so as to bring the subdivided tracing-paper over any strip of the projection bounded by two contiguous meridians traced on the projection at a distance of five degrees apart, will exhibit the strip beneath divided into spaces each measuring a degree of latitude or longitude each way. By moving the strip of cardboard as required, the position of any place can be fixed on the projection with a pin or any sharp-pointed instrument.

We will give the reader another method of fixing the position of places according to their latitude or longitude on his projection. Let him take a strip of cardboard similar to that which is shown in Fig. 18, but suited, of course, as far as length is concerned, to the extent of his map from north to south. A portion of the strip of cardboard marked G H C K in the figure must then be cut clean away, the line G K being in the straight line drawn through E from the point F, the centre from which the concentric arcs representing the degrees of latitude have been described, and about which the strip of cardboard must work. Having secured the strip as before with a drawing-pin passing through F, and also precisely through the point on the paper underneath from which the parallels of latitude have been described, let the edge of the cardboard, represented by G H, be laid against the central meridian of the projection, and carefully graduated in divisions, each representing a degree or a part of a degree, if the projection be on a sufficiently large scale. Having got a scale of degrees numbered along K G from 30 to 75 (supposing that the map of Europe is the map on which we are at work), which will indicate the *latitude* of any place to be inserted in the map, by moving it east or west from the central meridian as required, the *longitude* may be fixed by bringing the edge G K of the cardboard to the required longitude, as shown in the graduated line at the bottom of the map, in which is marked the longitude east and west from Greenwich, and the position of the place determined by making a mark on the paper at its proper latitude, as shown on the graduated line, G K. In using this method, however, care must be taken to make allowance for the thickness of the point of the pencil or steel-point with which the position of the place is marked on the projection.

These methods may be recommended as obviating the necessity of subdividing the whole projection into spaces of a degree each way, as shown in the centre of the lower part of Fig. 17. The subdivisions of any strips of paper prepared as we have directed for fixing the position of places on a projection according to their latitude and longitude, must depend on the size of the projection, and the length of the line assumed to represent five degrees, two degrees, one degree, or even less, which is taken as the basis on which the projection is constructed. As in cases where the projection is constructed on a large scale, a subdivision into fractions of a degree or minutes is desirable for the purpose of obtaining on the projection positions of places approximating as closely as possible to their actual positions on the world's surface as determined by observations, we append a table of minutes in fractional parts of a degree, which our readers may find useful.

Min.	Frac. of Deg.	Min.	Frac. of Deg.	Min.	Frac. of Deg.	Min.	Frac. of Deg.	Min.	Frac. of Deg.	Min.	Frac. of Deg.
1	1/60	11	11/60	21	7/20	31	31/60	41	41/60	51	51/60
2	1/30	12	1/5	22	11/30	32	8/15	42	7/10	52	13/15
3	1/20	13	13/60	23	23/60	33	11/20	43	43/60	53	53/60
4	1/15	14	7/30	24	2/5	34	17/30	44	11/15	54	9/10
5	1/12	15	1/4	25	5/12	35	7/12	45	3/4	55	11/12
6	1/10	16	4/15	26	13/30	36	3/5	46	23/30	56	14/15
7	7/60	17	17/60	27	9/20	37	37/60	47	47/60	57	19/20
8	2/15	18	3/10	28	7/15	38	19/30	48	4/5	58	29/30
9	3/20	19	19/60	29	29/60	39	13/20	49	49/60	59	59/60
10	1/6	20	1/3	30	1/2	40	2/3	50	5/6	60	1

When the positions of the cities and principal physical features, such as capes and headlands, mouths of rivers and mountain peaks, have been marked, the contour of the coast and the courses of rivers and mountain chains may be filled in from a reliable map on a large scale which gives the details of the coast-line and river windings. The political boundaries may also be filled in from the same source.

Having given these instructions, we now proceed with our list of latitudes and longitudes, compiled from the best authorities, in order to enable our students to proceed at once to the filling up of their projections. As every place in Europe lies in some parallel of latitude north of the equator, the letter N. for *north* is appended only to the latitude of the first place, Aalborg; but to prevent errors, the longitude of every place is distinguished by the letter E. or W. placed after it, as the position of the place itself happens to be east or west of the meridian of Greenwich.

TABLE OF LATITUDES AND LONGITUDES OF PLACES IN EUROPE.

Name of Place.	Country, etc.	Latitude.	Longitude.
Aalborg	Denmark	57° 2′ N.	9° 55′ E.
Aarhaus	Denmark	56 9	10 13 E.
Abbeville	France	50 7	1 49 E.
Aberdeen	Scotland	57 8	2 5 W.
Abo	Finland	60 28	22 18 E.
Agen	France	44 13	0 38 E.
Aix	France	43 33	5 25 E.
Ajaccio	Corsica	41 55	8 45 E.
Akerman	Russia	46 12	30 19 E.
Aland Islands	Baltic Sea	60 15	20 0 E.
Alby	France	43 55	2 9 E.
Algeciras	Spain	36 8	5 29 W.
Alicante	Spain	38 23	0 25 W.
Alkmaar	Holland	52 38	4 46 E.
Almeria	Spain	36 51	2 32 W.
Alten	Norway	69 55	23 4 E.
Altona	Prussia	53 32	9 56 E.
Amiens	France	49 53	2 18 E.
Amsterdam	Holland	52 22	4 53 E.
Ancona	Italy	43 37	13 31 E.
Angers	France	47 28	0 33 W.
Angouleme	France	45 39	0 10 E.
Annan	Scotland	54 59	3 15 W.
Antwerp	Belgium	51 13	4 23 E.
Aranjuez	Spain	40 0	3 38 W.
Archangel	Russia	64 33	40 38 E.
Arendal	Norway	58 28	8 51 E.
Arles	France	43 42	4 37 E.
Arras	France	50 17	2 46 E.
Astrakhan	Russia	46 15	48 4 E.
Athens	Greece	37 58	23 43 E.
Auch	France	43 38	0 37 E.
Augsburg	Bavaria	48 52	10 53 E.
Auxerre	France	47 49	3 34 E.
Auxonne	France	47 12 N.	5 23 E.
Aveiro	Portugal	40 38	8 39 W.
Avignon	France	43 57	4 50 E.
Avranches	France	48 41	1 22 W.
Aylesbury	England	51 49	0 49 W.
Azov	Russia	47 2	39 28 E.
Barcelona	Spain	41 23	2 9 E.
Basle	Switzerland	47 33	7 35 E.
Bassano	Italy	45 46	11 43 E.
Bayonne	France	43 31	1 26 W.
Beachy Head	England	50 44	0 15 E.
Beauvais	France	49 26	2 5 E.
Belle-Isle (I.)	France	47 20	3 10 W.
Bender	Russia	46 47	29 32 E.
Bergamo	Italy	45 42	9 41 E.
Bergen	Norway	60 26	5 22 E.
Bergen-op-Zoom	Holland	51 29	4 17 E.
Berlin	Prussia	52 31	13 23 E.
Berne	Switzerland	46 57	7 26 E.
Berwick-on-Tweed	Scotland	55 47	2 0 W.
Besançon	France	47 17	6 5 E.
Beziers	France	43 20	3 12 E.
Blois	France	47 35	1 20 E.
Bologna	Italy	44 30	11 20 E.
Bomarsund	Russia	60 15	20 11 E.
Bommel	Holland	51 48	5 15 E.
Bonifacio (Strait)	Corsica	41 18	9 10 E.
Bordeaux	France	44 50	0 31 W.
Bornholm (I.)	Baltic Sea	55 10	15 0 E.
Boulogne	France	50 43	1 35 E.
Bourges	France	47 4	2 24 E.
Brandenburg	Prussia	52 26	12 32 E.
Braunau	Austria	48 15	13 2 E.
Breda	Holland	51 35	4 46 E.
Bremen	Prussia	53 5	8 48 E.
Brescia	Italy	45 33	10 13 E.
Breslau	Prussia	51 6	17 2 E.
Brest	France	48 23	4 27 W.
Bridgewater	England	51 8	3 7 W.
Briel	Holland	51 53	4 10 E.
Brieux, St.	France	48 33	2 45 W.
Brighton	England	50 49	0 8 W.
Bristol	England	51 28	2 35 W.
Brixen	Austria	46 44	11 37 E.
Bruck	Austria	47 25	15 16 E.
Bruges	Belgium	51 13	3 12 E.
Brunn	Austria	49 12	16 37 E.
Brunswick	Germany	52 16	10 31 E.
Brussels	Belgium	50 52	4 21 E.
Bucharest	Roumania	44 25	26 5 E.
Buckingham	England	52 0	0 59 W.
Buda	Hungary	47 30	19 2 E.
Burgos	Spain	42 21	3 42 W.
Cadiz	Spain	36 33	6 19 W.
Caen	France	49 11	0 21 W.
Caffa, or Kaffa	Russia	45 4	35 25 E.
Cagliari	Sardinia	39 13	9 6 E.
Cahors	France	44 26	1 27 E.
Calais	France	50 57	1 50 E.
Calmar, or Kalmar	Sweden	56 39	16 22 E.
Calvi	Corsica	42 34	8 44 E.
Cambrai	France	50 10	3 12 E.
Cambridge	England	52 13	0 6 E.
Camerino	Italy	43 8	13 4 E.
Candia	Crete	35 21	25 7 E.
Canterbury	England	51 16	1 5 E.
Carcassone	France	42 12	2 21 E.
Cardigan	Wales	52 5	4 39 W.
Carlisle	England	54 54	2 55 W.
Carlsborg	Sweden	58 31	14 28 E.
Carlscrona	Sweden	56 9	15 39 E.
Carlshama	Sweden	56 10	14 52 E.
Carlsruhe	Baden	49 0	8 25 E.
Carmarthen	Wales	51 52	4 19 W.
Carrickfergus	Ireland	54 43	5 48 W.
Cartagena	Spain	37 37	0 55 W.
Cassel	Prussia	51 19	9 31 E.
Castiglione	Italy	42 53	10 48 E.
Castres	France	43 36	2 14 E.
Catania	Sicily	37 28	15 2 E.
Cavan	Ireland	53 59	7 22 W.

(To be continued.)

LESSONS IN GREEK.—XIII.

THE THIRD DECLENSION (*continued*).

THERE are some nouns of the third declension which cannot be classified, and the differential points of these must therefore be given separately; they are as follow:—

EXCEPTIONAL NOUNS OF THE THIRD DECLENSION.

1. Ανηρ, ανδρος, a man; γαλα, γαλακτος, milk; γονυ, γονατος, a knee; δορυ, δορατος, a spear; ους, ωτος, an ear; χειρ, χειρος, a hand. The peculiar forms of these have been already set forth.

2. Γυνη, ἡ, a married woman, a wife; gen. γυναικ-ος, dat. γυναικ-ι, acc. γυναικ-α, voc. γυναι; pl. γυναικες, γυναικων, γυναιξι, γυναικας.

3. Ζευς, Zeus (Jupiter), gen. Διος, dat. Διϊ, acc. Δια, voc. Ζευ.

4. Θριξ, ἡ, hair, gen. τριχος, dat. τριχι, etc.; dat. pl. θριξι.

5. Κλεις, ἡ, a key, gen. κλειδος, dat. κλειδι, acc. κλειν; pl. nom. and acc. κλεῖς, also κλειδες, κλειδας.

6. Κυων, ὁ, ἡ, a dog, gen. κυν-ος, dat. κυν-ι, acc. κυν-α, voc. κυον; pl. κυνες, κυνων, κυσι, κυνας.

7. Μαρτυς, ὁ, a witness (our *martyr*), gen. μαρτυρος, dat. μαρτυρι, acc. μαρτυρα, voc. μαρτυς; dat. pl. μαρτῦσι.

8. Ναῦς (Latin, *navis*), ἡ, a ship, gen. νεως, dat. νηϊ, acc. ναῦν; dual gen. and dat. νεοιν (the nom. and acc. do not occur); pl. νῆες, νεων, ναυσι, ναῦς; compare γρως and βασιλευς.

9. Ὑδωρ, το, water, gen. ὑδατος, dat. ὑδατι, etc.

VOCABULARY.

Αθηναιος, -ου, ὁ, an Athenian.	Ιθυνω, I make straight, I direct.	Μαρτυρια, -ας, ἡ, testimony.
Αιακος, -ου, ὁ, Æacus.	Ἱστος, -ου, ὁ, a loom or mast.	Οικια, -ας, ἡ, a dwelling.
Αἰδης, -ου, ὁ, Hades, god of the lower world (Pluto).	Καστωρ, -ορος, Castor.	Οικος, -ου, ὁ, a house.
Αἰθιοψ, -οπος, an Æthiopian.	Κιστη, -ης, ἡ, a chest.	Πετρα, -ας, ἡ, a rock (hence *Peter*).
Απιστος, -ον, unfaithful, inadmissible.	Κοιλαινω, I hollow.	Πολυδευκης, -ου, ὁ, Polydeukes, Pollux.
Δεησις, -εως, ἡ, a request, entreaty.	Κομιζω, I carry, bring.	Σταγων, -ονος, ἡ, a drop.
Δεχομαι, I receive.	Κτεις, κτενος, ὁ, a comb.	Σωζω, I save, rescue.
Εκκλησια, -ας, ἡ, an assembly; (the New Testament word for *church*).	Κτενιζω, I comb.	Σωτηρ, -ηρος, ὁ, a saviour, deliverer.
	Κυβερνητης, -ου, ὁ, steersman.	Ωφελεια, -ας, ἡ, advantage, ability.
	Κυβος, -ου, ὁ (our cube), a die.	

EXERCISE 47.—GREEK-ENGLISH.

1. Αἱ γυναικες τῳ κοσμῳ χαιρουσιν. 2. Οἱ Ἑλληνες σεβυνται Δια και Ποσειδω και Απολλω και αλλους θεους. 3. Ταις γυναιξιν ἡ αἰδως πρεπει. 4. Οἱ κυνες τον οικον φυλαττουσιν. 5. Ὁ κυβερνητης την ναυν ιθυνει. 6. Αἱ σταγονες του ὑδατος πετραν κοιλαινουσιν. 7. Της γυναικος ἐστι τον οικον φυλαττειν. 8. Γυναικος εσθλης ἐστι σωζειν οικιαν. 9. Λει ευ πιπτουσι Διος κυβοι. 10. Οἱ κυνες τοις ανθρωποις ωφελειαν και ἡδονην παρεχουσιν. 11. Αἱ των μαρτυρων μαρτυριαι πολλακις απιστοι εισιν. 12. Κομιζε, ω παι, την της κιστης κλεῖν. 13. Ω Ζευ, δεχου την του ατυχοῦς δεησιν. 14. Καστωρ και Πολυδευκης των νεων σωτηρες ησαν. 15. Γυναικι πασῃ κοσμον ἡ σιγη φερει. 16. Οἱ Αἰθιοπες την τριχα μελαιναν εχουσιν. 17. Ω γυναι, σωζε την οικιαν. 18. Τῳ κτενι τας τριχας κτενιζομεν. 19. Αιακος τας Αἰδου κλεῖς φυλαττει.

EXERCISE 48.—ENGLISH-GREEK.

1. Ornament becomes a woman. 2. It is the business of women to guard the house. 3. They bring the keys of the house. 4. The keys of the house are brought to the mother. 5. The Athenians had (*to the Athenians were*) many ships. 6. Jupiter had (*to Jupiter were*) many temples. 7. The fish emerge out of the water. 8. The steersman guides the ship. 9. The ship is guided by the steersman. 10. You worship Jupiter and Apollo.

IRREGULAR ADJECTIVES.

There also some irregular adjectives, the forms of which I must set before you—such as πραος, πραεια, πραυ, soft; πολυς, πολλη, πολυ, much, pl. many; μεγας, μεγαλη, μεγα, great—as follow:—

Singular.

Nom.	ὁ πραος,	ἡ πραεια,	το πραυ.
Gen.	πραου,	πραειας,	πραου.
Dat.	πραῳ,	πραειᾳ,	πραῳ.
Acc.	πραων,	πραειαν,	πραυ.
Voc.	πραος, πραε,	πραεια,	πραυ.

Plural.

Nom.	πραοι, πραεῖς,	πραειαι,	πραεα.
Gen.	πραεων,	πραειων,	πραεων.
Dat.	πραοις, πραεσι,	πραειαις,	πραεσι.
Acc.	πραους, πραεῖς,	πραειας,	πραεα.
Voc.	πραοι and πραεῖς,	πραειαι,	πραεα.

Dual.

N.A.V.	πραω,	πραεια,	πραω.
G.D.	πραοιν,	πραειαιν,	πραοιν.

Singular.

	ὁ.	ἡ.	το.	ὁ.	ἡ.	το.
Nom.	πολυς,	πολλη,	πολυ.	μεγας,	μεγαλη,	μεγα.
Gen.	πολλου,	πολλης,	πολλου.	μεγαλου,	μεγαλης,	μεγαλου.
Dat.	πολλῳ,	πολλῃ,	πολλῳ.	μεγαλῳ,	μεγαλῃ,	μεγαλῳ.
Acc.	πολυν,	πολλην,	πολυ.	μεγαν,	μεγαλην,	μεγα.
Voc.	πολυ,	πολλη,	πολυ.	μεγα,	μεγαλη,	μεγα.

Plural.

Nom.	πολλοι,	πολλαι,	πολλα.	μεγαλοι,	μεγαλαι,	μεγαλα.
Gen.	πολλων,	πολλων,	πολλων.	μεγαλων,	μεγαλων,	μεγαλων.

The other parts are regular.

VOCABULARY.

Αιγυπτος, -ου, ἡ, Egypt.	Ιλιας, -αδος, ἡ, the Iliad.	Παθος, -οῦς, το, suffering.
Αλεξανδρος, -ου, ὁ, Alexander.	Κροισος, -ου, ὁ, Crœsus.	Προσαγορευω, I name, call.
Αλγος, -οῦς, το, pain, grief.	Μακεδων, -ονος, ὁ, a Macedonian.	Προσοδος, -ου, ἡ, approach, income.
Αφθονια, -ας, ἡ, freedom from envy (*a, not*), abundance.	Μεγα, adv., greatly, very.	Σιτος, -ου, ὁ, wheat, corn.
Εθος, -οῦς, το, custom; plural, manners, morals; hence our *ethics*.	Ολιγος, -η, -ον, small; plural, few.	Φοβος, -ου, ὁ, fear; φοβον εχειν, to have fear — that is, to cause fear.
	Οφελλω, I nourish, augment, aid.	

EXERCISE 49.—GREEK-ENGLISH.

1. Πολυν οινον πινειν κακον εστιν. 2. Οἱ βασιλεις μεγαλας προσοδους εχουσιν. 3. Εν Αιγυπτῳ πολλη σιτου αφθονια. 4. Ἡ θαλαττα μεγαλη εστιν. 5. Κροισῳ ην πολυς πλουτος. 6. Πολλακις εξ ολιγης ἡδονης μεγα γιγνεται αλγος. 7. Πραεσι λογοις ἡδεως εικομεν. 8. Τα μεγαλα δωρα της τυχης εχει φοβον. 9. Πολλων ανθρωπων εθη εστι πραεα. 10. Πονος αρετην μεγα οφελλει. 11. Οἱ παιδες τους πραους πατερας και τας πραειας μητερας στεργουσιν. 12. Ὁμιλιαν εχε τοις πραεσιν ανθρωποις. 13. Αἱ γυναικες πραειαι εισιν. 14. Αλεξανδρον, τον Μακεδονων βασιλεα, μεγαν προσαγορευσι οἱ πολλοι.

EXERCISE 50.—ENGLISH-GREEK.

1. Abstain from much wine. 2. Bad men delight in much wine. 3. Much wine injures men. 4. Kings have great incomes. 5. The income of the kingdom is great. 6. Egypt has much corn. 7. Many have much wealth, but little understanding. 8. Strive after mild manners. 9. The manners of the women are mild. 10. (There) is beauty in (*to*) mild manners. 11. Alexander, the king of the Macedonians, is often called the Great.

THE SECOND DECLENSION CONTRACTED.

A deviation from the usual form of the Second Declension may here claim the student's attention.

A few substantives in which an *o* or an *ε* stands before the case-endings undergo contraction. By contraction is meant the blending of two vowels into a diphthong, or some other equivalent. The student must learn both the uncontracted and the contracted forms, first horizontally, as πλους, πλοῦς; πλοου, πλοῦ, etc.; and then perpendicularly, as πλοος, πλοου, πλοῳ, uncontracted; and πλοῦς, πλοῦ, πλῷ, contracted. Thus are declined ὁ πλοος, a sailing *or* voyage; ὁ περιπλοος, a sailing round *or* circumnavigation; and το οστεον, a bone.

EXAMPLES OF CONTRACTED NOUNS, SECOND DECLENSION.

Singular.

	Uncontracted.	Contracted.	Uncontracted.	Contracted.	Uncontracted.	Contracted.
Nom.	πλοους,	πλοῦς.	περιπλοος,	περιπλους.	οστεον,	οστοῦν.
Gen.	πλοου,	πλοῦ.	περιπλοου,	περιπλου.	οστεου,	οστοῦ.
Dat.	πλοῳ,	πλῷ.	περιπλοῳ,	περιπλῳ.	οστεῳ,	οστῷ.
Acc.	πλοον,	πλοῦν.	περιπλοον,	περιπλουν.	οστεον,	οστοῦν.
Voc.	πλοε,	πλοῦ.	περιπλοε,	περιπλου.	οστεον,	οστοῦν.

Plural.

Nom.	πλοοι,	πλοῖ.	περιπλοοι,	περιπλοι.	οστεα,	οστᾶ.
Gen.	πλοων,	πλῶν.	περιπλοων,	περιπλων.	οστεων,	οστῶν.
Dat.	πλοοις,	πλοῖς.	περιπλοοις,	περιπλοις.	οστεοις,	οστοῖς.
Acc.	πλοους,	πλοῦς.	περιπλοους,	περιπλους.	οστεα,	οστᾶ.
Voc.	πλοοι,	πλοῖ.	περιπλοοι,	περιπλοι.	οστεα,	οστᾶ.

Dual.

N.A.V.	πλοω,	πλῶ.	περιπλοω,	περιπλω.	οστεω,	οστῶ.
G.D.	πλοοιν,	πλοῖν.	περιπλοοιν,	περιπλοιν.	οστεοιν,	οστοῖν.

After this manner decline the multiplicative adjective, ending in *-οος* (*-οῦς*), *-οη* (*-ῆ*), *-οον* (*-οῦν*), as ἁπλοῖς, ἁπλῆ, ἁπλοῦν, single *or* simple; also adjectives of two terminations in *-οος* (*-οῦς*) and *-ουν* (*-οῦν*), formed from the substantive νοος (νοῦς), the mind, as ὁ, ἡ ευνοῦς, το ευνοῦν, well-minded, that is, well-disposed; and from the substantive πλοος (πλοῦς) ὁ, ἡ ευπλοῦς, το ευπλοῦν, voyaging successfully. These differ from their substantives only in this, that in the neuter plural they suffer no contraction, ending in *-νοα* and *-λοα*. Decline in the same manner adjectives ending in *-οος*, and denoting that of which a thing is made, as χρυσεος (χρυσοῦς), χρυσεα (χρυσῆ), χρυσεον (χρυσοῦν), golden. In the neuter plural *εα* is contracted into ᾶ. When the feminine termination *εα* is preceded by a vowel or *ρ*, the *εα* is contracted, not into ῆ, but into ᾶ, as—

ερε-εος (ερεοῦς), *ερε-εα* (ερεᾶ), *ερεεον* (ερεοῦν), woollen.
αργυρ-εος (αργυροῦς), *αργυρ-εᾶ* (αργυρᾶ), *αργυρ-εον* (αργυροῦν), of silver.

EXAMPLES OF CONTRACTED ADJECTIVES, SECOND DECLENSION.

Singular.

	ὁ.	ἡ.	το.	ὁ.	ἡ.	το.
Nom.	χρυσοῦς,	χρυσῆ,	χρυσοῦν.	ἁπλοῦς,	ἁπλῆ,	ἁπλοῦν.
Gen.	χρυσοῦ,	χρυσῆς,	χρυσοῦ.	ἁπλοῦ,	ἁπλῆς,	ἁπλοῦ.
Dat.	χρυσῷ,	χρυσῇ,	χρυσῷ.	ἁπλῷ,	ἁπλῇ,	ἁπλῷ.
Acc.	χρυσοῦν.	χρυσῆν,	χρυσοῦν.	ἁπλοῦν,	ἁπλῆν,	ἁπλοῦν.
Voc.	χρυσοῦς,	χρυσῆ,	χρυσοῦν.	ἁπλοῦς,	ἁπλῆ.	ἁπλοῦν.

Plural.

Nom.	χρυσοῖ,	χρυσαῖ,	χρυσᾶ.	ἁπλοῖ,	ἁπλαῖ,	ἁπλᾶ.
Gen.	χρυσῶν,	χρυσῶν,	χρυσῶν.	ἁπλῶν,	ἁπλῶν,	ἁπλῶν.
Dat.	χρυσοῖς,	χρυσαῖς,	χρυσοῖς.	ἁπλοῖς,	ἁπλαῖς,	ἁπλοῖς.
Acc.	χρυσοῦς,	χρυσᾶς,	χρυσᾶ.	ἁπλοῦς,	ἁπλᾶς,	ἁπλᾶ.
Voc.	χρυσοῖ,	χρυσαῖ,	χρυσᾶ.	ἁπλοῖ,	ἁπλαῖ,	ἁπλᾶ.

Dual.

N.A.V.	χρυσῶ,	χρυσᾶ,	χρυσῶ.	ἁπλῶ,	ἁπλᾶ,	ἁπλῶ.
G.D.	χρυσοῖν,	χρυσαῖν,	χρυσοῖν.	ἁπλοῖν,	ἁπλαῖν,	ἁπλοῖν.

VOCABULARY.

Αδηλος, -ον, unknown.	Θεραπαινα, -ης, ἡ, a female servant.	Οχλος, -ου, ὁ, a multitude, crowd.
Αληθεια, -ας, ἡ, truth.	Και—και, both.	Προσφερω, I carry, I bring to.
Ἀνοῦς, -οῦν (*a, not*, and *νοος*), unintelligent, senseless.	Κανεον, -ου, το, a small basket.	Συν, with.
Αρτος, -ου, ὁ, bread.	Κατοπτρον, -ου, το, a mirror.	Τεγεα, -ας, ἡ, Tegea, a city in Arcadia.
Δηλος, -η, -ον, known, evident, clear.	Κυπελλον, -ου, το, a goblet.	Τεκνον, -ου, το, a child.
Εκκαλυπτω, I uncover.	Λεγω, I say, I name.	Ὕπνος, -ου, ὁ, sleep.
Επικουφιζω, I lighten.	Νοῦς, -οῦ, ὁ, the understanding, the mind, the soul.	Χαλινος, -ου, ὁ, a bridle, rein.
Εριζω, I contend, I am in strife with some one.	Ολιγος, -η, -ον, few.	Χαλκεος, -εα, -εον, brazen, made of brass.
Ευνοῦς, -ουν, well-disposed, benevolent.	Οργη, -ης, ἡ, anger.	Ψυχη (Eng., *Psyche*), -ης, ἡ, the soul.
	Ορεστης, -ου, ὁ, Orestes.	

EXERCISE 51.—GREEK-ENGLISH.

1. Λογος κατοπτρον εστι του νοῦ. 2. Τον νοῦν εχουσιν οἱ ανθρωποι διδασκαλον. 3. Τον ευνοῦν φιλον θεραπευε. 4. Οἱ αγαθοι φιλοι πιστον νοῦν εχουσιν. 5. Ὁ πλοῦς εστιν αδηλος τοις ναυταις. 6. Συν νῳ τον βιον αγε. 7. Ὁ οχλος ουκ εχει νοῦν. 8. Μη εριζε τοις ανθρωποις. 9. Οἱ αγαθοι τοις αγαθοις ευνοῖ εισιν. 10. Ορεγου φιλων ευνῶν. 11. Τα Ορεστου οστᾶ εν Τεγεᾳ ην. 12. Αἱ θεραπαιναι εν κανοῖς τον αρτον προσφερουσιν. 13. Οἱ θεοι και καλον και κακον πλοῦν τοις ναυταις παρεχουσιν. 14. Ψυχης χαλινος ανθρωποις ὁ νοῦς εστιν. 15. Πολλακις οργη ανθρωπων νουν εκκαλυπτει. 16. Ἁπλοῦς εστιν ὁ της αληθειας λογος. 17. Λογος ευνοῦς επικουφιζει λυπην. 18. Το κυπελλον εστιν αργυροῦν. 19. Ὁ θανατος λεγεται χαλκοῦς ὑπνος.

EXERCISE 52.—ENGLISH-GREEK.

1. The understanding is a teacher to men. 2. The well-disposed friend is honoured (θεραπευω). 3. Well-disposed friends are honoured. 4. To the well-disposed are many friends (that is, the well-disposed have many friends). 5. Abstain from the senseless. 6. Strive after benevolent friends. 7. Bring the bread in a basket. 8. Avoid senseless youths. 9. Senseless youths are avoided. 10. The goblet is golden. 11. Silver goblets are beautiful. 12. Pass life (βιον αγειν) with understanding. 13. Contend ye not with the senseless.

Remark that, as a general rule, the subject (or what is commonly called the nominative) has the article, the predicate being without it. Thus, if, as in the last Greek sentence, you meet with a sentence having two nouns connected by the verb *ειναι*, take first—that is, take as the subject—that which has the article before it, as—

Subject.		*Predicate.*	
ὁ θανατος	λεγεται	χαλκοῦς	ὑπνος.
Death	is called	a brazen	sleep.

KEY TO EXERCISES IN LESSONS IN GREEK.—XII.

EXERCISE 41.—GREEK-ENGLISH.

1. The earth blooms with lovely flowers. 2. Keep not free from heat and cold. 3. We judge the honourable, not by length of time, but by virtue. 4. Every height in the mortal race is not secure. 5. Do not speak false. 6. Keep from evil gains. 7. Wicked gains ever bring disgrace. 8. Brass is the mirror of beauty, and wine of the mind. 9. Men aim at glory. 10. Men rejoice in glory. 11. The brave aim at glorious deeds. 12. We admire the glorious deeds of men.

EXERCISE 42.—ENGLISH-GREEK.

1. Απεχου πονηρων κερδων. 2. Οἱ σπουδαιοι απεχονται των πονηρων κερδων. 3. Οἱ σπουδαιοι ορεγονται των καλων. 4. Μη απεχου, ω νεανια, θαλπους και ψυχους αλλα των πονηρων. 5. Ζημια ἑπεται τῳ ψευδει. 6. Θαυμαζομεν τους Ἕλληνας τοις κλεεσι. 7. Φευγομεν πονηρα κερδη. 8. Οἱ στρατιωται χαιρουσιν εν τοις κλεεσι.

EXERCISE 43.—GREEK-ENGLISH.

1. The fishes rise up out of the river. 2. The hunters catch wild boars. 3. All were like corpses. 4. God rules our souls. 5. The vine brings forth grapes. 6. The earth brings forth ears of corn and grapes. 7. The mice fought once with the frogs. 8. The mice are caught in traps. 9. The Syrians worship fishes as gods. 10. We catch fishes with a hook.

EXERCISE 44.—ENGLISH-GREEK.

1. Αγκιστροις αγρευομεν τους ιχθυς. 2. Οἱ ιχθυες αγρευονται αγκιστροις. 3. Ὁ θηρευτης ενεδρευει τους αγριους συας. 4. Οἱ βατρυες και οἱ σταχυες εισι καλοι. 5. Αμπελος φερει βοτρυας. 6. Τοις βατραχοις πυτε την μαχη προς τους μυας. 7. Προσβλεπομεν τους νεκυας. 8. Ἡ γη φερει πολλας αμπελους. 9. Ὁ θεος βασιλευει των ιχθυων και βατραχων.

EXERCISE 45.—GREEK-ENGLISH.

1. Wantonness produces outrage. 2. Many are our comrades in eating and drinking, but few in a good work. 3. Wealth sets men free from scarcity and want. 4. Follow your nature. 5. The passions of the body produce wars, and insurrections, and battles. 6. The magistrates are the guardians of the laws in a city. 7. O citizens, keep away from sedition. 8. O men, desire good deeds. 9. The natures of men differ. 10. Many evils spring from arrogance. 11. The gifts of a bad man bring no gain. 12. Character and wealth without wisdom are not safe possessions. 13. The fruits of the fig-tree are sweet. 14. The possessions of virtue alone are secure. 15. Many cities have walls. 16. The towers of the city are strong. 17. The towers are an ornament to the city.

EXERCISE 46.—ENGLISH-GREEK.

1. Ὁ πλουτος λυει απανευθε. 2. Ἡμιν εισ: φιλοι εν ποσει και βρωσει, αλλ' ουκ εν τοις κακοις. 3. Εν τῃ πολει ὁ βασιλευς εστι φυλαξ των νομων. 4. Πιθου, ω νεανια, τοις εν τελει. 5. Ω παι, ορεγου των καλων. 6. Κτησις της αρετης εστι μονη βεβαια. 7. Τῳ αστει εισι πολλοι πυργοι. 8. Αγαθοι νομους φερουσιν τιμην τῳ αστει. 9. Ἑπου τῃ φυσει. 10. Οἱ στρατιωται μαχονται επι τῃ σωτηριᾳ της πολεως. 11. Ω πολιτᾳ, φευγε στασιν.

LESSONS IN DRAWING.—XXII.

THE HUMAN FIGURE (*continued*).

We now propose to give our pupils some *practical* instruction in the *method* of drawing the figure, and hope that from the directions given in former lessons on this portion of our subject they will be prepared to accompany us with full confidence as we proceed. They will perceive that all we have said throughout this course respecting the treatment of *curved lines*, distances, and especially *the angles formed by the meeting of lines, whether curved or straight*, have a particular importance here. The rules of proportion, and the anatomical knowledge previously acquired, must now be called into service; and we trust that the principles we have given upon the theory of the figure will have been carefully studied, so that the confidence hoped for may be well supported by the knowledge obtained; afterwards we feel assured the road will be easy, and the practice pleasant. We have found from experience that the readiest way for beginners to understand quickly how the arrangement of curved lines in conjunction may be best effected, is to treat them, whilst arranging the drawing, first *as straight lines*, or *as a succession of straight lines in the course of the curve*, with reference to their lengths, and to the extent and flexure of the curve. Observe how the *curved lines* in Fig. 134 are first represented by *straight lines* in Fig. 133.

Fig. 133.

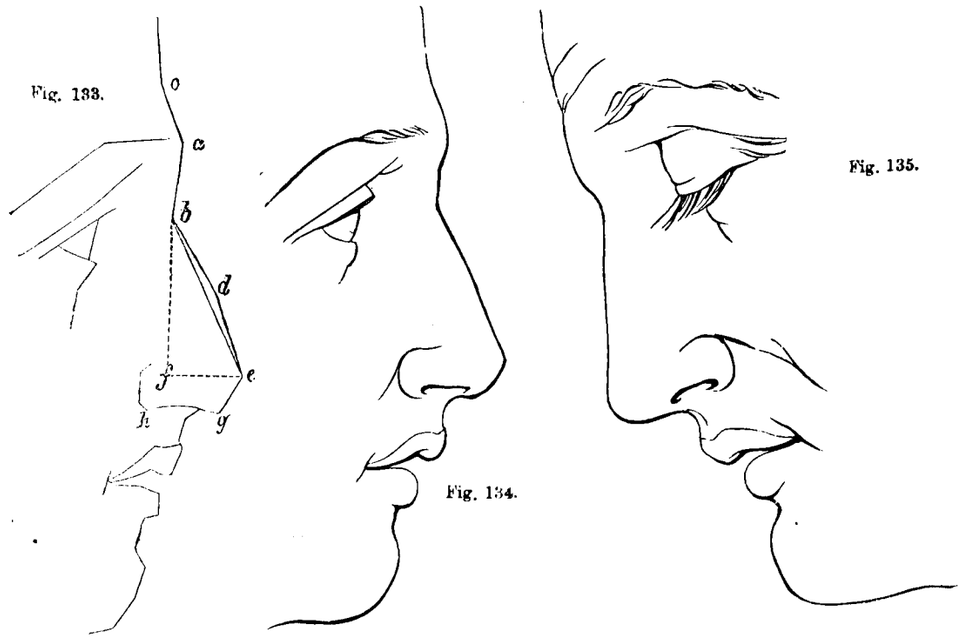
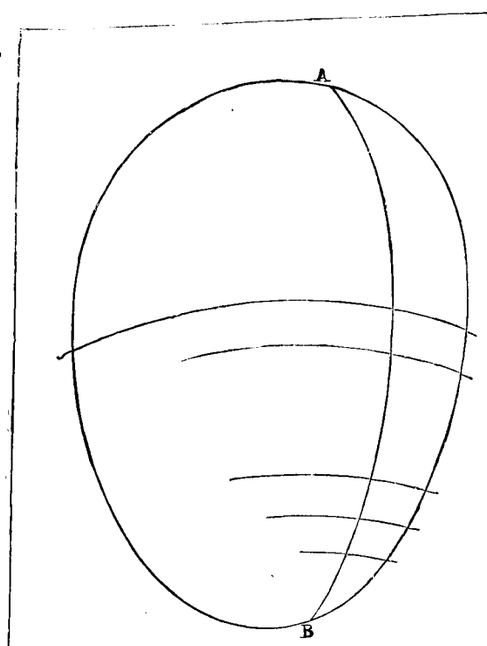


Fig. 134.

Fig. 135.

Now, although the object of the pupil is to make a finished drawing as in Fig. 134, yet he must first put it together as shown in Fig. 133. By this method he will not only obtain a close resemblance to the general contour of the line, but also he will more clearly understand the character and intention of the curves in connection with each other, as well as their positions, letting alone the labour saved, and the facility it ensures. Here is the first, and probably the most important step in the executive part of the drawing, wherein most of the difficulties are found that so frequently discourage beginners, and cause them to break down at the outset. Now, to prevent the occurrence of anything so disheartening, let us dwell upon this for a few moments, and endeavour, with minute explanation on our part, and the close attention of our pupils, to go through the construction of the subject (Fig. 133). It is advisable generally to commence from the bridge of the nose, for when the position of this part of the face is settled, we can then better determine the line of the nose in one direction, and the forehead in the other, with reference to the angles formed by all these lines respectively. Although we are at present attempting only a profile, yet with some additional remarks (to be made presently), this method of commencing the outline may be applied to any other view of the face, *full* or *three-quarters*. We will, then, begin from *a*, and mark in the distance to *b*, observing the inclination; join these two points by a straight line; from *b* drop a perpendicular line to *f*, arrange the distance *f e*, and join *b e* by a straight line; from *a* mark the distance and inclination *a c*. It will be noticed that the nose rises in the middle at *d*; observe the distance of *d* from *b*, and also from *e*, and how far it departs from the straight line *b e*; join *b d* and *d e* by other straight lines; treat the points *g*, *h*, and all other extremities of lines, in the same way. When the whole is satisfactorily arranged, *faint it*, and carefully, with the points and lines as guides, draw the *contours* of each curve through the points, as in Fig. 134. We recommend our pupils to copy this example three or four times, and then apply these principles of working to Fig. 135.

It will be quite unnecessary to repeat the details of this process for each figure, as we trust there can be no difficulty if the pupil will be particular in *placing a point to determine every angle* as he proceeds—or, in another sense, *whenever the outline alters its course*—and on no account attempt *the drawing* until this scaffolding of straight lines is completed. The advantage of this method of arranging the drawing will be evident after very little practice. In studying the contours of the curves, almost the same remarks we made upon a former occasion (Lesson XII.), respecting the management of half-tints, and the amount of ability and observation necessary in order to do them justice, are applicable here. Our present subject relates *to form*, the lesson we refer to relates to colour, and light, and shade; yet the same degree of perception and due appreciation of the delicacy of tone and tint is required with respect to the delicacy of form. The slightest movement of a muscle changes the outline, and although it may be even so trivial that the uneducated eye may not perceive it, yet it is the aim and desire of the true artist to mark the fact, and introduce those changes in the outline which are known to be subject to laws depending upon the movements of the body, and the disposition and manner in which the muscles approach or overlap each other. He who can realise the changes in the contour of the body and its parts, and



136.

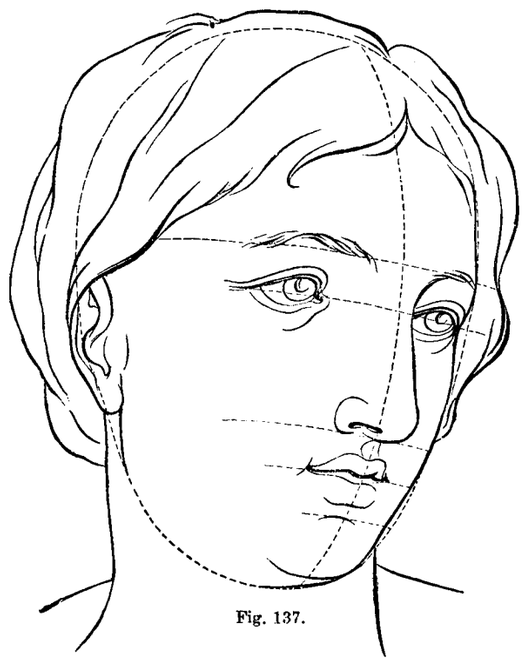


Fig. 137.

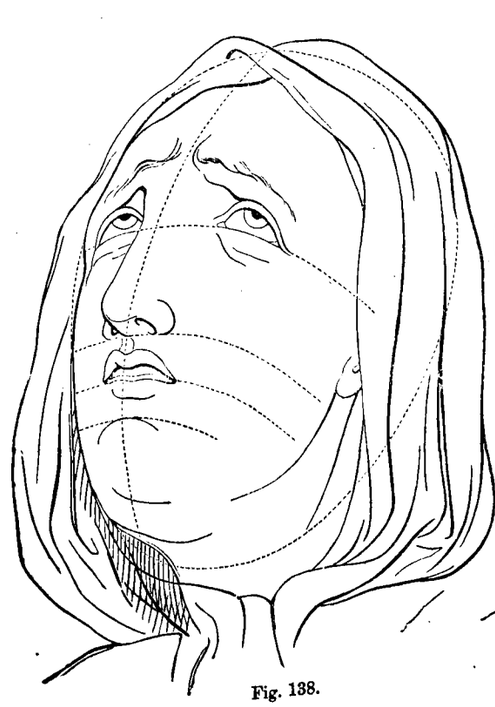


Fig. 138.

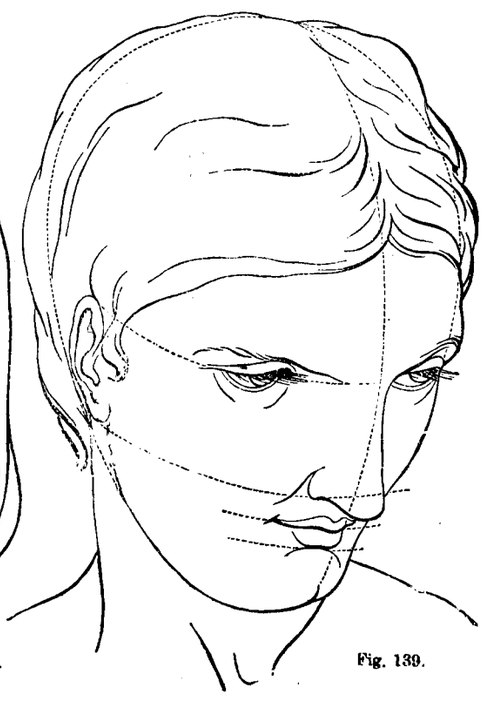


Fig. 139.

properly represent them according to the circumstances under which they are placed, may certainly claim the title of a draughtsman in its fullest meaning.

In arranging the positions of the head and features, we must bear in mind that the general form of the head is oval. This figure may be applied with great advantage in two ways, both of which we will consider. As the oval which represents the form of the head is a solid, and the several lines which we are about to draw, to determine the proportions and positions of the features, are supposed to be drawn on the surface, therefore the perpendicular line drawn throughout the length in Fig. 129, Lesson XXI., will decide the position of the face to be parallel, that is, a *full face*. In a retiring view this same line will be a curve, as A B in Fig. 136, upon which the features must be arranged as in Fig. 137. When the head is looking up or down, then all the lines which are straight in Fig. 129 become curved in proportion to the extent of the inclination of the head. Figs. 138, 139 will illustrate these positions, and show that the use made of the curved lines is the same as that employed in the full face. Regarding the treatment of the details, more especially the peculiarities belonging to each feature, the pupil must be left in a great measure to his own observation and practice from nature and from casts. In the details no two faces are alike; consequently, there can be no special rules in reference to them. We must treat the subject as a whole, and use those rules only which are applicable to all, with regard to proportion and position. We may say, for instance, that the length of the mouth is equal to the width between the eyes; that the centre of the mouth is one-third from the bottom of the nose to the lower part of the chin. These and other regulations may be useful where a classical head only is attempted, and it is right to know them; but Nature does not always carry out these exact dimensions, otherwise we should lose that individual character so admirable, and in most cases indispensable to real beauty. The knowledge of these proportions will help us to avoid extreme deformity, and many absurdities; it will likewise quicken our perception when studying the characteristic differences existing amongst heads; consequently, this knowledge, coupled with close observation regarding the angles of the face, and of the features one with another, and more minutely those angles which constitute the form of each feature singly, will together enable the pupil very quickly to acquire a power of giving character and individuality to his subject, either in portraiture or when engaged on an ideal head representing some passion or emotion of the mind. What rule could be furnished for drawing a Roman or a snub nose, beyond that of marking the angle which gives character to the shape of the nose? Nothing would prevent originality of drawing and a true feeling for Nature more effectually, than confining the practice in all cases to set rules for details. Because Nature is varied in her details, therefore it is in generalities only that rules are useful, and where it would be unwise to reject them.

LESSONS IN MUSIC.—XIII.

ILLUSTRATIONS OF MENTAL EFFECT OF FAH AND LAH.

In pursuance of our design to illustrate the proper mental effect of each note of the scale, we intend in this lesson to illustrate the fourth and the sixth—FAH and LAH. But let us afresh guard our pupils against misunderstanding. The mental effects of which we speak do not reside in the musical sound itself, but in the *association* with which *the mind* invests each note as it rises, clothing and colouring it with the relationship it holds *to other* sounds just heard, and which still linger on the ear. In other words, the *key* must be "established" by singing its common chord, or, yet more clearly, by adding also its TE and FAH, before the distinctive character and mental effect of any particular note is felt. The more completely "the ear is filled" with the other notes of the key, especially with those of opposite effect, the more clearly will the note to be illustrated be "brought out." Let the pupils also remember that these mental effects are modified in a marked manner by rate of movement, as well as by the accompanying harmony and other circumstances. We shall first give the result of our own observations, and then follow them by illustrations which will enable the pupil to test the truth of our assertions.

The *general* character of *suspense* and *expectancy* belongs both to FAH and LAH, but more strongly to the former. When FAH is held at any length the mind is conscious of an urgent and increasing desire for its solution in ME. But to LAH is allowed a greater independence, and it does not so soon demand its rest in SOH. Dr. Bryce compares ME and SOH to objects lying at rest on the ground, while LAH is "thrown loose and detached, with little indication of return," and FAH is "in the act of alighting." We have often likened LAH to the "sky-rocket" which mounts with an upward aim, but having reached its height shines beautifully for a moment, and then softly and elegantly descends. Such comparisons must, of necessity, be "far-fetched." But you cannot form a comparison, or judge of one, without minutely *observing* the things compared. If, by our far-fetched comparisons we secure your doing this, we are quite satisfied. Let the pupil *observe* for himself, and he will presently form a more perfect *mental conception* of the thing itself than any description or any language can convey.

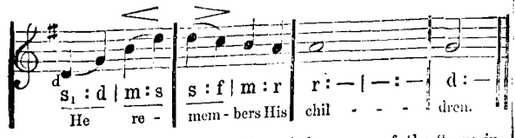
If the mental impressions produced by FAH and LAH be further sought, it will soon be noticed that they have an effect, when sung slowly, which would lead us to denominate

FAH as the *desolate* or *awe-inspiring* NOTE;
LAH as the *weeping* or *sorrowful* NOTE.

The names thus given help greatly to fix the attention, and many adults as well as children have been very thankful for the aid they give to the mind's command over the voice. We have seen many a class who could not at first strike LAH correctly, but were *unable to mistake* when told that they must make it a "weeping note." But it should be borne in mind that neither these nor any other single or ordinary *terms* of language can fittingly describe the mental effect which shall belong to a certain note of the scale under all its modifications of pitch, force, length, etc. We can only describe it proximately. But the effort to do so, or only to *perceive* the proximate truth of the description, kindles thought and feeling. If you were teaching others to understand these points, your best plan would be first to *produce the effect*, and then to get your pupils to describe your own impressions of it, with as much variety of language as possible. For instance, you might sing a short phrase to words or figures, and ask your pupils to describe the effect of the note which fell to such a word or figure. Another good exercise would be for you, after the mental effect of a note has been described or perceived, to sing a short phrase or tune to figures, and to ask your pupils *which* figure such a note was sung to. Thus the true *conception* and *recognition* of the mental effect of the notes will be reached. The mind is quicker than our words, and will form the *idea* long before we can express it. Thus it often is with some word in a new language which has no perfect synonym in our own: much study of dictionary, context, and concordance, with many endeavours to express it, at last bring us to *the thought*, and we enter on the luxury of *mental* translation, which is pleasanter to us than the verbal, but could not have been reached without its aid. Thus may our pupils be able to study and mentally enjoy the beautiful tunes we lay before them.

Mendelssohn, when he wished to express the tender parental care of God, the "overshadowing of his wings," the "yearning" of his love, to the words, "The Lord is mindful of *his own*"—travels into a new key on purpose to obtain the effect of FAH. Our pupils, who may be puzzled by the "transition" into a new key, must have patience with us. At the proper place we shall be pleased to explain to them this exceedingly interesting subject at length. It is enough at present for them to understand that in the first instance below, the note SOH is treated, by ear and voice, as though it had suddenly become DOH, and the best way of pronouncing it is—by throwing the two syllables together thus, S'DOH; and that in the next instance below, the new DOH becomes SOH again, as it was before and it is to be pronounced, in sol-faing, D'SOH. Notwithstanding this little difficulty, we could not exclude you from so beautiful an example of the mental effect of FAH.

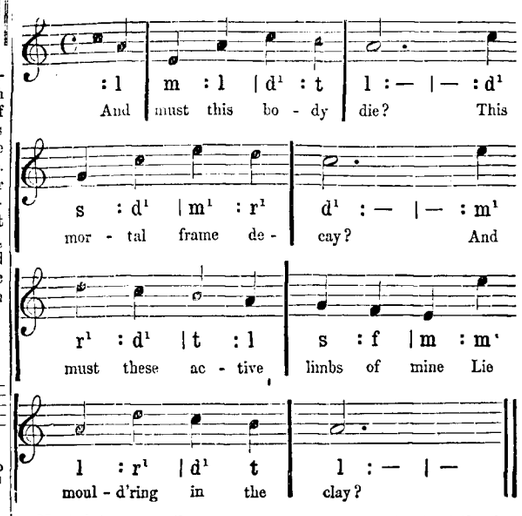




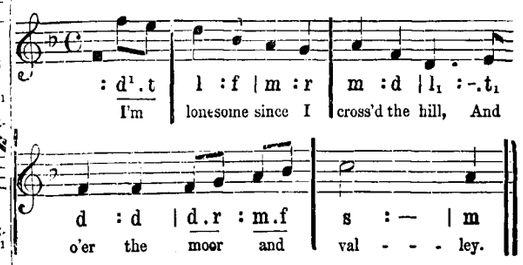
But the grandest manifestation of the power of the "awe-inspiring" note is to be found at the close of Handel's Hallelujah Chorus—where he employs it on nearly all the accented notes of the male voice parts (tenor and bass), while the treble voices hold clear and aloft the key-note. Never did music breathe forth the spirit of solemn awe so mightily as in this passage. That the pupil may be able to study it both now and at other stages of his course, we here print it, accompanied by our interpreting notation. It is put into the key of C. The highest "part" is the soprano, the next the alto, the next the tenor, and the lowest the bass. Our old notation friends may need to be informed that the mode of printing "part" music adopted in this example is called "short score," of which more anon.



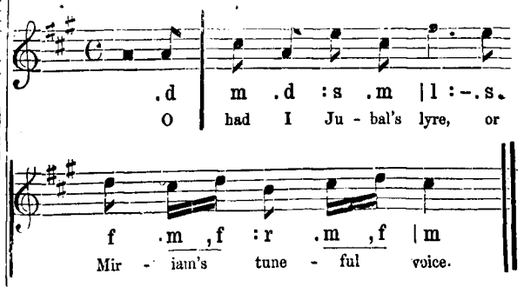
In turning to the study of LAH, the sixth of the scale, we would request our pupils to commence by singing the following tune—the chief characteristic of which is, that it begins with LAH, ends with LAH, and introduces LAH frequently with effect—and describe to themselves the impression it makes upon the mind.



Next, let our pupils mark the effect of LAH in the following phrases from a well-known love ditty—"I'm lonesome since I crossed the hill."



To illustrate the peculiar abandonment of gaiety which LAH is capable of expressing when sung quickly, sing in lively manner the following phrase of Handel:—



Yet further to illustrate the modification of effect by change in the rate of the movement, sing this last phrase, *very slowly indeed*, to the words, "And must this body die, This mortal frame decay?"

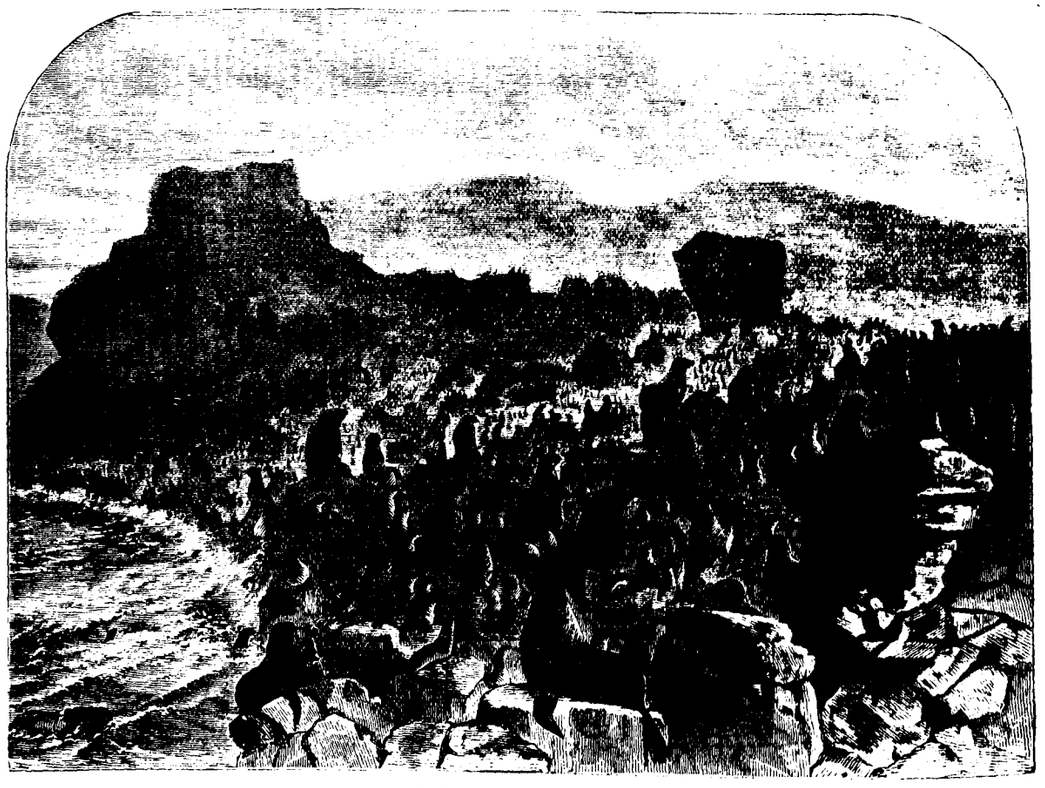
When the pupil has, by help of these examples and others which he may find, learnt to recognise the proper mental effect of FAH and LAH, he will proceed to the exercises which follow in our next lesson, learning to point them on the modulator from memory, and to sing them both to the syllables and to the words.

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RECREATIVE NATURAL HISTORY.

THE SEAL AND THE WALRUS.

r would be a curious thing, if we could only know it, to learn ow man is regarded by the rest of the animal creation. His ants appear to be opposed to the well-being of all other back-oned animals, so that upon the whole we should probably nd ourselves to be characterised in one word as tyrants. For re never scruple to hurl our artificial thunder at any beast we ish to rob of its coat, and in this way the seal has been a eavy sufferer. Seal-skin jackets for women, and caps and aistcoats for men, have been in high favour for a long time, onsequently there has been every year an immense offering of nese inoffensive animals on the altar of Fashion. Indeed, to



A COLONY OF FUR SEALS.

such a degree has the slaughter been carried on, that it has been gravely asserted the seal would soon cease to exist on the face of the earth, and be numbered only among those extinct animals whose bones are now carefully preserved in our museums. Sterner demands than European or Chinese love of a particular kind of dress have led the Eskimo to make a perpetual war against it, if we might give the name of war to a one-sided conflict in which the poor seal is comparatively helpless. It is, however, as necessary to the Eskimo as the sheep and cow to us of more temperate regions. To him its flesh is a palatable food; its fat he consumes for light during those long and terribly dreary nights of Arctic lands, and for fire during times of cold so intense that it not only makes all water solid, but congeals the mercury which to us is always a liquid within our thermometers; the fish he eats he makes tasty with seal-oil; he sews with thread made out of seal's sinews; makes his shirts and tent-curtains with the skin of its entrails; boils up its blood with other ingredients for soup; and covers his boats and tents with seal-skins.

The body of the seal is elongated and conical, and more fish-like than that of any other animal, if we except those marine mammals which we have already spoken of (Vol. II., p. 223). Instead of fins, however, it has four limbs, which one may regard as oars or paddles for regulating its movements in the water. The couple of fore limbs are so short that little more than the paw advances from the body, and the hind limbs are directed backwards, so as to look like a continuation of the body. Between the short hind limbs there is a small tail. We have already referred to two kinds of carnivores, viz., the digitigrade, or those which walk on their toes, like the cat; and the plantigrade, which walk on the soles of their feet, like the bear. The seal presents us with a kind of foot different from either, and which, while admirably adapted for progression in the water, serves but poorly for purposes of locomotion on land. The bones of the fingers and toes are separate, but enclosed in a skin which extends to their tips. The claws only are outside and free. Both hands and feet answer admirably for fins, to which they have a certain amount of resemblance, hence seals are spoken of as *pinniped*, or fin-footed carnivores. It is a curious thing to see how the foot of the seal differs from that of other animals, and the relation it bears to them. At the one extreme we have the compressed foot of the deer and ox, which are especially adapted for land transit; and at the other extreme the expanded foot of the seal, specially adapted for locomotion in water. Intermediate, the feet of the otter and frog show a form equally serviceable in and out of water. Having the form of foot which is of most use in water, we find the seal accordingly to be the most expert of swimmers. Its mode of progression is essentially fish-like. The flippers or arms would appear to be only used in balancing its movements and changing position, while the hind feet are employed for propelling it through the water. When the stroke is being given the fin-like feet are expanded to the utmost, so as to present the largest amount of surface to the water. It has

likewise the power of bending its body with considerable force by means of the muscles with which the spine is provided, a movement which is also of great importance in the act of swimming. Like the whale, the seal can remain under water for a length of time without suffering any inconvenience, and its nostrils and ears are provided with valves which can be closed at will previous to its sub-aqueous journeys. The long stiff hairs with which the upper lip is furnished are regarded as delicate organs of touch. It has large lustrous eyes, and an expression of face which would lead one to suppose, what appears to be the case, that the seal is a gentle, affectionate, and intelligent creature. Of its intelligence there are many recorded proofs, showing that where it has been reared in a tame state it has been taught tricks which appear marvellous when performed by a dumb animal not understanding articulate speech. It has a large brain.



WALRUSES.

It is not given to every one to see the seal in its native element, free to move in graceful fashion wherever it will. We have therefore to rest content with watching the single specimen usually exhibited in each of our marine aquaria, where its hollow bark resounds from the roof. How it darts through the water, dives down or springs up with equal ease! If it be feeding-time it is interesting to watch the keeper pitch it fish one by one, which it gobbles up in less time than it takes one to tell, even springing half-way out of the water to catch them, managing the feat with as much grace and precision as that shown by a cricketer rising to catch a ball. The quantity of fish it will take in this way is something surprising, and gives one an idea of the clever fisher it must be when roaming in the sea supplying its own wants. A hundred sillock, or young of the coal-fish, would hardly be a full meal for one of these hearty beasts. Perhaps we ought to call them gluttons, because of the quantity they eat and the manner they take it; for they often swallow their prey whole, without ever taking the trouble to chew it, and if this cannot be managed they are content with tearing it with teeth and nails into portions of such a size that there will be no need for mastication. It is even accused of the ostrich-like habit of swallowing inorganic morsels that no living being could digest, viz., the pebbles from the sea-shore; and the reason that has been assigned for this is the rather curious one that the seals require a load of stones as ballast. If they really partake of these pebbles it would appear not improbable that it is done in the course of hasty meals taken close to the beach, and it may further happen that the pebbles thus accidentally taken into the stomach serve by attrition as a masticatory mill for grinding up the food which has been swallowed whole, rather than as ballast for sailing purposes. Teeth it has—both chisel-like incisors, canine, and molars or grinders, but their form varies considerably in different kinds of seal, and they appear to be adapted more for holding their slippery prey than for cutting or crushing them up.

There are many different genera of seals, each including one or more species, but we shall here describe only a few of the more prominent species, using the common name by which each is generally known. The Common Seal, which inhabits the northern seas and the coasts of England and France, is found most frequently, according to Pennant, near the Welsh coast between Llyn, in Caernarvonshire, and the northern parts of Anglesea. Pennant further remarks that "the Latin name of this amphibious animal is *Phoca*, the vulgar name is Sea-calf; and on that account the male is called the bull and the female the cow. But the Celtic appellative is *Moelrhon*, from the word *moel*, 'bald,' or 'without ears;' and *rhon*, 'a spear' or 'lance.'" They lodge in hollow rocks or caverns on the shore, but out of reach of the tide, and at other times are busy in their native element, swimming and diving, ever with an eye to the game they love.

When alive and dry its hair is of a pale whitish grey, with the slightest tinge of yellow, and marbled on the back with blackish grey; nearly white on the under-surface, and pale grey on the sides of the body, and around the eyes and muzzle.

The Greenland Seal, which is rarely seen in Britain, and commonly in Arctic regions, has a hide which is freer from wool than many other species. Each individual hair is flat and lustrous. During the time the young are approaching towards

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the adult state there is a succession of colour and pattern changes of its coat. When born it has a white woolly covering, which in the first year changes to a cream colour; in the second year it has become grey; in the third painted with stripes; in the fourth, spotted; and in the fifth year it has the peculiar half-moon markings which show that it has reached maturity. These markings are so distinct in separate years that it will be quite understood that one may readily tell the age of a Greenland seal by means of them. It is this species which is of such great importance to the Eskimo, so that he hunts it on all available occasions, launching out to sea in his frail skin-covered boat for that purpose, and harpooning the seals as they come to the surface to breathe; or enveloping himself in a seal's skin and lying on the shore, in order to attract some unwary seal, which is thus lured to destruction; or by making a hole in the sheet ice, and patiently waiting and watching until a seal presents itself to breathe, when it is at once seized. When captured it is put to the various uses we have already described.

The Capucin Seal is so named because it has on its head, in the full-grown state, a peculiar organ in the shape of a hood, with which it can cover its muzzle when it chooses. Its peculiarities, however, do not end here. It can distend its nostrils in such a way as to give them the appearance of a bladder. It has also a structural peculiarity of the eyes, which is not a little puzzling. In order that we may perfectly understand it, we shall here make a short digression on visual organs and vision in general. In the inside of every vertebrate eye there is formed a picture of such external objects as the vertebrate may be looking at. The organic mechanism by means of which this is managed is beautiful and simple. Inside the eye there is a lens, held in position by transparent humours on either side of it, and more particularly by an elastic frame, which holds the lens just as a spectacle-frame holds its double convex glass lens. And the crystalline lens within the eye throws a picture of external objects on to the back of the eye, just as the spectacle-glass may be made to throw an image on to a white sheet of paper. The latter experiment is interesting, and the reader may therefore try it in this manner: Go into a dark room with a sheet of note-paper, a candle, and a pair of spectacles with double-convex lenses, *i.e.*, glasses thicker in the middle than at the rim. Having put down the candle, hold the sheet of paper a few feet away, and in between adjust one of the spectacle-glasses until an image of the candle upside down is seen on the paper. What is happening here in this experiment is happening within your eye when you look at the candle. The lens within the eye is throwing an inverted image of the candle on to the back of the eye, and the impression produced is carried away in a mysterious manner by a large nerve, called the optic-nerve, to the brain. The expansion at the back of the eye upon which the picture is cast is called the retina. The retina is most sensitive exactly in the centre, and a little on one side of this centre the optic-nerve enters. Now the spot where the optic-nerve enters is blind, so that one would naturally suppose it would have been a most unlucky thing for the animal kingdom had the optic-nerve entered the back of the eye exactly at its centre, for what is the most used portion of the eye would thus have been made blind. It is a strange thing, however, that this is exactly what is found to be the case with the Capucin seal. The optic-nerve enters at the back, exactly in the centre of the eye. Since, however, this seal is not blind, there must be some compensatory arrangement, and it appears to us not improbable that this may be found either in some external or internal divergence from the usual kind of eye. The external covering of the Capucin's eye, which is usually known as the sclerotic coat, is divided at its middle all round, the edges of the two hemispheres thus produced being connected by an elastic membrane thickly covered by muscles. It is supposed that these muscles are employed for drawing the eye deep within the socket during repose, and also for elongating the axis of vision, *i.e.*, lengthening the line passing through the centres of the lens and retina. May it not also have some hand in compensating for the peculiarity we have just mentioned, viz., the entrance of the optic-nerve into the central region of the retina? This, however, is an undecided matter, which we may well leave in the hands of those of our readers who hereafter shall become well versed in physiological optics. Capucin seals occur in large numbers in Davis' Straits, at certain times of the year. They are commonly found on large ice-islands, where they sleep without taking any precautions against the Eskimo seal-hunters. When surprised, they weep copiously. A full-grown Capucin seal is from seven to eight feet long.

The Elephant Seal of South Seas is the largest known species, being from twenty to thirty feet long, and the largest part of the body having a girth of twenty to thirty feet. The nose of the male is prolonged into a kind of trunk, but the female has no proboscis. It is much hunted for the oil it will yield, a full-grown male furnishing as much as seventy gallons. The skin is of little value as a fur, but is extensively used for carriage and horse harness, on account of its strength and thickness.

The Sea-bear, which is from four to seven and a half feet long, is common in the islands on the north-west point of America, Kamtschatka, and the Kurile Islands. Its soft brown fur is highly valued in China, and on this account the Russians hunt it with a zeal which may ultimately lead to its extinction. In common with a host of other animals, its fur becomes tinged with grey on the approach of old age, the tips of the hairs being most changed. It has external ears nearly a couple of inches long; they are conical, erect, covered with short hair, and opened by an oblong slit, which is shut in the water. The sea-bears are migratory in their habits, and when they arrive in spring on the shores of the islands we have mentioned, they are in high condition. They live in families, each male being surrounded by some fifty to eighty females. Each family, numbering over a hundred members, lives separately, and jealously guards the particular locality it may have taken up on the shore against the encroachments of any other family. Family squabbles are common, as the male appears to be somewhat of a tyrant, but both male and females are affectionate to the young. The flippers of the sea-bear become of sufficient size and power to enable the animal to progress in the water by their aid alone. It appears to fly in the water, for these flippers, when elevated and depressed in the water, twist and untwist precisely as wings do. The feet and lower portions of the body are moved only sufficiently to maintain a correct course, or alter it if necessary.

No matter what branch of science a man may study, it is always a matter of the keenest interest to him to turn back and compare what is known at the present with what was known in times long past, as set forth in some ancient book of established repute. Let us, then, in the present instance not deny ourselves this pleasure, but turn to Pliny and see what that naturalist had to say about seals more than eighteen centuries ago. In the 15th chapter of the 9th book of his "Natural History," after speaking of the birth and education of the young seal, he goes on to observe that "these animals are killed with the greatest difficulty, unless the head is cut off at once. They make a noise which sounds like lowing, whence their name of 'sea-calf.' They are susceptible, however, of training, and with their voice, as well as by gestures, can be taught to salute the public; when called by their name they answer with a discordant kind of grunt. No animal has a deeper sleep than this; on dry land it creeps along as though on feet, by the aid of what it uses as fins when in the sea. Its skin, even when separated from the body, is said to retain a certain sensitive sympathy with the sea, and at the reflux of the tide, the hair on it always rises upright; in addition to which, it is said that there is in the right fin a certain soporiferous influence, and that, if placed under the head, it induces sleep." The nineteenth-century reader will smile at the very idea of reposing on a seal's flipper in order to induce sweet sleep!

Now come we to speak of the Walrus, or Morse, an animal which resembles the seal in the general structure of its skeleton. There is a striking difference, however, in the cranium and teeth, the latter being very manifest in the couple of tusks projecting from the upper jaw, which form a very powerful instrument of attack and defence. These tusks are canine teeth developed to an extraordinary extent. They are sometimes two feet long, stout, and solid, with large roots, of which the sockets project considerably, giving a swollen aspect to the face. It is these large sockets which give rise to the characteristic form of the skull of the walrus. It has no cutting and canine teeth on the under jaw, but eight molar teeth in both upper and lower jaws, which are suited for pounding up hard substances. In other respects its form is seal-like, having a short neck, a bulky body—broadest round the chest and diminishing towards the tail—and short limbs. The inside of the flippers is defended by a horny kind of coat, which may have been produced by its habit of climbing over rocks and ice. It is ten to fifteen feet long, some of the largest bulls even attaining to a length of twenty feet. The colour, according to Fabricius, varies with the age, the young being black, then becoming brown, and gradually paler and paler till the animal in old age becomes white. This is directly opposite to the order of colour-change observed in a great number of other animals; even in man, for example, whose hair as a child may be of a light colour, but on reaching manhood has become decidedly darker. The change in the walrus is probably one which is induced by the climatic conditions it has to withstand, and, in becoming paler and paler as it increases in years, it is but obeying that mysterious law that animals have to acquire the colour of their surroundings, so that Arctic animals ought by rights to be as white as the ice and snow they move on.

The walrus is rare on the coasts of Britain, but in the North Pacific Ocean they may be observed lying in hundreds on the ice, huddling over one another like swine, and roaring and braying loudly. Mariners have often been warned by their noise of the close proximity of the ice, when the dense fog rendered everything a short distance away quite indiscernible. It feeds mainly on shelled molluscs, which it rakes from the submerged soil with its tusks. The tusks are likewise useful in enabling it to pull itself up on to the shore. In swimming, the fore and hind limbs take part in the work in nearly equal degree, the flippers being moved alternately, and the hind extremities being lashed from side to side by a twisting curved motion.

Their tusks supply us with an ivory harder and whiter than that of the elephant; an oil of better quality than the whale's is extracted from their fat; and their skins when tanned make a thick and substantial leather. The walrus is therefore much hunted, and, being exceedingly bold when attacked, the pursuit is one of no small danger.

LESSONS IN CHEMISTRY.—XIII.

COMPOUNDS OF CARBON WITH NITROGEN AND SULPHUR—THE HALOGENS—CHLORINE.

CARBON forms other compounds than those with oxygen and hydrogen already described. It enters into combination with chlorine, but the four products will not require attention until we reach organic chemistry. Only one compound is known with nitrogen. It is

Cyanogen (symbol, CN; combining weight, 26; and the density has been found to be 26, and therefore its true symbol is C_2N_2). —It was discovered in 1814 by Gay Lussac, and derives its name, "a producer of blue," from the fact that it is the chief agent in the production of Prussian blue. When bodies which contain carbon, nitrogen, and potash are heated together, a remarkable salt, the cyanide of potassium (KCN), is formed, which is characterised by crystallising in large yellow tables.

To produce this, substances rich in nitrogen—such as hoofs, hide-clippings, woollen rags, dried blood, etc.—are heated in an iron pot with two and a-half times their weight of potassium carbonate. The resulting potassium cyanide is now dissolved out by water and allowed to crystallise. It is commonly called the *prussiate of potash*. When iron, or any of the proto-salts of iron, is added to a solution of this prussiate of potash, large four-sided tables are deposited, which are *ferrocyanide of potassium*. When ten parts of this salt are dissolved in four times their weight of warm water, and distilled with seven parts of sulphuric acid diluted with twice its weight of water, the first portion of the liquid which comes over is a dilute solution of *hydrocyanic* or *prussic acid* (HCN). Mercuric cyanide may be made from this by saturating the solution with red oxide of mercury, and then evaporating. If this salt be heated, it is decomposed into cyanogen and mercury; and thus it is we get the compound. It is found to be a transparent, colourless gas, poisonous and inflammable; its flame is edged with purple; being soluble in water, it must be collected over mercury. If the gas be passed through iron tubes at a high temperature, it is decomposed, charcoal is deposited, and, as might be anticipated from the following equation, the resulting nitrogen is of the same volume as the original cyanogen:—

$$\begin{matrix} C_2N_2 & = & C_2 & + & N_2 \\ 2 & = & -- & + & 2. \end{matrix}$$

When a solution of ferrocyanide of potassium is added to a solution of a sesquisalt of iron, the well-known Prussian blue is precipitated.

Hydrocyanic acid (HCN) has been alluded to, and the first stage of its preparation given. If it be required in its pure state, dry calcium chloride is added to the above solution, and the liquid distilled. This must never be attempted save by experienced persons, and only then for some good reason. It is the most powerful poison known. It is a limpid, colourless liquid, which gives off vapour, a breath of which would be fatal. The poison seems to attack and prostrate the nerval system, and in cases where death has not resulted, the treatment is to pour cold water down the spine.

The acid has the odour of almonds, for in the kernels and leaves of many plants it is found in minute quantities.

There are other compounds of carbon and nitrogen into which oxygen enters, but they become too complicated for an elementary study of chemistry.

Bisulphide of Carbon (symbol, CS_2; combining weight, 76; density, 38).—A porcelain tube is passed through a charcoal furnace in an inclined position; it is packed with charcoal; occasionally, into its upper end, pieces of sulphur are thrown, and then the tube is stopped up by a cork. The sulphur is vaporised, and combines with the carbon, forming the bisulphide of carbon. A glass tube attached to the lower end of the porcelain tube conducts the vapour into a condenser, which is kept cool. Here there collects a mobile liquid of a very high refractive power, and possessing a fetid odour. It dissolves sulphur and phosphorus. This latter solution is the "Fenian fire," for when a bottle of it breaks, the bisulphide rapidly evaporates, depositing the phosphorus in so finely divided a state, that it soon spontaneously ignites. It also acts as a solvent on gums and india-rubber.

THE HALOGENS.

There are four elements which closely resemble each other, and which, from the fact that they combine *directly* with the metals to form salts, have received the name of halogens, "salt-producers." These elements are *chlorine*, *bromine*, *iodine*, and *fluorine*.

CHLORINE (symbol, Cl; combining weight and density, 35·5). —Chlorine is the most prominent member of the group. It is very widely disseminated through Nature, in combination with sodium, with which metal it forms *common salt* (NaCl).

Preparation.—There are two ways by which this gas may be obtained:—

1. Dilute sulphuric acid with its own bulk of water; allow it to cool, then to fourteen parts of this in a Florence flask add four parts of common salt, intimately mixed with three parts of black oxide of manganese. This reaction will ensue—

$$2H_2SO_4 + 2NaCl + MnO_2 = Na_2SO_4 + MnSO_4 + 2H_2O + 2Cl.$$

2. If hydrochloric acid be added to black oxide of manganese, the effect will be the liberation of chlorine, thus—

$$MnO_2 + 4HCl = MnCl_2 + 2H_2O + 2Cl.$$

The gas is greenish yellow, hence its name, and is about two and a-half times heavier than air. When submitted to a pressure of four atmospheres, it becomes a liquid, which as yet has never been frozen. The gas is best collected in the usual way, but the water must be *warm*, for cold water absorbs twice its bulk of the gas. Such a solution is a very convenient way of keeping chlorine for test purposes. The bottle may be labelled "Chlorine water," and kept well stoppered and in the dark, for light causes the chlorine and the hydrogen of the water to combine. On account of its weight, the gas may also be collected by "displacement," by passing the delivery tube to the bottom of the jar.

It will be found to possess a most irritating odour, and if breathed in any quantity may produce ulceration of the lungs. Since it does not combine directly with oxygen, chlorine is not combustible; but its most distinctive property is its great affinity for hydrogen. If, therefore, a taper be introduced into a jar of the gas, it will burn with a smoky flame. The combustion is due to the combining of the chlorine

with the hydrogen of the fat, forming hydrochloric acid (HCl). The carbon comes away unburnt as smoke.

Bodies rich in hydrogen will frequently take fire when plunged into a jar of this gas. This is the case with a piece of paper dipped in turpentine. Metals in a finely divided state are violently attacked by the gas. Copper leaf and antimony, which is powdered and slightly warmed, even take fire, the result being in every case a chloride of the metal.

The peculiar affinity chlorine possesses for hydrogen gives it the power of *bleaching*. If grass and fabrics dyed with vegetable colours be dipped into a jar of the gas, they will become white. This will be found to be the case only when the articles are moist; then the chlorine, taking the hydrogen of the water, liberates the oxygen, which, being in its *nascent* state, is much more active, and attacks the colouring matter, thus bleaching the body. This may be well illustrated by dissolving some indigo in sulphuric acid, and adding to a dilute solution some of the chlorine water above mentioned. The colour entirely disappears. The difference between writing ink and printers' ink is shown by introducing each into a jar of this gas; the former is bleached.

This property of chlorine makes it valuable as a disinfecting agent. It attacks the hydrogen of the noxious gas, and thus destroys it.

Hydrochloric Acid (symbol, HCl; combining weight, 36·5; density, 18·25).—This liquid is also called *muriatic acid*, or *spirits of salt*; it is water largely impregnated with the gas hydrochloric acid, which is prepared by gently heating common salt and sulphuric acid in a flask:—

$$NaCl + H_2SO_4 = HCl + NaHSO_4.$$

The gas which comes off is colourless, 1·27 times heavier than the air, and possesses a pungent odour. In contact with the air it combines with moisture, giving rise to white fumes. At a pressure of 40 atmospheres it becomes a clear liquid. Its composition may be determined both synthetically and analytically by the eudiometer. If equal volumes of chlorine and hydrogen be introduced into the instrument, on the passing of the spark they combine, forming HCl. There is no diminution of volume. Thus—

$$H + Cl = HCl$$
$$1 + 1 = 2.$$

If now a series of electric sparks be passed, some of the gas is again decomposed, and the unaltered acid may be removed by allowing a few drops of water to rise up through the mercury; these absorb the undecomposed HCl. The remaining gas is found to be equal volumes of H and Cl. These gases, when mixed in equal proportion, will combine, with an explosion, in sunlight.

Large quantities of this acid are made as a bye product in the manufacture of sodium carbonate. In this, its commercial state, it is very impure, since it contains iron in the form of a chloride, to which its yellow colour is due, and also sulphuric acid and arsenic.

The result of the action of hydrochloric acid on metals is that chlorides of the metals are formed. Their various salts may be found by replacing the H in the HCl, according to the atomicity of the metal. The presence of a chloride in a solution may be at once detected by a few drops of silver nitrate. The white, curdy silver chloride falls.

Aqua regia is a mixture of nitric and hydrochloric acids, which is capable of dissolving both gold and platinum.

Oxides of Chlorine.—Although these elements do not combine by direct means, yet in indirect ways five compounds have been produced:—

Hypochlorous acid .	$HClO$	Chloric acid . .	$HClO_3$
Chlorous acid . .	$HClO_2$	Perchloric acid .	$HClO_4$.
Peroxide of chlorine .	Cl_2O_4		

Hypochlorous Acid (HClO).—The prefix "hypo" is from the Greek ὕπο, *under*, or *beneath*, signifying that this acid has less oxygen in it than chlorous acid. It may be obtained by shaking up mercuric oxide with chlorine water. The reaction is—

$$HgO + 2Cl_2 = Cl_2O + HgCl_2.$$

The Cl_2O is hypochlorous oxide. This combines with an atom of water, forming the hydric salt, or the acid—

$$H_2O + Cl_2O = 2HClO.$$

The acid has a sickly odour, and is extremely weak, carbonic acid being capable of ejecting it from its combinations.

It is chiefly noted as a powerful bleacher, being the active principle in *bleaching powder*, which is a mixture of calcium chlorite ($CaCl_2$) and hypochlorite ($CaCl_2O_2$), and is made by allowing chlorine to enter the top of a chamber in which are trays of well-slaked lime one above the other. The gas falls by its weight, and is absorbed by the lime.

Chloride of lime, as this compound is usually called, emits the odour of hypochlorous acid. When exposed to the air, carbonic acid gradually displaces the chlorine which is given off. This makes this substance a valuable disinfectant, as the quantity of the gas emitted is so small as not to be injurious, and yet effective. The best mode of using it is to dip cloths in a solution of the powder, and hang them up.

Chloride of lime is used as the great bleacher. The calico, etc., is boiled in lime-water and a weak solution of caustic soda, to remove the grease of the manufacture and the "dressing." It is then soaked in a solution of two and a-half per cent. of bleaching powder in water. But the action is not discernible until the fabric is "soured" or dipped in a weak solution of sulphuric acid and water. Thus the chlorine is liberated in the fibre of the cloth, and the bleaching is effected. Sometimes this process is repeated, and finally the articles are thoroughly washed in water to remove all traces of the acid.

Chlorous Acid (Cl_2O_3).—To prepare this gas, three parts of arsenious acid, and four of potassium chlorate, are made into a paste with water; sixteen parts of pure nitric acid (specific gravity, 1·24) are added; the whole is placed in a small flask, which is filled up to the neck with the mixture, and a very gentle heat applied by means of a water-bath. The yellow-green gas may be collected in dry bottles by displacement. The greatest care is required in its manipulation, as it explodes at a temperature of about 56° Cent., and also if it come into contact with any very combustible body. Its formation is due to the deoxidisation of the chloric acid in the potassium chlorate.

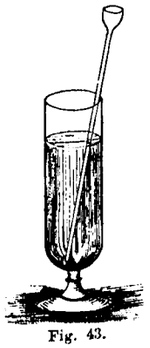


Fig. 43.

Peroxide of chlorine (Cl_2O_4) is a gas which explodes as soon as it touches organic or combustible bodies. It is prepared by pouring sulphuric acid on potassium chlorate. Mix equal parts of sugar and potassium chlorate, each in powder; then pour upon them a few drops of sulphuric acid; the whole will ignite. On this principle the first attempt at matches was founded.

Place a piece of phosphorus about the size of a pea at the bottom of a tall glass full of water (Fig. 43), also add a few grains of potassium chlorate; through a long tube pour a little sulphuric acid to the bottom of the glass. The phosphorus enters into combustion with the peroxide of chlorine as it escapes.

Chloric Acid ($HClO_3$).—This acid forms *chlorates*: if a current of chlorine gas be passed through a strong solution of caustic potash, the following reaction ensues:—

$$3Cl_2 + 6KHO = KClO_3 + 5KCl + 3H_2O,$$

potassium chlorate and chloride being the result; as the latter is more soluble, therefore it can easily be separated from the chlorate by crystallisation. It will be remembered that potassium chlorate was used in the preparation of oxygen.

Perchloric Acid ($HClO_4$).—If the decomposition of potassium chlorate when giving off oxygen be stopped, the residue will be found not only to contain potassium chloride and chlorate, but also perchlorate. It may be separated by means of hydrochloric acid, which acts on the chlorate and decomposes it, but not on the perchlorate. From this salt the acid itself may be got.

Compounds of Chlorine and Nitrogen.—If chlorine be passed into ammonia, as has before been said, nitrogen is liberated; but after a certain quantity of sal-ammoniac has been produced, drops of an oily liquid begin to form. These are supposed to be the *terchloride of nitrogen* (NCl_3), the most explosive and the most dangerous of chemical compounds. The experiment should never be attempted, unless all the apparatus used be of lead, and the operator dressed in a strong suit of leather, with an iron mask. A drop of this substance in a porcelain capsule was touched with the top of a fishing-rod; the violence of the explosion drove some of the porcelain through the bottom of the chair, which was of thick wood. A kindred compound of nitrogen with iodine, which is not so explosive, will be noticed.

LESSONS IN BOTANY.—XXVI.

SECTION LVI.—PRIMULACEÆ, OR PRIMEWORTS.

Characteristics: Calyx free or rarely adherent; corolla monopetalous, hypogynous or perigynous, regular; stamens inserted upon the corolla, their number equal to the parts of the corolla and opposite to its lobes; ovary unilocular; placenta central, free; ovules curved, seldom reflexed; fruit capsular; seeds numerous, dicotyledonous, albuminous.

The *Primulaceæ* derive their name from the genus *Primula*, so called because its species flower in the spring. They are for the most part herbaceous, annual or perennial, having a ligneous or tuberous rhizome.



205. THE COWSLIP (PRIMULA VERIS). 206. THE HAIRY DATE PLUM (DIOSPYRUS HIRSUTA). 207. COMMON HOLLY (ILEX AQUIFOLIUM). 208. THE EUROPEAN OLIVE (OLEA SATIVA).

The stem is usually subterraneous and short. The leaves are in some species radical and fasciculated, in others cauline and opposite, or verticillate, or alternate, and devoid of stipules. Flowers complete, either solitary or arranged in umbels on the summit of a shaft, or arranged in cymes springing from the axillæ of the leaves, occasionally terminal in spikes. Calyx monosepalous, usually five partite. Corolla rotate, campanulate, or infundibuliform, contorted in æstivation, sometimes absent. Ovary composed of as many carpels as there are lobes to the calyx. Placenta free central, for the most part globular, and communicating with the summit of the ovary by arachnoid filaments. Style and stigma simple. Fruit a capsule transversely or longitudinally dehiscent. Seeds ordinarily peltate; embryo straight in the axis of a fleshy albumen, lying across the hilum.

The *Primulaceæ* principally inhabit the temperate regions of the northern hemisphere, especially Europe and Asia. They not only please the eye by the beauty of their flowers, but also contribute something to the resources of medicine. The common primrose (*Primula vulgaris*) is well known to all from its yellow flowers and broad green leaves, which are seen in the hedges in sheltered nooks even before the departure of winter. The cowslip (*Primula veris*) is distinguished by the smallness of its flowers, which form an umbel (Fig. 205). The flowers of this plant act as a sedative, and are used in making a kind of wine of a soporific character. The auricula, or bear's ear, as it is called in some parts of the Continent, is employed by the inhabitants of some parts of the Alps as a remedy for consumption. It is equally good with all others proposed at different times as a remedy for that disease.

All the members of the primrose tribe are in great repute as ornamental plants, more especially the auriculas. From these plants, which are natives of the Alps, horticultural skill has developed several varieties. The cyclamen (*Cyclamen Europæum*) possesses radical leaves which are covered with white spots above, and red on their lower surface; the corolla has a roseate tint, and in all the species of this genus the tube of the corolla is turned towards the ground, whilst its limb or free portion is directed towards the sky. The root of the cyclamen, or sowbread, is eaten greedily by the

wild boars of Sicily. The name cyclamen is derived from the Greek κυκλος (ku'-klos), *a circle*, in allusion to the shape of the corm or bulb-like stem.

SECTION LVII.—EBENACEÆ, OR EBENADS.

Characteristics: Calyx free; corolla hypogynous, monopetalous; stamens sometimes equal in number to that of the lobes of the corolla, and alternating with them, sometimes double or quadruple in number; ovary many-celled, each cell uniovulate; ovules pendent from the summit of the central angle; fruit bacciform; seeds few in number, or occasionally one, dicotyledonous, albumen cartilaginous, radicle superior. Trees or shrubs possessing an aqueous juice, and furnishing a wood which is very dense.

Individuals of this natural order have alternate leaves which are coriaceous, entire, and without stipules. Flowers often incomplete, regular, axillary. Calyx three to six partite and persistent. The corolla is caduceus, urceolate, slightly coriaceous, three to six partite, imbricated in æstivation. Stamens inserted at the base of the corolla, rarely in the receptacle. The berry is globular or ovoid, sometimes dry, in which case it opens by splitting.

The *Ebenaceæ* are found in tropical Asia, the Cape, Australia, and tropical America; a few species are met with in the Mediterranean district.

The members of this natural order are celebrated for the hardness of their wood. Ebony, the wood of the *Diospyros Ebenus*, has been celebrated from all antiquity for the darkness of its hue, general beauty, and manifold uses. The ancients obtained it from Ethiopia; at present our supplies are chiefly drawn from the eastern coast of Africa, especially Mozambique. Ebony is either uniformly black or marked with white and yellow stripes. It is a remarkable fact that the wood of the *Ebenaceæ* only becomes black in aged trees; the wood of young plants is white. The appended diagram (Fig. 206) of a sprig of the *Diospyros hirsuta*, a member of this natural order, illustrates the more evident characteristics of the *Ebenaceæ*.

SECTION LVIII.—AQUIFOLIACEÆ, OR HOLLYWORTS.

Characteristics: Calyx free, four to six partite; corolla hypogynous, almost monopetalous; stamens four to six, alternate with the petals; ovary two to six or many celled, each cell uniovulate; ovule pendent; fruit fleshy; seed dicotyledonous; embryo straight at the summit of an abundant fleshy albumen; radicle superior; leaves opposite, simple, without stipules. The *Aquifoliaceæ* are evergreen ligneous plants, with petiolate shining leaves. The flowers are regular, axillary, and small, usually white or greenish in colour. Calyx persistent, imbricated in æstivation, as is also the corolla. Anthers admate; ovules pendent at the summit of the central angle of each cell, and reflexed; fruit composed of agglomerated drupes.

The *Aquifoliaceæ* are nowhere abundant, but they are more plentiful in north and equatorial America and the Cape of Good Hope than elsewhere. In tropical Asia and in Europe they are comparatively rare.

Most of the species of this natural order contain a bitter extractive principle, to which the denomination *ilicine* is given, and which in certain species is associated with varying proportions of an aromatic resin and a glutinous matter termed *viscine*. Some species are purely tonic, whilst others are purgative and emetic; a few are stimulant.

The common holly (*Ilex aquifolium*, Fig. 207) is a small tree distributed between the forty-second and fifty-fifth parallels of north latitude, and which in cold climates is only an unpretending shrub. It grows in greatest perfection in the mountainous forests of eastern Europe. In gardens it is cultivated for the sake of its pretty red berries and the deep green of its glossy leaves. By force of culture many varieties of the holly have been obtained, some bearing leaves devoid of spines, some having black, yellow, or white instead of red berries. Holly leaves were once employed as a febrifuge; they owe their medicinal properties to a principle termed *ilicine*, which admits of being extracted. Ilicine has been proposed instead of quina as a remedy for intermittent fever. From the inner bark of the holly the substance *birdlime* is obtained.

SECTION LIX.—OLEACEÆ, OR OLIVEWORTS.

Characteristics: Calyx free; corolla hypogynous, regular, composed of four petals, free or coherent; stamens two, inserted upon the corolla; ovary two to five celled, bi- or pluri-ovulate; ovules pendent; fruit bacciform or capsular, indehiscent, loculicidal; seeds pendent, dicotyledonous, albuminous; stem ligneous.

The *Oleaceæ* are trees or shrubs having opposite petiolate leaves without stipules. Flowers ordinarily complete and disposed in a panicle, cyme, or fascicle. Calyx persistent, four partite, sometimes absent. Corolla sometimes absent, composed of four petals, ordinarily coherent, infundibuliform or campanulate, valvate in æstivation. Anthers attached by their posterior side, ovules ordinarily twin. Fruit in some cases an unilocular drupe, as in the olive; sometimes a bilocular berry, at other times a bivalved capsule, or, lastly, a dehiscent capsule. The embryo occupies the axis of a central albumen; radicle superior.

The *Oleaceæ* inhabit temperate regions, especially in the northern hemisphere. They are rare in Asia and tropical America. The greater number of ash species (belonging to this natural order) are natives of North America. The lilacs have passed into Europe from the East. This natural order is interesting in the double respect of agriculture and horticulture. The cultivated olive (*Olea sativa*, Fig. 208) is a tree of little beauty, but whose utility is immense. It is a native of southern Europe. Its drupaceous fruit, the olive, is too well known to need prolonged description. The pericarp of this drupe is charged with a valuable oil, which is obtained by subjecting the fruit to heavy pressure. In the manufacture of soap and for culinary purposes olive oil is unrivalled.

The American olive (*Olea Americana*) bears edible drupes, as is also the case with many exotic species. The most celebrated of these is the Chinese olive (*Olea fragrans*), the flowers of which are mixed by the Chinese with the leaves of their tea.

LESSONS IN ARITHMETIC.—XXXV.

SIMPLE INTEREST.

4. When money is lent, money is paid to the lender for the use of it. The sum lent is called the *principal*, the money paid for the loan is called the *interest*. The sum paid for the use of the principal ought evidently to depend upon the *time* during which the borrower has the use of it. Interest is therefore generally paid at so much per cent. *per annum;* that is, for the use of every £100 of principal, so much is paid for its use during one year.

The principal and interest upon it added together constitute the *amount*.

If the borrower pays the interest to the lender at the expiration of every year (or as soon as, according to the agreement, it becomes due), he will evidently have to pay the same sum each year. But if he omit to do this, and retain it until he returns the principal, he will, year by year, keep in his possession a continually increasing sum belonging to the lender, upon which (if the agreement be so made) interest must be paid.

In the first case the interest is said to be *simple;* in the second, *compound*.

5. *To find the interest upon a given sum for a given time at a given rate per cent.*

The interest for one year upon any given sum is obtained (see Art. 2 (1) in preceding lesson, page 362) by multiplying by the rate per cent., and dividing by 100.

The interest for one year having been found, the simple interest for any number of years is obtained by multiplying the one year's interest by the number of years.

Example 1.—Find the interest on £780 10s. for 1 year at 5 per cent.

The answer is $\frac{5}{100}$ £780½, or £39 0s. 6d.

```
40 ) 1561 ( £39 0s. 6d.—Answer.
     120
     ---
     361
     360
     ---
       1
      20
     ---
      20
      12
     ---
     240
     240
     ---
     ...
```


Or, by decimals, $\frac{5}{100}$ £780·5 = 5 :: £7·805.

```
7·805
  5
------
39·025
  20
------
0·500
  12
------
6·000
```

Therefore £39 0s. 6d. is the required interest.

Example 2.—Find the interest on £176 17s. 3½d. for 7 years and 9 months at 8 per cent.

The interest for one year is $8 \left(\frac{£176\ 17s.\ 3\frac{1}{2}d.}{100}\right)$

And since 7 years 9 months = $7\frac{3}{4}$ years, the answer is $7\frac{3}{4} \times 8 \times$ (£176 17s. 3½d.) × 100.

The operation may be performed thus:—

```
£176 17s. 3½d.
            8
-------------
100 ) £1414 18s. 4d.
      ------
      14·14
        20
      ------
       2·98
         12
      ------
      11·80
          4
      ------
       3·20
```

Hence the interest for one year is £14 2s. 11½d. ·2 farthings, and for $7\frac{3}{4}$ years the interest is this sum multiplied by $7\frac{3}{4}$.

Another convenient method of working such a question would be to reduce the principal to the decimal of a pound, by the rules given in Lesson XXXI., Art. 10 (Vol. II., page 270).

```
Now, 3½d. = 14 f = £·014
   17s. =         £·85
17s. 3½d. = £·864 to 3 places.
```

Therefore, for one year interest = $\frac{8}{100}$ 176·864 pounds

```
= 8 × 1·76864
= £14·14912
        20
      ------
       2·98240
         12
      ------
      11·7888
          4
      ------
       3·1552
```

£14 2s. 11½d. is the interest for one year, true to the nearest farthing; and to find the interest for 7 years 9 months, this result must be multiplied by $7\frac{3}{4}$, or £14·14912 by 7·75.

6. *Given the simple interest upon a sum of money at a given rate per cent., to find the time during which the interest has been running.*

We have evidently to find the interest on the principal for *one* year; then the number of years required will be the number of times the given interest contains the interest for one year.

7. *Given the* AMOUNT *of a sum of money at simple interest for a given time at a given rate per cent., to find what principal has produced this amount.*

Example.—Suppose it be required to find what sum at 4½ per cent. has produced an *amount*, £138 14s. 4d., in 2 years.

In two years £100 would amount to £109.

Hence we have the proportion,

As £109 : £100 :: £138 14s. 4d. : required principal;

which, when worked out, gives as the result—

£127 5s. $3\frac{13}{109}$d.

Hence we get the following

Rule for determining what principal has produced a given amount in a given time, at a given rate per cent.

Multiply the given amount by 100, and divide by the number obtained by the addition of £100 to the interest on £100 for the given time.

8. *If a given principal produce a given interest in a given time, to find the rate per cent.*

Dividing the whole interest by the number of years gives us the interest on the principal for one year.

We can then, by the Rule of Three, find the interest upon £100 for one year, *i.e.*, the rate per cent.

Example.—The interest on £274 for 5 years being £47 19s., find the rate per cent.

£274, *i.e.*, 960 × 274 farthings, produce £47 19s., *i.e.*, 46032 farthings in five years, and therefore $\frac{46032}{5}$ farthings in one year.

Hence, by Rule of Three,

As 960 × 274 : $\frac{46032}{5}$ :: 100 : rate per cent.

Therefore the rate per cent = $\frac{46032 \times 100}{5 \times 274 \times 960}$

= $\frac{3}{4}$ = 3½ per cent.—Answer.

Exercise 54.—Examples in Simple Interest.

Find the interest of the following sums:—

	£	s.	d.				
1.	525	0	0	at 4	per cent.	for one year.	
2.	874	16	3	at 5	„	„	
3.	1539	12	6	at 5½	„	„	
4.	2288	16	9	at 6½	„	„	
5.	1286	14	7	at 7⅞	„	„	
6.	7671	19	5½	at 4¼	„	„	
7.	476	16	0	at 6	„	for 3 years 6 months.	
8.	781	16	10	at 4	„	for 5 „ 2 „	
9.	971	18	4	at 5	„	for 8 „ 6 „	
10.	1792	12	6	at 6½	„	for 5 „ 10 „	
11.	3584	18	8	at 3⅛	„	for 10 „ 9 „	
12.	7365	4	10½	at 7½	„	for 12 „ 4 „	

13. The interest on £781 16s. 10d. at 4 per cent. is £75 11s. 6½d., find how long the interest has been running.

14. The interest on £971 18s. 4d. at 5 per cent. is £413 1s. 3½d.; find how long the interest has been running.

15. The interest on £841 17s. 9d. at 4¾ per cent. is £113 6s. 0¾d.; find how long the interest has been running.

16. What principal will amount to £308 7s. in 2½ years at 4½ per cent.?

17. What principal will amount to £132 3s. in 2½ years at 4 per cent.?

18. What principal will amount to £247 10s. in 2 years at 5 per cent.?

19. In what time will £537 16s. 8d. amount to £591 12s. 4d. at 2½ per cent.?

20. If £575 in 3 years amounts to £600, what is the rate per cent.?

21. In how long will £2500 double itself at 4 per cent. simple interest?

22. If £293 7s. 6d. produces in 2½ years an interest of £25 10s., what is the rate per cent.?

23. If £2475 8s. 4d. in 3 months produces an interest of £24 15s. 1d., what is the rate per cent.?

KEY TO EXERCISE 53, LESSON XXXIV. (Vol. II., page 362).

1. £15.
2. £13·055.
3. ·9683.
4. $9\frac{1134471}{1953571}$, or 9·5642, etc.
5. 21600.
6. 18518.
7. 8·21.
8. 5·14.
9. 10 per cent.
10. 3·84 oz.
11. $58\frac{4}{13}$ per cent.
12. 7·04549, etc.
13. 2s.
14. ⅝ per cent. is gained.
15. £2⅔ per doz., *i.e.*, 11⅓ per cent.
16. £1111 2s. 2⅔d.
17. £1078 11s. 6·9533d., etc.
18. $23\frac{1}{13}$ per cent.
19. £1000.

LESSONS IN LATIN.—XXVI.

REGULAR VERBS—THE SECOND CONJUGATION.

ACTIVE VOICE.

Example.—Moneo, 2, *I remind.*

Chief Parts: Moneo, monui, monĭtum, monēre.

Characteristic letter, E *long.*

The corresponding parts and signs having been given under the first conjugation, need not be repeated; in the Latin, the student will easily make the alterations required by the difference of conjugation, and the English is unaffected by conjugation.

MOODS, TENSES, ETC., of MONEO, *I remind.*

PRESENT TENSE.

	Indicative.	*Subjunctive.*	*Imperative.*	*Infinitive.*	*Participle.*
Sing.	Moneo.	Moneam.		Monēre.	Monens.
	Mones.	Moneas.	Mone, or monēto.		
	Monet.	Moneat.	Monēto.		
Plu.	Monēmus.	Moneāmus.			
	Monētis.	Moneātis.	Monēte or monetōte.		
	Monent.	Moneant.	Monento.		

IMPERFECT TENSE.

	Indicative.	*Subjunctive.*	*Imperative.*	*Infinitive.*	*Participle.*
Sing.	Monēbam.	Monērem.			
	Monebas.	Moneres.			
	Monebat.	Moneret.			
Plu.	Monebāmus.	Monerēmus.			
	Monebātis.	Monerētis.			
	Monebant.	Monerent.			

FIRST FUTURE TENSE.

Sing.	Monēbo.		Monitūrum esse.	Monitūrus.
	Monebis.			
	Monebit.			
Plu.	Monebimus.			
	Monebitis.			
	Monebunt.			

PERFECT TENSE.

Sing.	Monŭi.	Monuĕrim.	Monuisse.
	Monuisti.	Monueris.	
	Monuit.	Monuerit.	
Plu.	Monuimus.	Monuerimus.	
	Monuistis.	Monueritis.	
	Monuērunt.	Monuerint.	

PLUPERFECT TENSE.

Sing.	Monuĕram.
	Monueras.
	Monuerat.
Plu.	Monuerāmus.
	Monuerātis.
	Monuerant.

SECOND FUTURE TENSE.

Sing.	Monuĕro.
	Monueris.
	Monuerit.
Plu.	Monuerimus.
	Monueritis.
	Monuerint.

GERUNDS.		SUPINES.	
Gen.	Monendi.	1.	Monĭtum.
Dat.	Monendo.	2.	Monĭtu.
Acc.	Monendum.		
Abl.	Monendo.		

EXERCISES:—Like moneo form doceo, *I teach;* and habeo, *I have.*

VOCABULARY.

Aditus, -ūs, m., *access, entrance* (E. R. *an adit*).	Gaudeo quod, *I rejoice that.*	Placeo, 2, *I please.*
Deleo, 2, *I blot out.*	Nocco, 2, *I injure.*	Probe, *honestly, properly*
Displiceo, 2, *I displease.*	Oblivio, -ōnis, f., *forgetfulness.*	Repente, adv., *suddenly.*
Exerceo, 2, *I exercise.*	Occido, 3, *I fall, die.*	Taceo, 2, *I am silent* (E. R. *tacit*).
Floreo, 2, *I flourish.*	Pareo, 2, *I obey.*	Timeo, 2, *I fear* (E. R. *timid*).
Gaudeo, 2, *I rejoice.*	Pateo, 2, *I lie open, I am open.*	Valeo, 2, *I am well.*
		Venio, 4, *I come.*

Observe that, occasionally, forms of other conjugations, etc., than the one immediately under treatment, are introduced with a view to keep up the student's attention, exercise his ingenuity, and test his progress.

Rule.—After verbs expressive of fear, *ne* is used with the subjunctive of the following verb. Ne is, in Latin, a negative, and may be often rendered by *lest;* it may, however, in construing into English, be altogether dropped, the ordinary connecting particle *that*, or *that not*, being put between the two verbs; for example—

Timeo ne tibi displiceam,
I fear lest I should displease thee; that is,
I fear displeasing thee.

In this case, the second verb may be considered as the object of the first, as is seen in the second rendering, which is equivalent to *I fear to displease thee.* The force may be more clearly seen if the meaning is put into other words. Plainly the import of the sentence is, *I wish not to displease thee.* Take another example:—

Metuo ne Cæsar vincat,
I fear Cæsar may conquer; or,
I wish Cæsar may not conquer.

After verbs of fearing *ut* is also employed, but with an import the reverse of that which is given by *ne:* for example:—

Metuo ut Cæsar vincat,
I fear that Cæsar may not conquer; or,
I wish Cæsar may conquer.

Hence, you see, that in putting similar sentences into English, you must drop the negative where it is found in the Latin, and use it where it is not found in the Latin.

EXERCISE 92.—LATIN-ENGLISH.

1. Exercco. 2. Exercebam. 3. Exercebat. 4. Exercebo. 5. Gaudeo quod tu vales. 6. Præceptor gaudebat quod vos ejus præceptis parebatis. 7. Tibi placebas, aliis displicebas. 8. Virtutis honorem nulla oblivio delebit. 9. Exercui. 10. Græcia omnibus artibus floruit. 11. Laudo vos quod mentes vestras studio probe exercuistis. 12. Cur tacuistis? 13. Tacuit puer repente. 14. Tacebat mater. 15. Tacent omnes. 16. Nisi virtutis præceptis paruerītis, aditus in cœlum vobis non patebit. 17. Si cupiditates tuas coercueris, beatus eris. 18. Curo ut pueri mores emendem et corpus exerceam. 19. Moneo vos ut patris præcepta observetis. 20. Timebam ne vobis displicerem. 21. Cura ut pueri mores emendes et corpus exerceas. 22. Timebam ne inimicus mihi noceret. 23. Timuit puer ne tacuerit mater. 24. Curabam ut pueri mores emendarem et corpus exercerem. 25. Curabam ut pueri mores emendares et corpus exerceres. 26. Curabam ut præceptor pueri mores emendaret et corpus exerceret. 27. Timeo ut venias. 28. Timet maritus ne uxor occidat. 29. Timuit præceptor ut discipulus ejus verbis pareret. 30. Malus puer timet ne veniat præceptor.

EXERCISE 93.—ENGLISH-LATIN.

1. He reminded me. 2. They reminded the king. 3. I might remind you. 4. You might remind me. 5. They have reminded the boy. 6. Thou wast reminding the woman. 7. I will remind the teacher. 8. Be silent. 9. Do you be silent. 10. Let them be silent. 11. The woman was suddenly silent. 12. Take care to improve. 13. Take care that thou improvest the morals of the citizens. 14. I fear he may displease thee. 15. The boys feared to displease their father. 16. He pleases all (persons). 17. A good man will displease the bad. 18. Why art thou silent? 19. They fear that Cæsar will conquer their country. 20. Good sisters fear (their) brothers will not be well. 21. Art thou well? 22. I fear thou wilt not be well. 23. If thou exercisest thy body thou wilt be well. 24. My mother fears an entrance into heaven will (may) not lie open to me.

As some of our readers may wish to know the meaning of the names given to the cases of the Latin nouns, we have given the following explanation of their derivation, etc.

The names of the cases in Latin are of Greek origin, as is the term *case* (πτωσις, pto'-sis, *fall*) itself. The nominative is so called because it assigns the name (*nomen*) of the agent; the genitive denotes the relation of genus, origin, or birth, that out of which a thing arises, and to which therefore it belongs; the accusative points out that which is caused (*causa*) or effected, that which receives the action implied in the verb, the result of that action, the object or thing on which the action falls; the dative case is the giving (do, dare, dedi, datum, *to give*) case, signifying the person (or thing) to which something is given or assigned; the vocative (voco, *I call*) is the case of calling on or addressing; and the ablative (ablatus, *taken from*) bears the name because it involves the idea of separation. In the Greek there is no ablative, the relations implied in that case being expressed partly by the genitive, partly by the dative.

KEY TO EXERCISES IN LESSONS IN LATIN.—XXV.

EXERCISE 81.—LATIN-ENGLISH.

1. I was praising thee. 2. You were blaming me. 3. The brother was judging. 4. I shall praise thee. 5. Thou wilt blame me. 6. The brother will judge. 7. I walked. 8. You watched. 9. The wind blew. 10. I had walked. 11. Thou hast watched. 12. The wind had blown. 13. I shall have praised thee. 14. Thou wilt have blamed me. 15. The brother will have judged. 16. When the soldiers were entering the city, all the citizens were full of fear. 17. When we were walking in the wood, a strong wind was blowing through the high oaks, while tranquil sleep refreshed you. 18. You were watching. 19. So long as you are (will be) happy, you will number many friends. 20. I shall always praise the good, and shall always blame the wicked. 21. If you fight energetically, O soldiers, you will deliver (liberate) your country from ruin. 22. If thou lovest virtue, all good men will love thee.

EXERCISE 82.—LATIN-ENGLISH.

1. Because you have always observed the precepts of virtue, you have acquired to yourselves great praise. 2. Why didst thou watch during the whole night? 3. I have always loved my teachers, hast thou not loved thine? 4. You fought energetically against the enemies. 5. When the soldiers had entered the city, great fear seized the minds of all the citizens. 6. The narrative which you (had) lately narrated to me, had delighted me greatly. 7. When the hostile army had attacked the city, we had already gone out. 8. If you have adorned your mind with virtues you will always be happy. 9. When the enemies have laid waste the fields of our city, they will attack the city itself.

EXERCISE 83.—ENGLISH-LATIN.

1. Nos te laudabamus. 2. Tu me vituperabas. 3. Pater judicabat. 4. Tu me laudabis. 5. Ille te laudabit. 6. Pater nos judicabit. 7. Ambulāsti. 8. Vigilavi. 9. Venti flavēre. 10. Foris ambulabo. 11. Vigilas. 12. Ventus flabat. 13. Milites urbem intrabunt. 14. Milites urbem intrabant. 15. Milites urbem intrant. 16. Milites urbem intraverunt. 17. Milites urbem intraverant. 18. Vehemens ventus per domum flat. 19. Multosne milites numeras? 20. Multos numeravi amicos. 21. Patriam interitu liberavit. 22. Per totamne noctem vigilāsti? 23. Amate præceptores. 24. Parentes amanto. 25. O pueri, amate virtutem. 26. Narratio fratrem delectavit. 27. Narratio puellas delectat. 28. Narratio patrem et matrem delectabit. 29. Famam narratione interitūs comparavisti.

EXERCISE 84.—LATIN-ENGLISH.

1. It often happens that utility strives with honesty. 2. See that you sin not against the precepts of virtue. 3. All parents wish that their children may cultivate learning diligently. 4. We ought to live so as to (so that we may) preserve a pure conscience in everything. 5. The physician takes every care that he may heal the sick man. 6. I love thee that thou mayest love me again. 7. The general commanded that the soldiers should keep their posts. 8. I walked yesterday that I might gladden my sad mind.

EXERCISE 85.—LATIN-ENGLISH.

1. Vide ne filius peccet. 2. Peccasne contra virtutis præcepta. 3. Sapiens pater curam adhibet ne liberi peccent. 4. Duces curam adhibent ut milites stationes suas servent. 5. Curam adhibetis ne liberi peccent. 6. Bonæ matres curam adhibent ut liberi earum præceptis obtemperent.

EXERCISE 86.—LATIN-ENGLISH.

1. I doubt not that our soldiers have overcome the enemies. 2. I did not doubt that our soldiers had overcome the enemies. 3. I doubt not that our soldiers will overcome the enemies. 4. I did not doubt that our soldiers would overcome the enemies. 5. I did not doubt that you would free your country from servitude. 6. There was no doubt that our army would easily endure all labours and hardships. 7. Who doubts that Hannibal fought most bravely against the Romans?

EXERCISE 87.—ENGLISH-LATIN.

1. Nemo dubitat quin pro patriæ libertate acerrime pugnaturi sitis. 2. Nemo dubitat quin fortiter pugnaverit. 3. Nemo dubitabit quin fortiter pugnaturus sit. 4. Nemo dubitabat quin fortiter pugnavisset. 5. Quis dubitat quin milites urbem expugnaturi sint? 6. Dubium non est quin studeatis servare honestatem. 7. Non dubito quin pater venturus sit.

EXERCISE 88.—LATIN-ENGLISH.

1. My friend, diligently take care of your health. 2. O boys, love learning. 3. Do not doubt concerning the immortality of the soul. 4. My son, always preserve a clear conscience. 5. Let the scholar love the teachers. 6. Praise the good, blame the wicked. 7. Do not praise bad boys. 8. Let all men love God.

EXERCISE 89.—ENGLISH-LATIN.

1. Curate, mei filii, matrem. 2. Carole, ne dubita de bonorum immortalitate. 3. Servate, liberi, conscientiam rectam. 4. Liberi amanto præceptores. 5. Mei amici, amatote Deum. 6. Carole, ne vitupera sororem.

EXERCISE 90.—LATIN-ENGLISH.

1. My parents removed into the city to dwell. 2. The hostile army came to lay waste our fields. 3. An unripe grape is bitter to the taste. 4. Troubles are hard to bear. 5. Thirst is most difficult to bear. 6. Pears are sweet to the taste.

EXERCISE 91.—ENGLISH-LATIN.

1. Milites adventant regem liberatum. 2. Exercitus hostilis advenit urbem expugnatum. 3. Uvæ maturæ sunt dulces gustatu. 4. Uvæ immaturæ difficillimæ sunt toleratu. 5. Adventant agros occupaturi. 6. Aves cantando animum delectant.

LESSONS IN GERMAN.—XXXVI.

SECTION LXX.—VARIOUS IDIOMS (*continued*).

Auf eine Rechnung setzen answers to our "place to an account;" as:—Diese Bücher können Sie auf meine Rechnung setzen, these books you may place (or charge) to my account. So also:—Er machte sich auf meine Rechnung (or Kosten) lustig, he made himself merry at my expense.

1. Preisgeben is compounded of Preis, *prize*, and geben, *to give;* as:—Er hat mich verlassen, und mich meinen Feinden Preis gegeben, he has deserted me, and exposed me to my enemies.

2. Hervor (forth, out) is compounded with many verbs, and often expresses mere prominence, as:—Er hat diesen Punkt besonders hervorgehoben, he has given this point especial importance.

VOCABULARY.

Ab'sichtlich, purposely.	Erbit'tern, to embitter	Rauch, *m.* smoke.
Ab'wesend, absent.	Erklä'ren, to declare, explain.	Rechnung, *f.* account, score.
Anbruch, *m.* break, beginning.	Ersti'cken, to suffocate.	Strafbar, punishable.
Artig, good, well-behaved.	Hervor'heben. (See R. 2 in this lesson.)	Verle'genheit, *f.* embarrassment, dilemma
Befrei'en, to set free.	Hitze, *f.* heat.	Verschul'den, to commit a wrong.
Behaupt'ung, *f.* assertion, statement.	Ja'nuar, *m.* January.	Verzö'gerung, *f.* delay, putting off.
Bess'erung, *f.* improvement.	Kei'neswegs, in no wise, by no means.	Wacker, valiant, brave, honest.
Büßen, to atone for, suffer for.	Lustig, merry.	Wälzen, to roll, remove.
Entschul'digen, to excuse, exculpate.	Na'mentlich, especially	Zart, tender, frail.
	Oef'fentlich, openly.	
	Pflanze, *f.* plant.	
	Preis'geben. (See R. 1 in this lesson.)	

RÉSUMÉ OF EXAMPLES.

Er ließ Alles, was er holte, auf meine Rechnung setzen; allein, ich werde nur das bezahlen, was ich selbst geholt' habe.	He had everything that he went for placed to my account, but I shall only pay (for) what I went for (got) myself.
Er suchte Alles, was er verübt' hatte, von sich ab und auf meine Schultern zu wälzen.	All that he had committed, he sought to remove from himself and bring to my charge (upon my shoulders).
Ich mag weder auf Rechnung (or Kosten) eines Andern spotten, noch mich selber dem Gespött'e Preis geben.	I wish neither to scoff at the expense of another, nor expose myself to (the) ridicule.
Ich habe die Arbeit gethan', und verlan'ge nun meinen Lohn.	I have done the work, and now demand my pay.
Von nun an hatte das Leben allen Reiz für ihn verlo'ren.	From now (this time forward) life had lost all attraction for him.
Endlich langte die versproch'ene Hülfe an.	At last the promised aid arrived.

EXERCISE 134.

1. Entschuldigen Sie mich, mein Herr, es ist nicht vorsätzlich geschehen. 2. Wenn er es absichtlich gethan hat, so ist er keineswegs zu entschuldigen. 3. Obgleich Sie es nicht mit Absicht gethan haben, so ist es doch strafbar. 4. Hätten Sie es vorsätzlich gethan, so müßten Sie sich schämen. 5. Den Gefangenen hat man absichtlich befreit. 6. Dieser Mann hat nicht absichtlich diese Verzögerung herbeigeführt. 7. So lange noch solche Männer an der Spitze des Staates stehen, können wir an keine Besserung denken. 8. So lange ich keine Beschäftigung habe, kann ich nicht zufrieden sein. 9. So lange ihr artig seid, sollt ihr alles haben, was ihr braucht. 10. So lange die Welt steht, hat man keine solche Behauptung gemacht. 11. Ich arbeite für dich, so lange du krank bist. 12. Wir sorgten für seine ganze Familie, so lange er abwesend war. 13. Sie können, so lange Sie wünschen, in meinem Hause wohnen. 14. Wenn er sich nicht so lange aufhält, so kann er auch meine Briefe nicht mehr bekommen. 15. Dieser Mann arbeitet von Anbruch des Tages bis spät in die Nacht. 16. Von jetzt an gehe ich alle Tage vom Fluß bis an den Berg spazieren. 17. Ich habe nun einen Brief erhalten und werde, so bald ich kann, zu meinen Freunden reisen. 18. Bis zum zwanzigsten Januar werde ich alle meine Geschäfte geordnet haben. 19. Da ich jetzt angekommen bin, so werde ich mit ihm sprechen, so bald ich ihn sehe. 20. Als sie endlich kamen, war es Nacht geworden. 21. Von nun an wollen wir Freunde sein. 22. Bis es Abend wird, wollen wir in der Stadt bleiben. 23. Der Kaufmann setzte Alles auf eine Rechnung. 24. Was ihr gethan habt, kommt jetzt auf meine Rechnung, und ich muß büßen, was ihr verschuldet habt. 25. Es ist heute eine erstickende Hitze. 26. Der Unglückliche erstickte in dem Rauche. 27. Das Unkraut erstickt die zarten Pflanzen. 28. Die Stadt wurde den erbitterten Soldaten Preis gegeben. 29. Er wurde seinem Schicksale Preis gegeben. 30. Er hob sein wackeres Betragen hervor und lobte ihn öffentlich. 31. Er konnte in seiner Verlegenheit kein Wort hervorbringen. 32. Nach langem Suchen brachte sie ein altes Buch hervor.

EXERCISE 135.

1. The books which I bought of you, you may charge to my account. 2. The conquerors made themselves merry at the expense of their enemies. 3. As long as the man has employment, he may be contented. 4. As long as the world stands, the word of God will never vanish. 5. I will work for my friend as long as he is ill. 6. As long as the scholars are diligent, their teacher

will praise them. 7. You can remain with my family as long as you wish. 8. If you remain till I have finished these letters, you may take them to my friend. 9. From now, we shall give more time to study. 10. The ship was exposed to the wind and waves. 11. From the break of day till late in the evening the town was exposed to the fire of the enemy. 12. The sun breaks forth between the clouds. 13. The Athenians declared none but Jupiter should henceforth reign in Athens. 14. As long as my heart approves of my conduct, the censure of the people shall give me no pain. 15. He has given to the last point in his speech especial importance. 16. They were amusing themselves at his expense, and he did not perceive it.

SECTION LXXI.—PASSIVE VERBS IN THE INDICATIVE.

The passive is formed by placing the auxiliary werden (to become, to be) before the past participle of the main verb (§§ 84, 85). In the perfect, pluperfect, and second future tenses, the participle of werden rejects the augment ge, and is to be rendered by "been;" as:—Er ist geliebt worden (not geworden), he has *been* loved. The verb sein is also used in these tenses, but with the signification of "have;" as:—(Er ist geliebt worden, he *has* been loved. Er war gelobt worden, he *had* been praised. Er wird gelobt werden sein, he will *have* been praised.

Many intransitive verbs are used impersonally in the passive; as:—Es wurde bis spät in die Nacht gefochten, the fighting (it was fought, etc.) was continued till late in the night. Es wurde ihm von allen Seiten zu Hülfe geeilt, from all sides it was hastened to his assistance. Es wird in dem Garten von den Kindern gespielt, it is played by the children in the garden. Es wurden in dem Concert einige schöne Lieder gesungen, there (it) were sung some beautiful songs in the concert.

VOCABULARY.

Al'penlied, *n.* song of the Alps.
An'erkennen, to acknowledge, own.
Au'genblick, *m.* moment, twinkling (of an eye).
Aus'machen, to find out, ascertain.
Brief'träger, *m.* letter-carrier, postman.
Componi'ren, to compose.
Dereinst', once, one day, in the future.
Erbit'terung, *f.* exasperation, animosity.
Erken'nen, to perceive, recognise.
Erklet'tern, to climb, scramble up.
Ermor'den, to murder.
Ernst, earnest.
Gem'senjäger, *m.* chamois-hunter.
Gericht', *n.* judgment.
Heimisch, heathenish, heathen, pagan.
Hof'fentlich, it is to be hoped, as I hope.
Je nachdem', as, according as.
Kostbar, costly, expensive.
Nach'lässig, neglectful.
Mit'wirkung, *f.* co-operation.
Priester, *m.* priest.
Rechtlich, honest, upright.
Schlagen, to beat, strike.
Schmieden, to forge, put (into irons).
Schmücken, to adorn, attire.
Tadeln, to blame, cast a blame upon one.
Un'benützt, not used, not availed of.
Unschuld, *f.* innocence.
Verach'ten, to despise.
Verleum'den, to backbite, calumniate.
Versam'meln, to assemble, meet.
Verur'theilen, to doom, condemn.
Wüste, *f.* desert, wilderness.
Zeugniß, *n.* testimony.

RÉSUMÉ OF EXAMPLES.

Viele Menschen werden ihres Reichthums, nicht ihrer Verdienste wegen geach'tet.
Many persons are honoured on account of their riches, not on account of their merits.

Am Ende der Schlacht wurden die Tap'fersten mit Lorbeer bekränzt'.
At the end of the battle the most valiant were crowned with laurels.

Das Buch des Schicksals ist von Gottes Hand verschlossen worden, und kein Sterb'licher vermag' einen Blick in seine geheim'nißvollen Blätter zu thun.
The book of fate has been closed by the hand of God, and no mortal is able to cast a look upon (into) its mysterious pages (leaves).

Dem reichen Cröesus war von dem Ora'tel das Ende seiner Herr'lichkeit verkün'digt worden.
To the rich Cœsus, the end of his splendour had been announced by the oracle.

So lange Zwietracht und Wi'derspruch unter den Menschen herrscht (§ 136 [3]), so lange werden die wich'tigsten Wahr'heiten bekämpft' werden.
So long as discord and contradiction reign among mankind, so long will the most weighty truths be contested.

Ruhe und Friede werden erst dann in diese Thäler zurück'kehren, wenn der Feind gänzlich geschla'gen worden sein wird.
Repose and peace will first return to these valleys, when the enemy shall have been utterly defeated.

EXERCISE 136.

1. Der Lehrer liebt und lobt den fleißigen Schüler. = Der fleißige Schüler wird von dem Lehrer geliebt und gelobt. 2. Der Jäger schießt nicht nur Wölfe und Bären, sondern auch Vögel. = Nicht nur Wölfe und Bären, sondern auch Vögel werden von dem Jäger geschossen. 3. Die Mutter warnte den Sohn. = Der Sohn wurde von der Mutter gewarnt. 4. Der Briefträger brachte einen Brief. = Der Brief wurde von dem Briefträger gebracht. 5. Der Jude hat das Pferd des armen Mannes gekauft. = Das Pferd des armen Mannes ist von dem Juden gekauft worden. 6. Der Schweizer hat die Alpenlieder schön gesungen. = Die Alpenlieder sind von dem Schweizer schön gesungen worden. 7. Das Kind hat das Buch vergessen. = Das Buch ist von dem Kinde vergessen worden. 8. Der Metzger hat das Kalb geschlachtet. = Das Kalb ist von dem Metzger geschlachtet worden. 9. Der Feldherr wird seine Soldaten loben. = Die Soldaten werden von ihrem Feldherrn gelobt werden. 10. Gott wird das Gute belohnen. = Das Gute wird von Gott belohnt werden. 11. Der Nachbar wird dem Freunde geholfen haben. = Dem Freunde wird von dem Nachbar geholfen worden sein. 12. Der heidnische Priester wird das arme Mädchen geopfert haben. = Das arme Mädchen wird von dem heidnischen Priester geopfert worden sein. 13. Cäsar ist unter Mitwirkung seines Freundes Brutus ermordet worden. 14. Die steilsten Felsen werden von den Gemsenjägern erklettert. 15. Der günstige Augenblick wird von dem Klugen ergriffen. 16. Es wurde in einer halben Stunde mehr gethan, als sonst in einer ganzen. 17. Der Streit wurde auf beiden Seiten mit großer Erbitterung geführt. 18. Schon manche kostbare Stunde ist unbenützt geblieben. 19. Das Werk ist endlich vollendet worden, und wird in den ersten Tagen erscheinen. 20. Endlich ist es ausgemacht worden, wer der Dieb ist. 21. Die Brücke wurde durch das Eis mit fortgerissen. 22. Die Kameele werden in der Wüste oft von den Reisenden geschlachtet, um Wasser zu erhalten. 23. Die Söhne des Brutus waren von ihrem Vater zum Tode verurtheilt worden. 24. Prometheus war von Jupiter an einen Felsen geschmiedet worden. 25. Die Sache wird sehr interessant werden. 26. Hoffentlich wird der Feind geschlagen worden sein. 27. Es wird dereinst ein ernstes Gericht gehalten werden, nachdem alle Völker versammelt worden sind. 28. Viele werden gelobt werden, welche Tadel erwarteten, und Viele getadelt werden, welche Lob erwartet hatten. 29. Dieser Jüngling war verleumdet worden. 30. Die Unschuld desselben wird erkannt werden, nachdem seine rechtlichen Handlungen werden erkannt worden sein.

EXERCISE 137.

1. The mother warned the son. = The son was warned by the mother. 2. Romulus founded Rome. = Rome was founded by Romulus. 3. The Gauls burnt it. = It was burnt by the Gauls. 4. Mr. G. composed this song, and Mr. N. sang it. = This song was composed by Mr. G., and was sung by Mr. N. 5. We love and seek skilful people. = Skilful people are loved and sought; but unskilful people are generally despised. 6. A man often neglects his duties, while thinking of his pleasures. 7. Most sacred duties have often been neglected, while we have been devoted too much to pleasure. 8. The hat of the victor had been adorned with flowers. 9. The most valiant of the army will be rewarded, according as their actions are acknowledged. 10. Thy sister is loved and praised by her teacher, because she is diligent and attentive; but thou wilt be censured by thine, because thou dost not like to work. 11. Charles has been punished because he had not finished his exercise. 12. We were praised by our teacher, because we were diligent. 13. Our friend has been punished, because he had been neglectful. 14. Thou hast had the pleasure of passing some days with thy friends in the country; thou hast been praised and rewarded by them, because thy teacher has given thee a favourable testimony. 15. His brother would have been better received.

KEY TO EXERCISES IN LESSONS IN GERMAN.

EXERCISE 53 (Vol. I., page 260).

1. Je häufiger unser Umgang mit Völkern ist, desto mehr wird unser Handel erweitert. 2. Sind die Paläste der Könige von England so schön, als die der deutschen Könige? 3. England ist nicht so fruchtbar wie Spanien oder Italien. 4. Es ist ebenso leicht, gut zu thun, als übel. 5. Die Tugend ist die größte Zierde des Mannes. 6. Ein Weiser sagte, je mehr er die Unsterblichkeit der Seele erwäge, desto wichtiger erscheine sie ihm. 7. Der Rhein bietet die schönste Aussicht dar. 8. Die Landluft war in der Herstellung dieses Jünglings wohlthätiger, als die Behandlung des geschicktesten Arztes. 9. Ovid ist ein nicht so angenehmer Schriftsteller, als Virgil. 10. Der Frühling ist veränderlicher, als der Herbst. 11. Diese Aussicht ist schön, aber die Aussicht von jenem Hügel ist schöner. 12. Augustus war vielleicht kein größerer Mann als Antonius, aber er war glücklicher als dieser.

13. Unter allen Blumen ist die Rose am schönsten, wenn nicht das Veilchen noch schöner ist. 14. Die Gesellschaft jenes Jünglings ist nicht so angenehm, als die seines Bruders. 15. Mont Blanc ist ein hoher Berg, aber der Chimborasso ist höher, und der Mont Everest ist der höchste. 16. Tugend ist mehr (or höher) zu schätzen als Reichthum. 17. Die Soldaten gehen nach Wien. 18. Der Holzhauer haut die höchste Buche des Waldes ab. 19. Rom ist die Hauptstadt von Italien. 20. Die Sterne am Himmel scheinen hell. 21. Sie ist mehr schön als liebenswürdig. 22. Je lauter der Mann schrie, desto schneller lief der Knabe. 23. Der Schiffer ruderte schnell über den Fluß.

EXERCISE 54 (Vol. I., page 282).

1. Will your son hold my horse? 2. He did hold it, but he has received a letter which he wants to read. 3. How has this boy behaved? 4. He has behaved well; he has carried my umbrella. 5. The Russians have found a brave hero. 6. The Germans have invented many useful arts. 7. This beggar has stood an hour at the door; he has not understood me. 8. Has this bootmaker time to make me a pair of boots? 9. He has no time to make you boots, he has promised too much to others. 10. Has the peasant more coffee to drink than bread to eat? 11. He has bread enough to eat and water to drink; but he has no coffee. 12. Have you the same books which my neighbour has had? 13. Has the sailor answered his brother? 14. No, I have answered his letter.

EXERCISE 55 (Vol. I., page 282).

1. Sie haben die Fremden mir und Ihnen empfohlen. 2. Es wohnt in Neapel einer meiner Freunde, ich werde ihn an Sie empfehlen. 3. Einer meiner Freunde, welchen Sie bei mir gesehen haben, hat Amerika bereist, und mir einen Brief geschrieben, in welchem er seine Reise beschreibt. 4. Ein Mann von Ehre erniedrigt sich vor Niemanden, in welcher Lage er sich auch befinden mag. 5. Erhielten Sie die Neuigkeiten vor uns? 6. Ich erhielt sie nach Ihnen; die ganze Nachbarschaft wurde auch davon unterrichtet, als wir Ihren Brief erhielten. 7. Die Kinder versprachen dem Vater, gehorsam zu sein. 8. Vortheile können aus dieser Erfindung entspringen, welche Niemand berechnen kann.

EXERCISE 56 (Vol. I., page 282).

1. Does your father not go out to-day? 2. He has already gone out; he has risen this morning very early. 3. Where has he gone to? 4. He has gone to his neighbour; he will go into the country. 5. Where will you go to? 6. I must go into the market, in the garden, and to the well. 7. His friend has written to him that he has arrived in America. 8. When did you begin to learn German? 9. I began to read six weeks ago. 10. When will you begin to learn French? 11. I have already begun to read, and shall soon begin to speak. 12. Will you do me the favour to light a lamp? 13. I will do it with the greatest pleasure. 14. Has the servant already made the fire? 15. No, she has not yet made it.

EXERCISE 57 (Vol. I., page 282).

1. Wollen Sie die Güte haben, mir diese Wörter auszusprechen? 2. Sprechen Sie gut aus? 3. Ich glaube ich spreche gut aus, aber mein Bruder spricht besser aus. 4. Manch einer unschuldigen Seele ist durch Lesen schädlicher Bücher geschadet worden. 5. Der Sturm hat die Gesellschaft in ihrem Vergnügen gestört, und das Haus zerstört. 6. Ich habe Lust in ihrem Vergnügen gestört, und das Haus zerstört. 7. Die Leute, welche das Haus in Brand steckten sollten gestraft werden.

EXERCISE 58 (Vol. I., page 283).

1. Will you have a pattern from this cloth or that? 2. I will have neither. 3. We will give him a dollar for each of the two men. 4. Do you drink wine or beer? 5. I drink neither wine nor beer (or, I drink neither). 6. You are right in having done this. 7. Is John right in remaining out so long? 8. No, he is wrong, as he has to learn his exercises. 9. How much cloth does little Frederick require for a summer coat? 10. He requires just as much as for a winter coat. 11. The state of Pennsylvania furnishes just as much coal as the whole of England. 12. Does not Gustavus work quite as much as his brother Armann? 13. Little Eliza gave her sister Paulina just as many plums as her friend Emma. 14. Have not our neighbours a garden? 15. No, they have not one yet. 16. Shall you still remain a long while in the country? 17. I shall still remain a short time, and my friends also. 18. Are you going to take another walk to-day? No, because I must still work. 20. The tears of joy of the long-separated friends affected the hearts of all spectators. 21. Can you sell these goods cheaper? 22. It is quite impossible. 23. You must do this differently. 24. What can I do otherwise? 25. You must speak and act differently. 26. I shall visit you, if you allow it. He narrated this affair quite differently. 28. It makes a difference whether I write, He is "learned," or "empty."

EXERCISE 59 (Vol. I., page 283).

1. Hat der Lehrer das Papier oder das Buch weggenommen? 2. Er hat Beides weggenommen; denn Beides gehört ihm. 3. Beide Städte liegen an schiffbaren Flüssen. 4. Sie mögen eine jede Richtung nehmen, da beide so weit fortgeschritten sind. 5. Ein großer Theil des Landes in Amerika ist noch unangebaut. 6. Derjenige, welcher den Zweck will, muß auch das Mittel wollen. 7. Das Dampfschiff, Rhein, ist soeben nach Holland abgesegelt. 8. Sie irren sich völlig, wenn Sie sagen, daß Sie jede Schwierigkeit ganz überwunden haben, wo nicht, so würde alles, was Sie vorgegeben haben, richtig sein. 9. Welcher von uns hat Recht, ich oder er? 10. Sie haben Beide Unrecht. 11. Es ist etwas ganz anderes zu sagen, daß er unwohl sei, und in Folge dessen nicht kommen könnte. 12. Ich werde nicht mehr davon sprechen, denn ich habe bei genauer Untersuchung gefunden, daß er weder habsüchtig noch verschwenderisch ist. 13. Sie halten sich selbst nicht für besser als andere. 14. Emma ist ebenso verständig als Elisa. 15. Der Matrose segelt morgen nach Amerika ab. 16. Trinken Sie Wein oder Bier? 17. Ich trinke weder Wein noch Bier, ich trinke immer Wasser. 18. Gustav gab dem Knaben einen Thaler, um Kohlen für seine Mutter zu kaufen. 19. Pennsylvanien ist ein reicher und blühender Staat in den Vereinigten Staaten von Amerika. 20. Sie ist gerade wie ihre Schwester. 21. Gieb dem Knaben noch einige Pflaumen. 22. Ich habe keine mehr. 23. Das Mädchen vergeß Freudenthränen, als sie ihre Mutter sah. 24. Diese Waare ist billig, und das Muster derselben ist schön. 25. Mein Freund hat einen neuen Winterrock gekauft. 26. Dieser Kaufmann schickt seine Waaren auf einem Wagen in die Stadt. 27. Wollen Sie morgen einen Spaziergang machen? 28. Es ist unmöglich.

LESSONS IN BOOKKEEPING.—XVII.

THE LEDGER (*continued*).

THE *Profit and Loss Account*, which may be called the *Check Account*, because it constitutes the real *check* on the *Balance Sheet* of the Merchant, is now to be debited to every *Property Account* on which there is a difference exhibiting *a Loss* on the business; and the same Account is to be credited by every *Property Account* on which there is a difference exhibiting *a Gain*. Consequently, as soon as these entries are made, all accounts of both kinds must be balanced as before, and the accounts themselves may be *closed up* as formerly directed. The difference between the amount of the *Losses* and the amount of the *Gains* on opposite sides of *The Profit and Loss Account*, will exhibit at once the *Net Gain* or the *Net Loss*, according as the amount of the one or the other preponderates. If the difference be *Net Gain*, it is then placed to the credit of the *Stock Account*, and the *Profit and Loss Account* is then balanced by debiting it to *Stock Account*. If the difference be *Net Loss*, the *Profit and Loss Account* is then balanced by crediting it *by Stock Account*. Of course the former process will show that the Merchant has *gained* by his business, and that his *Stock* is increased; the latter process will show that he has *lost* by his business, and that his Stock is diminished.

The *Net Stock*, independent of *Gains* and *Losses*, is at once ascertained by deducting from the amount placed to the credit of *Stock Account* the amount abstracted from the business for *Private Account*, that is, for the Merchant's own private use, as Household Expenses, etc. This is done systematically by making *Stock Account* Dr. to *Private Account*, as we have done in the Journal, in the first entry under the head of *General Balance;* this entry at once balances *Private Account*, and reduces *Stock Account* to its proper dimensions. When all the entries above mentioned have been made in the *Stock Account*, it will be found that the sums of both sides of this account are the same, a demonstrative proof that the books are correctly balanced, and that the Merchant's *Real Worth* has been correctly ascertained. *Stock Account* may now be *closed up*, and the Books are completely balanced. If the Ledger will admit of carrying on the business for another period, whether a whole year, or half a year, all the accounts which are *closed up* by *Balance Account* must have the balances carried under the closing-up lines, to the opposite sides of these accounts, in order to carry on the business as before; but if a new Ledger be required, the balances can be entered in the new *Stock Account*, as New *Assets* and *Liabilities*, and Journalised and posted as if they were original entries in the *New Ledger*.

In the old Italian system of Bookkeeping, the question was usually put to the Bookkeeper, in order to test the clearness of his views on the subject, "What is the reason that the difference of the *Stock Account*, added to the difference of the *Profit and Loss Account*, gives the exact difference of the *Balance Account?*" With this question we leave our students at present, hoping that, from what we have said, they will be able to answer it.

*

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(1) LEDGER A. (1)

DR. STOCK ACCOUNT. CR.

1881.				£	s.	d.	1881.				£	s.	d.
June	30	To Private Account . .	7.	59	0	0	Jan.	1	By Cash	1.	1200	0	0
„	„	„ Balance Account . .	„	1882	11	3	June	30	„ Profit and Loss . .	7.	741	11	3
			£	1941	11	3				£	1941	11	3

DR. PRIVATE ACCOUNT. CR.

1881.				£	s.	d.	1881.				£	s.	d.
Jan.	22	To Cash	1.	10	0	0	June	30	By Stock Account . .	7.	59	0	0
Mar.	18	„ Do.	3.	20	0	0							
April	30	„ Do.	4.	9	0	0							
June	15	„ Do.	6.	20	0	0							
			£	59	0	0				£	59	0	0

DR. CASH. CR.

1881.				£	s.	d.	1881.				£	s.	d.
Jan.	22	To Sundries . . .	1.	2205	0	0	Jan.	22	By Sundries .	1.	2205	0	0
Feb.	26	„ London and Westminster Bank . .	2.	220	0	0	Feb.	28	„ Do. .	2.	220	0	0
							Mar.	30	„ Do. . . .	3.	2908	14	9
Mar.	29	„ Sundries . . .	3.	2920	8	6	April	30	„ Do. . . .	4.	1161	19	7
April	25	„ Do. . . .	4.	1150	13	7	May	30	„ Do. . . .	5.	1661	13	3
May	29	„ Do. . . .	5.	1679	7	2	June	30	„ Do. . . .	6.	1815	18	9
June	30	„ Do. . . .	6.	1800	11	4	„	„	„ Balance Account . .	7.	2	14	3
			£	9976	0	7				£	9976	0	7

(2) LEDGER. (2)

DR. PETTY CASH. CR.

1881.				£	s.	d.	1881.				£	s.	d.
Jan.	10	To Cash	1.	10	0	0	June	30	By Charges . . .	6.	57	8	9
Feb.	28	„ Do.	2.	10	0	0	„	„	„ Balance Account . .	7.	2	11	3
April	15	„ Do.	4.	20	0	0							
May	11	„ Do.	5.	10	0	0							
June	5	„ Do.	6.	10	0	0							
			£	60	0	0				£	60	0	0

(2) (2)

DR. BILLS RECEIVABLE. CR.

1881.				£	s.	d.	1881.				£	s.	d.
April	26	To Sundries . . .	4.	600	1	8	May	29	By Cash	5.	1031	19	2
May	31	„ Do. . . .	5.	2132	8	10	June	30	„ Do.	6.	1700	11	4
June	11	„ Powell and Co. . .	6.	308	5	0	„	„	„ Balance Account .	7.	308	5	0
			£	3040	15	6				£	3040	15	6

D BILLS PAYABLE. CR.

1881.				£	s.	d.	1881.				£	s.	d.
April	24	To Cash	4.	288	3	4	Jan.	31	By Sundries . . .	1.	751	7	1
May	3	„ Do.	5.	327	5	0	Mar.	31	„ Baring, Smith and Co.	3.	288	1	3
June	3	„ Do.	6.	135	18	9	April	29	„ Sundries . . .	4.	484	5	4
„	30	„ Balance Account .	7.	772	6	7							
			£	1523	13	8				£	1523	13	8

(3) LEDGER. (3)

DR. THREE PER CENTS. CONSOLS. CR.

1881.				£	s.	d.	1881.				£	s.	d.
June	17	To Cash	1.	985	0	0	Mar.	3	By Cash	3.	997	10	0
„	30	„ Profit and Loss . .	7.	12	10	0							
			£	997	10	0				£	997	10	0

DR. COTTON. CR.

1881.				£	s.	d.	1881.				£	s.	d.
Jan.	26	To Sundries . . .	1.	751	7	1	Feb.	21	By Sundries . . .	2.	673	19	9
Feb.	25	„ Do. . . .	2.	1146	14	7	Mar.	22	„ Do. . . .	3.	559	12	4
Mar.	24	„ Baring, Smith and Co. .	3.	288	1	3	April	30	„ Do. . . .	4.	1150	3	4
April	22	„ Sundries . . .	4.	667	9	7	May	27	„ Do. . . .	5.	856	9	2
June	30	„ Profit and Loss . .	7.	769	18	7	June	1	„ Powell and Co. .	6.	308	5	0
							„	30	„ Balance Account .	7.	75	1	6
			£	3623	11	1				£	3623	11	1

DR. LONDON AND WESTMINSTER BANK. CR.

1881.				£	s.	d.	1881.				£	s.	d.
Jan.	3	To Cash	1.	1200	0	0	Jan.	22	By Cash	1.	1005	0	0
Feb.	22	„ Do.	2.	100	0	0	Feb.	26	„ Do.	2.	220	0	0
Mar.	30	„ Do.	3.	2460	0	0	Mar.	26	„ Do.	3.	800	0	0
May	30	„ Do.	5.	500	0	0	April	27	„ Do.	4.	990	0	0
June	30	„ Do.	6.	1650	0	0	May	20	„ Do.	5.	550	0	0
							June	3	„ Do.	6.	100	0	0
							„	30	„ Balance Account .	7.	2245	0	0
			£	5910	0	0				£	5910	0	0

(4) LEDGER. (4)

DR. INTEREST. CR.

1881.				£	s.	d.	1881.				£	s.	d.
May	25	To Cash	5.	1	2	3	June	30	By Profit and Loss .	7.	1	2	3

DR. CHARGES. CR.

1881.				£	s.	d.	1881.				£	s.	d.
Feb.	25	To James Manning . .	2.	3	12	2	May	16	By Perkins and Co. .	5.	21	5	10
June	30	„ Petty Cash . . .	6.	57	8	9	June	30	„ Profit and Loss .	7.	39	15	1
			£	61	0	11				£	61	0	11

HISTORIC SKETCHES.—XXVI.

THE DAGGER SCENE IN THE HOUSE OF COMMONS.

On the 28th of December, 1792, the English House of Commons was occupied by a very grave subject, and the foremost men of the day took part in the debate. The subject under consideration was whether or not aliens—that is to say, persons not subjects of the King of England—should not be subjected to some regulations, such as giving security for good behaviour, while resident within the realm. Among those who took part in the debate were Pitt, Fox, Sheridan, Erskine, Lord Sheffield, Grey, and Burke, and the contest among them ran high.

The Government had thought fit to bring in a bill for the regulation of aliens, to the intent it might be known who was and who was not in the country, and they justified their measure by an appeal to the existing state of public affairs. Mr. Fox, who was at the time leader of the Opposition, vehemently denounced the bill as utterly unnecessary, and quite unworthy of the Government. A few nights before, in the course of a debate on the influence of the French constitution, and more especially on a proposal of his own that the king should be requested to send a minister to Paris to negotiate with the French Provisional Government, he had used the most violent and inflammatory language, and had asserted that the country, so far from being in the unsettled condition described by the ministers, was perfectly quiet, perfectly loyal, and that there did not exist any warrant, in fact, for the exceptional legislation demanded by the Government. His proposal had been, indeed, rejected, but the same spirit which induced him to make it continued to animate him, and on the Alien Bill he spoke with his wonted warmth, eloquence, and bitterness. The year before he had—not of his own will, certainly—publicly broken a friendship with Burke which had lasted for a quarter of a century; Mr. Burke having on that occasion said in the House of Commons, adverting to the effect which his altered opinions upon the current of French affairs would have upon his private friendships, alluding more especially to his friendship with Fox, "I know the value of my line of conduct; I have, indeed, made a great sacrifice. I have done my duty, though I have lost my friend. There is something in the detested French constitution that envenoms everything it touches."

Attempts were made to heal the mortal wound which the friendship of these two men had received, but to no purpose; the breach was irreparable, and on the Alien Bill, therefore, Burke and Fox were widely opposed. On the 28th of December, 1792, Burke, who did not rise till late in the evening, spoke long and eloquently on the question. He said that the ministers of a monarchy could not, and ought not, to have their hands tied behind them while the emissaries of republicanism, regicide, and atheism poured into the country with the intention to destroy it, and were yet, through the weakness of the law, to be beyond control. From discussing the principles he went on to describe the practice of those whom he called "emissaries of republicanism, regicide, and atheism," and whom he accused of trying to spread their doctrine of liberty, fraternity, and equality by the sword. Information had come to him that 3,000 daggers had been ordered from Birmingham by the friends of liberty, fraternity, and equality; and in order to make a deep impression on the house, he had resorted to the somewhat theatrical expedient of hiding a dagger under his waistcoat.

At the proper moment, when the attention of the house was concentrated on him, and when his actions, whatever they might be, were certain of being reported, he put his hand inside his waistcoat and drew forth the dagger, which he flung before him on the floor of the house. "This," said he, pointing to the dagger, "is what you are to gain by an alliance with France; wherever their principles are introduced, their practice must follow. You must equally proscribe their tenets and their persons from our shores;" and he ended an impassioned address by begging the house to strengthen the hands, not of the ministry, not of the Opposition, but of the country, by passing the Aliens' Bill.

Happily for us, the times have passed away when such an exhibition, so theatrical, so sensational, would be tolerated in the House of Commons; happily, too, there has not, since 1792, been a recurrence of those circumstances which then made exceptional legislation of the kind mentioned desirable. But manners and customs were different then, and it would be wrong to judge of Mr. Burke's conduct by the light of the conduct of a great political leader at the present time. The circumstances, too, were different to anything within our experience. Let us consider them a little, and see whether the famous "dagger scene" was so much out of place after all.

In 1789 the French Revolution broke out—that is to say, in that year the French people, tired of the load of tyranny and legalised selfishness which had been imposed upon them for centuries, and moved by the exhortations of men who gave themselves out as, and believed themselves to be, the friends of mankind, rose in their wild strength, and, ignorant of the goal where true liberty and true national happiness were to be found, goaded on by the fierce spirits who ever come to the surface, coming and going like bubbles in time of great public disturbance, maddened by long years of suffering and oppression, conscious only of strength, unconscious how to use it, impelled forwards by the very fact that their existence depended on progress, seeing that the interests and principles of all then existing governments were directly opposed to them—this great people woke up to the conviction they were alive, and they exhibited an amount of vitality and energy that truly took the nations by surprise.

In order to give an accurate idea of the causes which led to the Revolution, it would be necessary to go back through the history of France for a period of two hundred years. We have not space to do this even in a cursory examination, but we may mention some of the principal matters which proved intolerably burdensome to the French people. The many obligations of the feudal system (general notice was taken of these in Historic Sketches, I.) were more offensively enforced, and therefore more keenly felt, in France than in any other European country, and there, too, they were exacted till a date far beyond that at which they had been quite abandoned elsewhere. This of itself was evil enough to rouse the indignation of the classes beneath; but added to it was the injury done by a system of government of which the fundamental principle was feudalism; that is to say, a principle which had regard solely to the interests of the few, who were to be supported in power and sustained in insolence at the expense of the many. And this system of government was carried very far. At one time the nobles were the exponents of it, each ruling absolutely and tyrannically on his separate estate, grinding all he could out of his *villeins*, as they were called, and caring nothing for their individual welfare. Against this oppression the peasantry lodged a practical and brutal protest at the time of the Jacqueric,* in 1358, when the hour of trial and humiliation had come upon the nobles of France through the hands of the Black Prince. When the English armies overran the country, and the French had been beaten with a dreadful slaughter, the French peasants rose upon their native oppressors, and slew them root and branch, often murdering, in their ignorance and blind fury, those who were really their benefactors, and being guilty of the crime of killing women and children. Only by the aid of the Black Prince and his knights was this formidable insurrection of one class against another suppressed, and the lower classes would have been relegated indefinitely to their former bondage, but for the desire of the French kings—a desire which could not be gratified without the help of the people—"to deliver the Crown from wardship," or to free it from the restraints imposed upon it by the power of the great nobles.

As a consequence of this coalition, temporary though it was, between the Crown and the people, some slight benefit accrued to the latter; but when the object for which the Crown had striven had been attained, the people found out by experience that it was unwise to put their trust in princes. Once more they were handed over, or, what had the same effect, were left to, the tender mercies of the cruel, and they had to bear the kingly tyranny as well. They had to live the lives of slaves on the estates of the landed proprietors, rising early and late taking rest,

> "Barred from delight by Fate's untimely hand,
> By wealthless lot, or pitiless command,"

condemned to ignorance lest they should learn to know their strength, and crushed under the weight of laws in the making of

* The Jacquerie was so called from the name Jacques Bonhomme, which was the generic name given to French peasants, as John Bull is the generic name descriptive of Englishmen.

which they had no voice, and the force and object of which they knew only through suffering.

In some respects the condition of the people as regarded the lords was better than it had been before the Jacquerie, but what they gained in this direction they lost in another, for whenever they succeeded in asserting a *quasi* independence on the seigneurs, they became amenable to the heavy and far-reaching hand of the king, for whose service their persons were taken, and for whose prodigal expenses their little ewe lambs were killed. Nor was this all. Had the people been required to make these sacrifices in behalf of a strong government, which spent the money it drew from taxes in promoting the glory and honour of the kingdom, they might have borne their lot without doing more than murmur; but when they found that direct taxes were levied in addition to indirect taxes, which were laid upon the very necessaries of life, in order to support the king and his courtiers in riotous living—when they found that not only were they oppressed, but also that they paid for the means of oppression, they did something more than murmur, and they bided their time for the expression of their wrath.

During the long reign of Louis XIV., the Grand Monarque, as his flatterers called him, the people were blinded, though they suffered, by the magnificence to which they contributed. The honest endeavours of a few ministers to do right and justice towards the people, to improve the internal condition of the country, and to develop its resources, had also been fully appreciated; but with the death or withdrawal of these ministers, their endeavours ceased also; and what they had done remained but as a token of what might still be, and as a foil to set off the absence of further efforts in the same direction. Frenchmen almost forgave Louis XIV., Louis the Magnificent, the Grand Monarque, though men died of hunger outside his park railings, and though his lavish expenditure upon himself and his glory had drained France of money and utterly ruined her. He had a lustre borrowed from the great men who served him, and had, like our Charles II., a certain way with him which won the popular fancy. But when his grandson, Louis XV., succeeded him, and fresh demands were made on the already exhausted country, not for the glory or even the decent maintenance thereof, but for the expenses of mistresses, the wages of sin, and the support of that ignoble host who are ever found in the courts of bad princes, the people turned and listened to the voice of those seductive charmers who told them of a way by which they might be free of their burdens for ever. Mr. White, in his "History of France," says well, "Debasing tyranny like Louis the Fourteenth's, degrading viciousness like Orleans' and Dubois', and the wider and more systematic demoralisation introduced by the king who was now ready to assume the sceptre, could not fail, sooner or later, to produce fruits worthy of the altogether corrupted tree which had been planted in such soil and tended by such hands."

The storm did not burst on the heads of those who had gathered it; the offences of the fathers were visited upon the children, in whose day the system of which they were the visible representatives was ripe for destruction. Upon the mild, good-intentioned, weak Louis XVI. and his family did the storm of popular anger break. Would-be friends of the people, who thought, moreover, that they could stop the ball whenever they pleased after it had been set rolling, began the movement, and in a very short time they found, to their infinite dismay, that they could *not* "ride on the whirlwind and direct the storm."

Louis XVI., finding the country on the verge of bankruptcy, and that the efforts of three of the most eminent financiers of the time had been tried in succession, but in vain, to redeem the finances, resolved to make an appeal to the notables of France, the peers, nobles, and magistracy, men who for the most part contributed nothing in the shape of taxes towards the burdens of the State, though they enjoyed immense privileges—one, the most monstrous, being that as nobles they were free from taxation. The notables accordingly assembled in 1788, but separated without lending the king any help; they would not give up their pensions, they would not submit to be taxed, and they were not their brothers' keepers; what had they to do with the sufferings of the vulgar? On the 1st of May, 1789, the States-General met for the first time since 1614. In the States-General all classes were represented, the starving shopkeeper, the ruined farmer, the intellectual but untitled, and therefore despised professional man, the curé of lowly birth but ample brains, as well as the pompous prelate and the dissolute duke. The States-General were to consider the situation of France. Within a week of their meeting dissensions broke out which by their very nature were difficult to be allayed, but which hatred, long cherished during so many years, made inextinguishable as between the noble and the human classes. Louis, to gain time, and in hope of stilling the disorders, prorogued the assembly for a month; but when the Commons, wishing to enter their hall, were refused by soldiers with fixed bayonets, they adjourned to the Tennis Court of the Palace of Versailles, and took an oath not to dissolve till they should have attained the object for which they met, and they called themselves the National Assembly. A number of priests and nobles from the other section of the States-General joined them, and the king was obliged to yield. The Assembly met again, and all caste privileges were abolished, taxes were ordered to be levied on all classes alike, and the closed professions, the army and the civil service, were thrown open; restrictions were removed from the press, the public debt was secured, personal and religious liberty were promised. But the States-General would not dissolve, and when the king threatened and then withdrew his threats, they assumed supreme power, and the National Assembly was king in his stead.

On the 14th of July, 1789, the populace of Paris, excited by what had taken place, and anxious to make use of their newly-gotten power, rushed in arms to the Bastille, the fortress in which so many dark deeds had been committed, and, after a brief resistance, overcame the guards, demolished the fortress, and, leading the governor and his officers to the Place de Grève, cut off their heads, which they paraded about on pikes. In the country the example of Paris was imitated; the people rose on the estates, and murdered, outraged, and destroyed; they burnt castles and title-deeds, all the relics of the old system they could come across; ousted the king's authorities in the towns, and set up their own instead. In October, Louis, who had been forced with his own hands to "undeck the pompous body of a king," and to submit himself on many occasions to the authority of the National Assembly, was driven to Paris from Versailles by a mob of hungry, unkempt folk, who had been induced to come down in consequence of some indiscretion on the part of the royal guards. In Paris the royal power was at an end; the nobles saw it and fled, they and their families, and all they could transport, into foreign countries. Thousands of people left the country, and the gold they took with them was so great in quantity that a circulating medium ceased almost entirely. In 1791 the Marquis de Mirabeau, who at one time was the fiercest denouncer of the old order, but who had veered round on beholding the excesses committed and to be committed by the popular side, died, and with him went the last chance for royalty. In all the clubs of Paris, in the churches, in every other house, was heard the voice of violence, proclaiming eternal hatred to kings, and inflaming the popular frenzy against that poor king who was really a prisoner in his palace at the Tuileries.

The king having been put on one side, foreign princes feared for themselves, and, in the name of royalty generally, took up arms against the Revolution. Thousands of French emigrants swarmed in the enemies' ranks, and there is reason to think that Louis himself authorised negotiations which had for their object his release from restraint by means of foreign troops. Once he attempted to escape, but through imperfection in the arrangements he was detected at Varennes, and brought back to Paris; and the people, who discovered his part in bringing the foreigner into France, attacked his palace, slaughtered his guards and all his servants, and would probably have slain him, had he not taken refuge, with his family, in the Hall of the National Assembly. From the National Assembly the royal family were removed to the prison of the Temple, which the king and queen never left again till the days of their trial and execution.

On the 10th of August, 1792, when the Tuileries were attacked by an infuriated mob, monarchy was virtually abolished in France, and the National Assembly, considering itself unequal to the emergency presented by the new circumstances, called a more democratic assembly than itself, the National Convention, to take the responsibility. The guides and apostles of this assembly were those who were the fountain-head of all the violence which had taken place—Robespierre, Marat, and Danton. Under them was formed the Revolutionary Tribunal, a court erected for the

express purpose of hurrying forward the executions, and which was found to be fully equal to its infernal work. Thousands of persons were sent to the scaffold on the bare suspicion of not being sound in the cause of the democrats, and, as if this were not enough, the prisons being inadequately guarded, the mob rushed into them, and murdered the inmates before they could be tried. Members of the Convention were sent into the provinces to root out the upholders of the old régime, and awfully they fulfilled their mission. The guillotine could not fall fast enough; volley-firing into squads of helpless prisoners, many of them children, and women with infants at the breast, was resorted to, and so was wholesale drowning, to clear the dungeons. Lists were prepared in which the names of the doomed were written, and in them were to be found, as the Revolution went on, the names of those who at the beginning had supported change, but who tried to check it when the wickedness of the measures of it became so apparent.

Under these circumstances it was that Mr. Burke played his part in the famous dagger scene in the British House of Commons; these were the events he had in his memory when he spoke of what this country had to gain by an alliance with France. And dreadfully was he justified in his assertion of what would happen. Within four weeks of the time he uttered his warning, the head of Louis the Sixteenth of France had rolled on the scaffold, and already had the French rulers issued an invitation to all peoples to throw down their princes, and promised them the support of the French armies in doing so.

The scene at the death of the king has been graphically pictured by the Abbé Edgeworth, who was himself an eye-witness:—"On quitting the tower, the king crossed the first court, formerly the garden, on foot. He turned back once or twice towards the tower, as if to bid adieu to all most dear to him on earth; and, by his gestures, it was plain that he was trying to collect all his strength and firmness. At the entrance of the second court a carriage waited; two gensd'armes held the door: at the king's approach, one of these men entered first, and placed himself in front; his majesty followed, and placed me by his side at the back of the carriage; the other gend'arme jumped in last, and shut the door. The procession lasted almost two hours; the streets were lined with citizens, all armed; and the carriage was surrounded by a body of troops, formed of the most desperate men of Paris. As soon as the king perceived that the carriage stopped, he turned and whispered to me, 'We have arrived, if I mistake not.' My silence assured him that we had. On quitting the vehicle, these guards surrounded his majesty, and would have taken off his clothes, but he repulsed them with haughtiness; he undressed himself, untied his neckcloth, opened his shirt, and arranged it himself. The path leading to the scaffold was exceedingly rough and difficult to pass; the king was obliged to lean on my arm, and, from the slowness with which he proceeded, I feared, for a moment, that his courage might fail. But what was my astonishment when, arrived at the last step, I felt that he suddenly let go my arm, and I saw him cross with a firm foot the breadth of the whole scaffold, silence, by his look alone, fifteen or twenty drummers that were placed opposite to him, and in a loud voice heard him pronounce distinctly these memorable words:—'I die innocent of all the crimes laid to my charge; I pardon those who occasioned my death; and I pray God that the blood you are now going to shed may never be visited on France.' He was proceeding, when a man on horseback (this was Santerre), in the national uniform, waved his sword, and ordered the drums to beat. Many voices were heard at the same time encouraging the executioner, who immediately seized the king with violence, and dragged him under the axe of the guillotine, which, with [illegible] his head from his body."

It must indeed have been painful to a keen lover of liberty as Burke was, to be compelled to range himself on the side which was seemingly opposed to it, to be compelled to break with old friends whose tutor and father in politics he had been. But he saw what they did not see, that liberty carried to excess had become licence, that licence was not capable of being contained within any bounds, and that unless a check were forthwith applied to the spirit of licence here, the wild asserters of freedom would in this country, as in France, "cry havoc, and let slip the dogs of war!" "Truth, truth! How many lies are told in thy name!" These words of an eminent truth-seeker are strictly applicable to the case of the founders and the overthrowers of the French Revolution; but the former had at least the merit of believing what they said, and they sealed their profession with their blood. In England they had many admirers, none greater than Edmund Burke himself, and included within their ranks were Fox and his political friends, who, heedless of the example forced upon their notice, reckoned on their own power to introduce revolutionary principles into the English constitution, and to stop them at a certain point with some magic words, like those of King Canute, "Thus far shalt thou go, and no farther."

Outside the Parliament, in the ranks of the middle and lower classes, the principles of the Revolution had numerous adherents, though there was not the same reason for adopting them as there was in France. England had never at any time since Magna Charta been in such slavery, never had suffered so dreadfully, as France did before the Revolution, and those dangers which ambition, and pride, and the tyranny of priest, peer, or king, might threaten, had been sufficiently guarded against years before by many constitutional barriers. But there was just enough of misgovernment, of selfishness, corruption, and disunion in the country in 1789, to allow of the key-note struck in the French States-General vibrating through many an English breast. The lovers of change for change's sake of course felt it, and there were numerous lovers of the abstract principle of liberty who recognised in what was going forward the assertion of a right which they believed to emanate from God himself. There was not, however, any guarantee that even the most honest professors might not be carried away by their enthusiasm, or be swamped, as the French asserters of freedom had been, by the men of passion, while there could not be any doubt that on the first show of disaffection in high places, there would be found men of violence who by their nature would have carried events far beyond the bounds prescribed for them by their authors. At the very time Mr. Burke spoke, there were in London many political societies, some secret, others bold in declaring themselves, of which the members openly avowed their sympathy with the French in all that had been done, and it was no mystery that these societies were in direct communion with the most revolutionary of the French political clubs. From the press flowed daily a torrent of seditious matter, and men who, perhaps, did not mean that their words should be taken literally, but only wished to stir up the popular will to achieve something short of what was indicated and what was preached, enunciated doctrines wholly subversive of the British constitution.

In spite of the warnings given in France, there were men, like Fox, who could not see danger in these facts, and though sobered a little by the news that the son of St. Louis had been sacrificed, persisted in denying that there was any danger to be apprehended from an alliance with the murderers. It was a wish to startle such men into conviction, to bring the matter home suddenly to their minds in an unusual and therefore striking way, that Mr. Burke, on the 28th of December, 1792, resorted to the theatrical expedient of throwing a dagger—the emblem of French liberty, fraternity, and equality—on the floor of the British House of Commons.

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