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The
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VOL. XXXI.]

FEBRUARY 1925.

[No. 2.]

All literary contributions, books for review, newspapers or magazines, sent in exchange, &c., should be addressed to the Editor, No 4, Mount Road, Madras. Articles and communications intended for publication in the succeeding issue should, as far as possible, reach the Editor not later than the 20th of the month. The Editor solicits contributions on all subjects of educational interest. Stamps should accompany the M.S., if the writer wishes it returned, in case of non-acceptance. The Editor can in no case hold himself responsible for accidental loss.

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TWELFTH INDIAN SCIENCE CONGRESS

HELD AT BENARES, 12TH JAN. 1925.

PRESIDENTIAL ADDRESS

By Dr. M. O. FORSTER, F.R.S.,

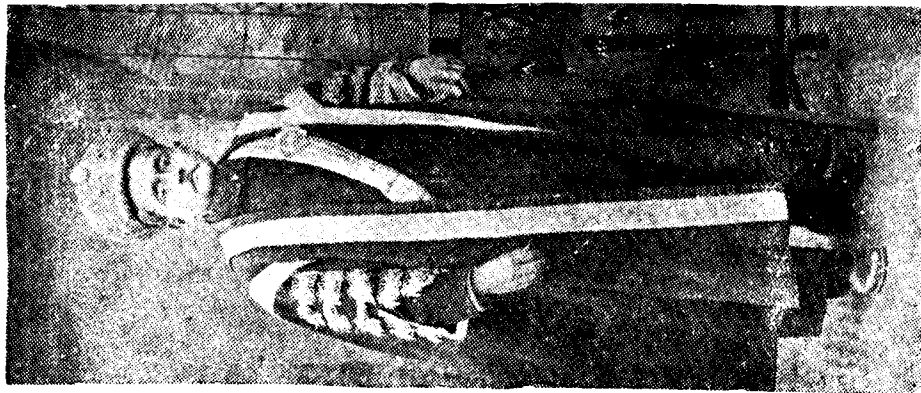
Director, Indian Institute of Science, Bangalore.

SINCE the members of this Congress turned homewards, a year ago, the Moving Finger has recorded the death of three past Presidents. In February, 1924, there died in Edinburgh in his sixty-sixth year, Major-General William Burney Bannerman, who crowned a distinguished career in the Indian Medical Service by filling the office of Surgeon-General, Madras, from 1911 to 1918; it was during this period that he presided at the Madras Meeting, 1915.

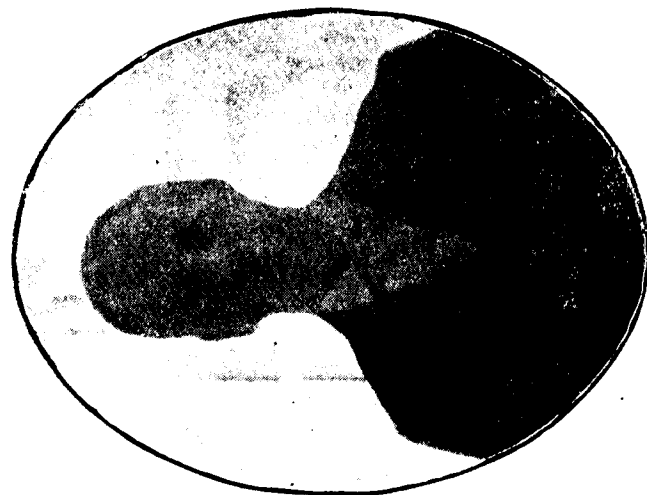
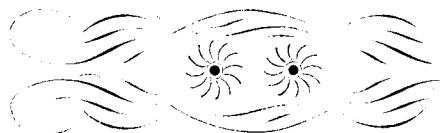
In the following April, while the happy impression of his presidential activ-

ity yet lay fresh upon us, Dr. Thomas Nelson Annandale died in Calcutta after a brief illness at the age of forty-eight. Becoming Superintendent of the Indian Museum in 1906, and appointed Director of the Zoological Survey of India ten years later, he was on the full tide of scientific achievement, illuminating his technical excellence in zoology and anthropology by broad human vision and by characteristic literary expression.

Six weeks later, an equally unexpected shock befell the Congress in the sudden death of Sir Asutosh Mookerjee at Patna, in his sixtieth year. Distinguished alike as jurist, educationist and mathematician, famous for his robust independence of character, his name will endure the passage of time, perpetuated by a constructive genius which devoted



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itself unstintingly to the University of Calcutta. To his English admirers, he represented a conspicuous example of an Indian who could appreciate and use for his country's benefit the best factors in Western culture without surrendering one particle of his nationality. He was the first President of the Indian Science Congress, 1914, and had consented to preside at the Bangalore Meeting, 1924; prevented by bad health at the last moment from occupying the chair, his place was taken by the late Dr. Anandale.

It is with deep consciousness of our loss, and with profound respect for the dead, that I take up the burden which they have laid down. I cannot hope to serve this Congress as they served it, but I can claim to be as much in earnest for promoting its aims; and they could not have been more deeply, than I am, sensible of the distinction conferred by you each year upon the member you select as President.

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"True conquests, the only ones which leave no regrets, are those which are gained over ignorance. The most honourable, as well as the most useful, occupation for nations is to assist in extending human knowledge."—BONAPARTE.

"The ultimate aim of bio-chemistry is to gain complete insight into the unending series of changes which attend plant and animal metabolism."—EMIL FISCHER.

Among the million pilgrims annually visiting this venerable city, the members of the Indian Science Congress form a

numerically trifling proportion; but a little leaven leaveneth the whole lump, and we should be lacking at once in imagination and fidelity to our trust if we did not hope and believe that our presence here, dramatic enough in its juxtaposition of ancient and modern, is entitled also to assume the aspect of a favourable omen, presaging the day when the kingdom of Science, the study and better knowledge of Nature, shall surely come.

This assembly has a great opportunity for usefulness and benefit to India if the members will regard themselves as evangelists, spreading from place to place the gospel of scientific truth and beauty. We must, however, guard ourselves against one, very common, evangelical error. In our enthusiasm for propagating the knowledge of Nature, we ourselves run the risk of putting Nature in blinkers. Because modern Science is to us the most enthralling of pursuits, constantly revealing new intellectual delights and everywhere making fresh contacts with daily needs, we are too disposed to assume that we are the only apostles of light, and that our unregenerate brethren are angels of darkness. We do not always call them angels, and the epithets we do use, or imply, must be sometimes the source of perfectly legitimate irritation to them. For sixty or seventy centuries the historical world has run along certain definite lines which have been strictly limited by human nature. For how many centuries it ran along those lines

before the dawn of history we can scarcely even speculate; and yet, without any recognisable alteration in human nature we complain that our brethren, limited as we all are by personal pre-occupations, temperamental disinclinations and the various other fetters by which humanity is enchained, have not, in the bare century during which scientific men have become coherently articulate, fallen on our necks, proclaimed Science the only god and us his prophets.

EXPERIMENTAL TRAINING.

Leaving now the shadow, let us pass to the sunshine. The fundamental principle of a scientific training which distinguishes it from the systems of classical instruction is experiment. The outstanding mental advantages to be gained by such training are (a) cultivation of the observational powers, (b) the art of deduction, (c) linguistic precision, (d) appreciation of Nature, and (e) understanding of truth. The last-named is incomparably the most important of these because health, happiness, prosperity and civil harmony have their common foundation in honesty—honesty of purpose, word and deed. No country can afford to neglect the teachings of modern Science, but a country standing so close to Nature as does India, where man is alternately threatened with flood, famine and disease, or lulled to languorous idleness by beautiful scenery, a splendid flora and the passive contemplation of historic ages—such a country exposes herself to unnecessary physical

risks and denies herself vast opportunities of spiritual development by remaining indifferent to modern revelation.

The reluctance of enlightened peoples to embrace the experimental method in their educational system calls for some explanation. The whole purpose of education is to provide the mental equipment and the principles of character necessary to self-development of the individual, so that the discipline of life may be accepted with courage and the opportunities of living may be enjoyed with self-restraint. Life itself is the greatest and most complex of all experiments and yet, in our preparation for it, the vast majority are allowed to reach maturity untouched by experimental teaching. We are thrown into deep water without having learned to swim, and although some people acclaim that method as best calculated to produce good swimmers, the casualties are surely entitled to question the validity of the hypothesis.

Probably this reluctance to place ourselves in contact with current facts arises from the natural indolence of which we are all, in varying degree, the victims. It is so much easier to read than to write: so much easier to be carried than to walk: so much easier to receive than to give. Thus it has come about that a studious habit and a retentive memory have clothed with a mantle of reputed scholarship many a man who could not give a truthful description of the air he breathes, the water he drinks, or the food he eats. One of the most pathetic

moments in my life occurred when a distinguished scholar and cultivated wit, rightly welcomed by the "best people," sorrowfully confessed that he had not the faintest idea what happens when an electric light-switch is pressed.

THE BALANCED VIEW.

Widespread adherence to ancient learning is not a monopoly of any hemisphere, and another, more creditable factor in the common mistrust of experimental methods may be recognised in the proper reverence which we all must bear to those countless predecessors whose thoughts and actions have entitled them to the respect of posterity. No truly scientific man would allow himself to ignore or belittle those great writers and thinkers who, in conjunction with their disciples, have transmitted a splendid intellectual heritage for our enlightenment; these men, whether named or nameless, are rendered immortal by their spiritual bequests. All that we ask, and we ask it for the benefit of our fellows and of our successors more than for our own advantage, is that a balanced view may be taken of knowledge in its various branches. Nothing can diminish the importance of the past—excepting a slavish obscurantism; the most enlightened homage which we can offer our predecessors, the best form of gratitude we can show for the knowledge that they made, is to follow their example by making fresh knowledge.

DIRT AND DISHONESTY.

Herein lies the potential value of Science to the State, because it is by the

experimental method of studying Natural Science that the mind most rapidly and surely learns to distinguish between fact and fable. Adoption of scientific training as an instrument of general culture is more important to the State than multiplying the number of those who intend to practise a branch of Science as a means of livelihood; the elements of Chemistry and Physics, rightly taught, may become the foundations of civic virtue. Honesty and cleanliness among enlightened peoples are axiomatic: they are inculcated by a study of Chemistry and Physics, because it is impossible to conduct sound experimental work in these branches of Science independently of those principles. More time is wasted by dirt and dishonesty than by any other social vice, because dirt is a common precursor of disease, and the circumvention of potential dishonesty demands the services of numberless healthy and intelligent people who might be so much more productively employed. The profession of stable-door-locking, civil, naval and military divisions, comprises the cream of the world's physique and a large proportion of its brightest brains: if these forces could be directed towards alleviation and prevention of tropical diseases, or the utilisation of solar energy, for example, a dazzling prospect would unfold itself, and their present misdirection becomes a proportionately dismal tragedy.

HUMILITY AND REVERENCE.

Embracing a system of experimental training will not greatly assist India, or

any other nation, however, unless we are willing to assimilate the results in our outlook on life. So far from being a polite accomplishment to be paraded or screened from view as occasion demands, so far from being a fashionable veneer assumed in anticipation of commercial advantage, the best results of this training should find embodiment in the commonplace actions of everyday life, thus engendering an attitude of mind impelling its possessor honestly to attempt an accurate evaluation of ordinary occurrences and human relationships. No mistake could be greater than to suppose that the adoption of such a mental attitude is a surrender to materialism: its real aim is neither more nor less than sanity—soundness of mind and body. Commonsense is attainable by a mind which has thoughtfully ranged the proportions of Nature. Acknowledging of necessity that man cannot grasp the immensity of astronomical distances, or conceive the minuteness of an electron, a frequent survey of the firmament and a daily contemplation of the atom cannot fail to imbue the scientifically trained mind with a spirit of deep humility and reverence. Furthermore, such a mind is capable of acquiring more definite appreciation of actualities than one to which the firmament is merely a grand sidereal spectacle, or in which the subdivision of matter has not proceeded beyond the limits of a dust-grain.

Humility still more profound, and reverence even more sincere must per-

meate the reflections of those who bring scientific method and experimental resources to a study of the manifestations which distinguish living creatures from the elements of which they are composed. Imperfect as our knowledge and understanding of these manifestations must ever remain, clumsy as our efforts to unravel these mysteries must ever appear, they have nevertheless brought mankind to the threshold of a shrine which, to recognise, is most humbly to worship. To my mind, no actions can be more intrinsically religious than those revealing the wonders by which we are surrounded, so bringing us and our fellows to a more intimate understanding of, and consequent veneration for, the complex and beautiful system in which we are scarcely recognisable units. Man approaches more nearly to his Origin, and brings with that approach a deeper conception of his own relative unimportance by these patient attempts to dissect the chemical mechanism of his own and other animal bodies, of plant-life and of the microscopic objects which support him or which prey upon him in uncounted myriads.

A GENUINE MIRACLE.

The members of this assembly are fully competent to supply illustrations of the foregoing principle; I will mention only one of the many which appeal to me. A single cubic millimetre of human blood has a living population approaching that of the State of Mysore. The red corpuscles forming the vast majority of its inhabitants are bodies of great chemi-

cal complexity, and busily wear out their lives in service of the body politic by conveying oxygen to the tissue-cells. Associated with them is a relatively small number of white corpuscles, the policemen of the blood, foe-engulfers, capable of producing proteolytic enzymes which kill and digest the enclosed alien. The medium in which these two classes of inhabitants exert their activities, known as the plasma, carries the food-materials required by the living cells, comprising proteins, amino-acids, carbohydrates, fats and mineral salts, together with some of the necessary oxygen; it also receives the waste products thrown off by the cells in the shape of ammonium carbonate, urea, urates, xanthin bases, creatin and smaller amounts of other carbon compounds. Whilst the corpuscles have shape observable under the microscope, the unit mass of their active constituent, hæmoglobin, is molecular in size, but is nevertheless a definite chemical entity, sharing with the free-moving and simpler molecules already mentioned, the distinction of individuality which, to the chemist, is just as real and clearly defined as that of the personalities which he, as a human being, encounters during social intercourse or in his general reading of books and newspapers.

This microcosm, our cubic millimetre of blood, will also contain a few thousand molecules of hormones, products of the ductless glands, of which adrenaline and thyroxin have already been recognised as definite entities. We are now being

led, however, into a field of complications embracing the problem of immunity, and rather than weaken the illustration, it is better to remind ourselves that all the millions of the above-specified molecules are suspended or dissolved in the necessary millions of water-molecules, and that the cubic millimetre, with its myriad contents, must be multiplied by about five millions to provide enough blood for the vascular system of a normal man. It is on the maintenance of a physico-chemical balance amongst these millions of millions of individuals, a balance unimaginable by the most experienced physicist or chemist, that the indescribable blessing of "feeling well" depends. Is not this a genuine miracle?

INSULIN.

A glimpse of the discriminating mechanism by which this miracle proceeds during the span of healthy life has been lately accorded by the study of insulin. Those who desire to inform themselves concerning this material should read the address delivered by Mr. F. H. Carr to the Annual Meeting of the Society of Chemical Industry at Liverpool on 11th July, 1924; it is dramatic in every implication of the narrative it unfolds, and is rendered the more effective by simplicity of language. From this address it becomes plain that the symptom of *diabetes mellitus* which characterises the disease, namely, excessive percentage of sugar in the blood, arises from failure by the pancreas to supply the amount of insulin required

for destroying the sugar (glucose). This amount is extremely small, the most concentrated insulin hitherto produced being able, within two hours, to transform 30,000 times its own weight of sugar, behaviour which groups it with those catalysts most familiar to organic chemists, the enzymes. Thus, administration of insulin to a diabetic patient brings rapid relief by removing excess of glucose from the blood; but conversely, doses too generous may cause death, and a normal pancreas actually contains a lethal amount. From the fact that in health neither sugar nor insulin offers any inconvenience—one of the numerous factors in the above-mentioned physico-chemical balance—it follows that a rise in the proportion of blood-sugar, or some associated condition so affects the release-control of the insulin-store as to liberate the contents in quantity sufficient, but only sufficient, to bring the percentage of blood-sugar once more on a level of toleration. Thus the cause of diabetes may be either failure of the pancreas to produce the insulin, or some fault in the pancreatic mechanism of insulin-release.

The importance of this discovery is not confined to the hopeful prospect of relief offered by its application to alleviating a dangerous and distressing malady. By depicting so clearly the physico-chemical process upon which one health-factor depends it points the way to establishing others. It ranges itself with the better known, preliminary stages of the digestive process by attaining the dignity of a chemical response to a chemical stimu-

lus. It defines another link in the chain of chemical events, amazing in their differential simplicity and equally amazing in their integral complexity, which unceasingly proceed within each one of us and within every living creature.

TEN COMMANDMENTS AND A MICROSCOPE.

Although this integral complexity is beyond human comprehension, the differential simplicity is of an order well within the grasp of an average intelligence endowed with modest experimental equipment. What objection to supplying this equipment can there be? Implanted in every normal human child, growing or grown-up, is a thirst for mystification. The word "mystery" has acquired several meanings, namely, a secret doctrine: anything very obscure: that which is beyond human comprehension: anything artfully made difficult. It may thus connote good elements or bad, and one of life's tragedies rests in the fact that the great majority are allowed to mystify themselves with bad mysteries, dusty cobwebs of the mind, or rotting fruits of ignorance, while hundreds of good, wholesome, stimulating and enlightening mysteries, everywhere making contact with our daily lives, are encountered with stony indifference and not even recognised as mysteries, bad or good. It should be the aim of every educational system, religious or secular, so to equip young men and women that they may be able to acquaint themselves with some of these good mysteries, closer examination of which would provide excitement much

more wholesome, and cultivation much more discerning than the distraction of "the pictures" and the receptivity of "listening in." True religion has a splendid ally in modern science: if required to define the minimum religious equipment for a boy or girl I should suggest, in all reverence, the Ten Commandments and a microscope.

RULERS AND RABBLE.

Is it not our duty, individually and collectively, to spread this gospel of scientific truth and beauty? You, members of the Indian Science Congress, if you really are in earnest, can do it so much more effectively than any Englishman. You are the leaders of scientific thought and activity in this country; in your hands and in those of your acolytes rests the scientific future of India. You are justly proud of your wonderful country, the land of high-speed photosynthesis. You seek self-expression, but hitherto you have left mainly to others the delicate and baffling task of adjusting your incomparable territory to the growth of knowledge. Here and there gallant examples of scientific achievement by Indian investigators have become entitled to the highest respect of the West: here and there, noble benefactions for the furtherance of scientific study have been made. The contribution of India to the progress of natural knowledge, however, is disproportionate to her splendid resources, intellectual and material, and the deficiency is not attributable to the tyranny of British rule. It is noteworthy, in fact, as a

general principle, that rulers and rabble sin against Science far less by active persecution than by passive neglect. Galileo might have pursued his astronomical observations unhampered by Inquisitorial attention had his mercurial temperament not led him to overstep the limits of controversial sobriety; it never has been considered good form to make fun of a Pope, but to do so in the seventeenth century was asking for trouble. Neither the Birmingham rioters who mobbed Priestley nor the revolutionary tribunal who decapitated Lavoisier took the slightest interest in phlogiston; it was the revolutionary sympathies of Priestley which enraged the anti-revolutionary scum of Birmingham, and the anti-revolutionary tendencies of Lavoisier which infuriated the revolutionary cut-throats of Paris.

"THE GOOD OLD TIMES."

To the scientific representatives of a nation priding herself on freedom from materialism, and claiming for the East superiority over the West in attachment to things of the spirit, I pass with some trepidation from the ghostly allurements of scientific work to the more prosaic loaves and fishes. Occasionally in England you will encounter a fanatic who claims to long for "the good old times." On examination, you will find that he has never embarked on the slender research which suffices to reveal the disgusting details of the good old times. When I meet such a visionary I smugly tell him that if he likes to have recovered from small-pox, probably to be

verminous, most certainly to be ignorant of the wonders which surround him and quite likely to be dead at forty, he is welcome to these advantages; for my part I prefer cleanliness, access to knowledge of Nature and a fair chance to complete the conventional span of life. Towards the end of his life, Dr. Johnson said: "I am always angry when I hear the ancient times praised at the expense of modern times. There is now a great deal more learning in the world than there was formerly; for it is universally diffused. You have, perhaps, no man who knows as much Greek and Latin as Bentley; no man who knows as much Mathematics as Newton: but you have many more men who know Greek and Latin, and who know Mathematics." This was in 1783, and the comments of the sage might be expected to have gained in force if they came to be uttered in 1925; because, while the opening sentence has continued to state the facts, he would have been able to amplify "learning" by toleration, sanitation and illumination—of body and mind. Concerning India, I am not yet sufficiently informed to say whether the ancient times were better than the present—so much depends on what one thinks one wants; but I do already know, to my satisfaction and gratitude, enough of this beautiful country to have seen that for men who try to be honest, cleanly, industrious and willing to believe good of their neighbours until the evidence forbids, the present is not such a bad time, after all. Another intellectual giant of the eighteenth century, probably

wiser, certainly more experienced than Dr. Johnson, said on this matter: "So what signifies wishing and hoping for better times. We may make these times better if we bestir ourselves. Industry need not wish, and he that lives upon hope will die fasting."

CUI BONO?

Let us therefore, with a stout heart, reply to the commendable citizen who seeks to know "what's the good?" of Science, more particularly to India. Mechanical and Civil engineering have provided India with a Railway mileage approaching 40,000 and an Irrigation acreage exceeding 28,000,000; both contribute incalculably to diminishing the disastrous consequences of seasonal failure. The same branches of Science, allied with naval architecture, have brought Bombay actually within four weeks of New York, potentially within three weeks, and have enabled India to distribute £200,000,000 worth of goods throughout the world during one year. The domains of medicine and surgery, whose practitioners are ceaselessly and without ostentation combating the diseases to which tropical regions are more than others prone, owe their successful administration to advancement of knowledge in physiology and micro-biochemistry. Electrical technology has transformed into tangible values countless neglected foot-pounds formerly passing unheeded to the ocean: Sivasamudram alone, during the little more than twenty years of its active life, has made a total profit reaching 158 per cent. of the

capital expended, and had a gross revenue-demand of Rs. 45 lakhs during 1923-24. The reflected value of such developments on the life of the nation cannot be measured. The stimulus to knowledge and manufacture is obvious, but the stimulus to India's greatest industry, agriculture, although less evident superficially, is more far-reaching, and might be greatly intensified. Two examples of what has been done will suffice to show what might be done. By cultivating improved strains and varieties, by war on parasites, by economic planting and by various other devices arising from the investigations of scientific experts devoting their energies to agricultural problems, it is estimated that the financial gain to the ryots of the Madras Presidency alone, during a few recent years, amounts to upwards of Rs. 3 crores. Before the War, the State of Mysore annually auctioned about 2,500 tons of sandalwood, most of which was exported to Germany for oil-extraction. A scientific study of the process, however, led to establishment of an experimental factory at Bangalore in 1916, followed by a larger factory at Mysore City, the joint effort under scientific supervision and equipped with modern plant having produced over 900,000 lbs. of oil from 8,655 tons of sandalwood at the end of June, 1924. Thus the revenue to the State, formerly accruing by sale of sandalwood only, is now realised by selling the oil, and on that basis averages just over Rs. 19 lakhs per annum on a factory capital outlay of

Rs. 6.9 lakhs: the actual profit is difficult to define because the raw material is a State-monopoly, but the economic advantage of the foregoing procedure does not require definition. Considerations of this kind, which can easily be multiplied, must surely satisfy those who ask "what's the good?"

VARIETY OF SPECIES

Nevertheless, to diligent and earnest members of this Congress, it must always be the search for truth which takes the premier place in their motives and in their actions. Even if the loaves and fishes are not immediately attainable, there is generally half-a-loaf somewhere within reach; and fortified by this outlook which, believe me, is the only one worthy of a great nation, the opportunities for fruitful work which open before you are illimitable. Deep and lasting as is the happiness which chemistry has bestowed upon me, I have, since coming to India, constantly regretted my ignorance of entomology. In a delightful book by Sir Arthur Shipley entitled "Life," and modestly sub-titled "for elementary students," the following startling passage occurs: "I have recently had occasion to consult the authorities of the British Museum as to the number of known species. They estimate that mammals number 10,000; birds, 16,000; reptiles and amphibia, 9,000; fish, 20,000; mollusca, 60,000; crustacea, 12,000, whilst the number of insects is now put at 470,000, a little under half-a-million. These figures strongly support the view

that insects are the most dominant creatures on our earth."

Can men of Science themselves ever hope to grasp the significance of this marvel? At present they can only stand awe-struck at its fringe; but even the faint vision which is accorded to us, distorted and blurred as it doubtless is, will remain *purdah* to those who are required to worship the Almighty without being given the beginning of a glimpse into the wonders of His works.

The accuracy with which specific attributes and peculiarities are transmitted amongst mammals is a familiar experience, and the miracle of its precise operation risks diminution in our minds by the circumstance that the example of a previous generation exercises an appreciable control over the conduct of the next. The "most dominant creatures on our earth," however, are untrammelled by such examples; they live, and move, and have their being, by instinct. The mechanism by which their prospective activities are enshrined in a microscopic speck of protoplasm cannot ever be understood by finite beings, however intelligent or however enlightened, because it involves, amongst many other factors, the fundamental distinction between animate and inanimate matter; but a suggestion as to the cause underlying variety of species does flicker across the dim threshold of bio-chemistry on which we now stand. The inanimate basis of living protoplasm is protein, and we do now know enough concerning the chemical nature of protein to realise that

the various forms that it assumes are correlated with the permutations and combinations of amino-acids.

AMINO-ACID COMPLEX.

When the different forms of protein are submitted to close chemical examination, they are found to yield a mixture of amino-acids, which have thus come to be regarded as the units from which the proteins are assembled. Whatever the origin of the protein may be, whether animal or vegetable, there will be some amino-acids found common to all the mixtures; but their proportion will vary according to their source, and an amino-acid arising from one form of protein may be absent from the mixture derived from another form. Thus a chemical clew to the variation of species offers itself. Towards the conclusion of his life, Emil Fischer calculated that a polypeptide constructed from 30 molecules of amino-acids comprising glycine (5), alanine (4), leucine (3), lysine (3), tyrosine (2), phenylalanine (2) and thirteen various others, has a number of possible isomeric forms reaching 1.28×10^{27} . In this computation it is assumed that the mode of linking the amino-acids is limited to the conventional type of glycyglycine, but alternative junctions will suggest themselves to chemists and, if admitted, will substantially increase the above number of possibilities. May it not be that the secret of species lies locked in the pattern assumed by the relative amino-acid complex?

A practical answer to this inquiry may perhaps be drawn from an experiment

by Fischer himself. On comparing the amino-acid mixtures respectively derived from the silk of the Madagascar spider and of the silk-worm he found that the principal significant distinction between them was the substitution of glutamic acid by the spider for the serine of the caterpillar. It is hardly possible to find a contrast between two creatures occupying the same physical medium greater than that provided by the spider and the silk-worm. On the one hand an alert, carnivorous and crafty savage, descending in the female sex to the villainously ungrateful practice of slaughtering its mate, and yet commanding admiration by the delicate symmetry of its web; on the other hand a grub, incapable of self-defence, much less aggression, monotonously unenterprising in its vegetarian taste, ingloriously terminating a brief career of unbridled greed by dreamily wrapping itself in a 500-yard cerement. Secretion of silk is the form of chemical self-expression imposed by Nature on these two creatures: yet, in spite of their tremendous divergence in outlook on life, they produce closely allied chemical substances as the concluding stage of synthetical operations which are quite unapproached in the laboratory.

The converse phenomenon is also familiar to chemists. The lac-insect which, with its vegetarian voracity and its limited spiritual prospect, can claim superiority to the silk-worm only by entering the romantic entanglements of courtship, bases its title as an accom-

plished synthetical organic chemist on the production of three individual substances, widely asunder in properties and structure, but all devoid of the most characteristic element in silk, namely, nitrogen. The superficial explanation of this difference in achievement is the fact that the insect absorbs the juices of twigs whilst the grub grows fat on a chlorophyllaceous diet: but the cause of this disparity in taste is a point of deeper and more subtle interest.

CHEMICAL BASIS OF CHARACTER.

May not the underlying chemical factor which determines instinctive ways of life be the qualitative and quantitative aspect of the amino-acid complex which represents the protein pertaining to the protoplasm of a species? The horizon bounding this reflection is a distant one. Among the outstanding results of modern research is the prodigious chemical effect producible by adroitly applying minute quantities of an appropriate substance. Future generations may concern themselves with the chemical basis of character as determined by the amino-acid complex. Refinement of method may even permit the quantitative examination of that complex during life, and the regulation of its failures by artificial means, just as the failures of the thyroid and the pancreas may be regulated now. A kindlier and more enlightened attitude towards our fellow-creatures may ensue. It is possible to imagine one of those character-dissections which are said to occur sometimes in European ladies' clubs, and which are

believed to develop, now and then, a slightly censorious tendency, being terminated five hundred years hence by the charitable remark: "Well, my dear, it's very deplorable, but we have to remember that the polypeptanalysis reveals a lamentable deficiency in the hydroxy-amino-acid modestine."

Be this as it may, abundant opportunity for sound, constructive and imaginative work offers itself now to the Indian devotee of Science. Even those who are unhappily precluded by circumstances from a strictly scientific training need not, on that account, hold back if only they have the will to do. The example of Henri Fabre should appeal to this country more than to any other by reason of the special quality of your national genius and the wealth of entomological material which your dominion affords.

EMPIRE OF REASON.

It is mainly to your Universities, however, and the attitude towards new knowledge which is there developed, that we must look for future cultivators of the national field. In an opening address to the Universities' Conference last May, His Excellency the Viceroy signalled as the greatest service which your Universities can perform, "to extend the Empire of reason in India until it is coterminous with the Empire of India itself." Surely that is an aspiration sufficiently exalted to inflame the sacred enthusiasm of this country! In expanding the thought, His Excellency said: "Sentiment may be

and indeed often is noble: it is universal: there is no mind so dull, no nature so callous that some spark of sentiment cannot be found in it: but sentiment alone is an unsafe guide to decision. It is too often exercised on an object before reason has time to ascertain whether the object is worthy of its exercise: it is nearly related to prejudice: by itself it is insufficient and unstable ballast for any nation, and by trusting to it alone nations have suffered the ship of State to wreck. To weather the storms, and to bring the vessel into safe harbourage sentiment should be controlled and guided by reason."

These wise words are qualified for universal application. Reason, the faculty of mind by which man draws conclusions and is empowered to discern the truth, while becoming more and more diffused, remains vitally essential to the peace and happiness of mankind. Its full and balanced exercise is only possible when fortified by some knowledge of scientific developments because, without this equipment, every problem is at once thrown out of perspective. Relative to Infinity, the past has no greater importance than the future: it is the foundation on which Nature is, in the present, building futurity. Knowledge grows with immeasurable speed and the world correlatively shrinks apace. The West, throughout the ages, has accepted intellectual illumination from Eastern repositories of ancient wisdom: more recently, the East has received its guerdon in the benefits of

Western science: the time is approaching when it will become an obligation on the East to return the shuttle of enlightenment.

"It must be remembered that life consists, not of a series of illustrious actions, or elegant enjoyments; the greater part of our time passes in compliance with necessities, in the performance of daily duties, in the removal of small inconveniences, in the procurement of petty pleasures; and we are well or ill at ease, as the main stream of life glides on smoothly, or is ruffled by small obstacles and frequent interruption."—SAMUEL JOHNSON.

"In reality, there is, perhaps, no one of our natural passions so hard to subdue as pride.....for, even if I could conceive that I had completely overcome it, I should probably be proud of my humility."—BENJAMIN FRANKLIN.

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ALLAHABAD UNIVERSITY: CONVOCATION ADDRESS

By Mahamahopadhyaya
Dr. GANGANATHA JHA, M.A., D. LITT.,
Vice-Chancellor.

ON occasions like the present we have been accustomed, in places other than Allahabad, to listen to well-worn platitudes regarding methods of education, avoidance of 'cram' and other endless shibboleths of the zealous reformer. I shall resist, as my predecessors have always resisted, this temptation. Nor shall I follow their practice in giving an account of what we have done during the past year; this I have already done in the Progress Report presented to the Court. Further, this being the first occasion on which it is my privilege to address the Convocation, I feel I should address myself to the problems that confront us for practical solution, and lay before the members of the University what, in higher quarters, would be called 'policy', but which in our humbler sphere, I may call our hopes and fears. This is all the more necessary because having been launched upon comparatively uncharted seas, we have to study the lines of the compass, look ahead for rocks and shoals, control the rudder properly, and be quite certain of the shore to which we go.

At the very outset, I feel it is my duty to correct two misconceptions under which some people are labouring in regard to ourselves. In the first place, it has been alleged that the new residential University is very expensive. This is not true; in fact, our University does not cost the tax-payer much more than was spent over the Muir College (whose work we have taken over entirely) and the Queen's College (of whose work also we have taken

over the major and costlier share); and in addition to this we have undertaken all the higher work of the Ewing Christian and the Kayastha Pathshala Colleges. Thus it will be seen that with all its defects, our University is not expensive.

Another notion that has been only very recently set afloat is that we are lowering our standards. This charge also I emphatically repudiate. There is always a tendency in certain quarters to draw this conclusion from inadequate data. If, in any one year, the percentage of passes in an examination is a little above the average, the cry is raised that the standard has been lowered. As an old member of this University, I know that, unlike some other Universities, we have never manipulated the results of the award of marks made by our examiners; I am glad to be able to give the assurance that we still adhere to this wholesome practice; and when I add that there has not been much change in the personnel of our examiners during the two years of our re-organised existence, it should satisfy all fair-minded critics that there is no truth in the charge regarding the lowering of our standards. I know with what difficulties and under what disheartening circumstances, this University has deservedly won a reputation for high standards, and it would indeed be a sad commentary upon its reorganisation if it began its new career with anything that would tend to lower the estimation in which we were held even in our unregenerate days. If ever, at any time, any such tendency is detected, it shall be the earnest endeavour of your Vice-Chancellor to root it out. Our reputation is a sacred trust that we have inherited from the past and we cannot be too watchful over it.

Now as regards the problems before us. Two years ago this University underwent a process variously called 'reform,' 'reorganisation,' 'reconstruction.' This process implied two things—failure of our previous constitution and expectation of improvement. On both these I would ask you to bear with me for a while. It is said that the older Indian Universities have proved a failure. The learned Vice-Chancellor of a sister University is reported to have declared, for instance, that "the present system of education in India has hung almost as a deadweight on the heads of those who have come to seek for light and learning in our Universities; for a century the country has been struggling through a dull and stereotyped routine of subjects and studies which, while exercising the memory, fail to train the mind or develop its power of original thought."

Let us consider what truth there is in this and what the cause of it is. In what respects have we failed in the past? We have succeeded in sending forth a large band of graduates, many of whom are adorning our public life; we have given to the State public servants who are proving themselves to be as efficient and honest as any in the world; we have brought into existence innumerable lawyers, a large number of medical men and members of various other professions. Wherein then have we failed? Our critics tell us that we have failed in the domain of scholarly research. This is true; but only to a very limited extent. Even so, whose is the responsibility? Our promising young men have nearly all been drafted away to other lines of activity, which hold out brighter prospects than the austere life of scholarship. In our mythology we have been taught that Lakshmi and

Sarasvati—Wealth and Learning—never live together. But even from among those who were visionary and idealistic enough to devote themselves to the pursuit and advancement of learning, every one who found it possible went over to other countries; so that the scholars that remained for training in higher work were only the residue of all this. And yet, we have not failed to produce men whose scholarly work has compared very favourably with that of any other scholar trained elsewhere; and it is gratifying to find that at least with regard to one of these, the most learned Journal in Europe has pronounced the opinion that "probably no European can approach him in the mastery which he wields over the rugged realms of Indian philosophy."

However, whatever our past may have been, we are now expected to show a marked improvement over it. This is by no means easy. Concretely speaking, what we are expected to do is to show better work than was done at the old Muir College and the Queen's College, both, alas, only a pious memory now. Is this possible? These dear old institutions had teachers of the type of Griffith, Thibaut, Venis, Harrison, Gough, Cox, the two Hills, Aditya Ram Bhattacharya, Zakauilla and Amjad Ali and a host of lesser lights. In the first place, men of this type, of sound and deep scholarship, with profound sympathy with their pupils, have become much rarer, in the present day of stress and strife; and even if there are such men, are we prepared to pay for them? There lies the main difficulty. If we want better work than was turned out by the old colleges we must get teachers superior to those employed by these institutions, and if we want better men, we have to offer them more attractive terms. Are we in a position to do this?

Another point wherein the older Universities are said to have failed is in the building up

of character; it is alleged that not being residential Universities, they could not provide for that personal contact between the student and his teacher which is essential for the right formation of character. This statement again is an invalid deduction from false premises. As regards *our* University at any rate, we know that everyone of our important colleges both in Allahabad and elsewhere, under the old system, provided in its hostels for the residence of a large number of its students. And at least three of them, of which I have personal knowledge—the Muir Central, the Queen's and the Central Hindu—there was no want of contact between the Professor and his pupil; nor did we fail to make an impression upon our young pupils. This is evidenced by the fact that each of these Colleges developed an individuality of its own; we of the Queen's were inclined to be less worldly in our outlook, there was in us more of calm and dignified resignation than of ambition; if, for instance, by chance some one from amongst us secured a high place in University examinations, we did not feel elated, we were not perturbed; we regarded it only as a bubble in the ocean of the universe of education. At the Central Hindu also, there was developed a certain degree of resignation, but it was tempered with a healthy optimism based upon the teaching—essentially Hindu in its inception—that man is master of his own destiny. Lastly at the Muir Central, we were more assertive; every one claimed it almost as a right that the first place in every examination should be won by a Muir Collegian, and everyone who passed out from there felt sure that he should be either a Judge of the High Court or a leader of the Bar, or, at least, the Vice-Chancellor of the University.

Yet with all this, I do not give up all hope of showing better work. In the Post-graduate

Departments we have scope for improvement. So far as Post-graduate teaching was concerned, both at the Muir College and the Queen's College, we were seriously handicapped for want of adequate staff. With limited staff, we had to content ourselves mainly with B.A. and B.Sc. work, which took away all our energies; and if we still carried on Post-graduate work, it was due entirely to the enthusiasm for work displayed by some members of the staff who agreed to work for whole days together without encouragement of any kind. We had, however, our reward in the esteem and affection of our pupils and we felt amply recompensed.

It will, therefore, be my earnest endeavour to develop our Post-graduate Departments. But here again a fact has to be borne in mind which has been lost sight of by all critics of the older Universities. If these latter have failed—and we shall concede for the sake of argument that they have failed—to produce a large number of scholars of the solid type, the fault has not lain with the Universities themselves. Has there been any University in this country which could attract and keep for two or three years, a promising young man after he has taken the M.A. degree? Have they been able to provide students or fellowships for this purpose? If our Universities could induce young men to stay for years after the M.A. in a position that would enable them to give undivided attention to their work—in the way in which our foreign scholars can—I, for one, would feel sure that our output of scholars would be entirely satisfactory.

Another handicap under which Indian Universities have suffered, and are still suffering, is the widely spreading notion that scholarly work of the highest type cannot be carried on in India. The result of this has been that the highest ambition that a prom-

ising graduate, or his guardian has cherished, has been for going to Europe or America or Japan—in fact anywhere in the world outside India; and the mere fact of a young man having returned from abroad has given him a status and a market-value that are withheld from his less fortunate brothers. With all promising material thus tempted away from within our walls, how can we—even if we have the staff and equipment and the will to work—produce a band of high-class scholars? It will be readily conceded that our Universities are not in a position to provide facilities for higher work in all departments of knowledge. But one may be justified in asking: Is there any country which is all-sufficient in this respect? Do not we read of large numbers of scholars from America—where at least they do not suffer from financial stringency—coming to Europe for higher study? To compare great things with small—just as England and America do not, and cannot, make provision for higher work in all departments of knowledge, so we in India also are not able to do it. But that does not mean—it need not mean—that we lack facilities for work in all departments. There are certain departments, equipment wherein is less costly, and is well within the means of even an impecunious University like ours. I have in mind my own department of Sanskrit studies, where we want only brains and a few books and manuscripts; but in this field also we have been taught to expect no high work in this country; and yet not very long ago, scholars from England, America and Germany and Japan used to be sent to these same United Provinces for higher work in Sanskrit fields. We have perhaps lacked knowledge of modern methods; but with so many of our young men trained in Western methods of work, I hope we have been sufficiently leavened with modernity, and can

afford to forego the expensive luxury of going out of India.

It is sad indeed to notice that the persons that stand up for this system of sending our best scholars abroad for higher study are just those who, in other spheres of our national life, would have us believe that we have nothing to learn from outsiders, that we have learnt all that they had to teach. For the benefit of these friends, I quote the words of the veteran Vice-Chancellor whose lamented death we can never cease to mourn. Sir Asutosh Mukerji said :—" Blame us not if we deem it inconsistent with the national consciousness that the first and last words on Indian civilisation should be pronounced in intellectual centres far beyond the limits of our motherland."

It is not my view that the system of sending our scholars should be discontinued. Far from it. Let us send them out. A sojourn in foreign lands does serve the useful purpose of widening one's outlook. What I deplore is the underlying spirit and its implications. I feel that we should be imbued with what I may call 'University patriotism;' and everyone of us should go even to the extreme length of feeling that what cannot be taught and learnt at Allahabad is not worth being taught and learnt at all. For the curing of the mentality generated in us, we need some such extreme antidote.

For the purpose of removing this inconsistency in our outlook we have to develop our department of research; specially in those domains, materials wherein are more abundant in this country than elsewhere. At the Prince of Wales' Saraswati Bhavana Library at the Sanskrit College, Benares, we have a collection of manuscripts which is remarkably full; and there we still maintain the tradition of sound scholarship for which Benares has been famous since remotest antiquity. In

fact this institution is distinctively unique in its character, in that it combines both types of scholarship—the intensive scholarship of the old Pandit and the extensive scholarship of the modern *savant*. This is the combination that we need in all spheres of activity and so far as our Universities are concerned, if they have to take root in the life of the nation, they must derive their inspiration from Indian culture. They have "to cease to be exotic as they have hitherto been. All attempts to modernise the East by the importation of Western culture in our midst to the complete supersession of our native ideals, have proved a failure." If we are to profit by our past experience, we should now try to seek for progress in a proper combination of the two cultures; and for this purpose our own province provides unique facilities.

Holding these opinions as I do, I shall endeavour, to the utmost of my power, to develop what may be called our Post-graduate studies. The term 'Post-graduate' need not lead anyone to the hope, or the fear, that we are going to reproduce the conditions obtaining in that department at Calcutta. That, I am sorry to admit, is beyond us. We have had no Rashbehari Ghosh or Taraknath Palit in our midst; nor have you in your present Vice-Chancellor the masterly and resourceful personality that the Calcutta University had in Sir Asutosh Mukerji. But I must confess that that institution will serve as an ideal. It is mainly the Post-graduate department of the Calcutta University which, with all its defects, has demonstrated, beyond doubt, that in almost all departments of knowledge, work of the highest kind can be carried on in India. I have had several occasions of judging the work that is being done there in the domain of Oriental studies; and I am prepared to assert that most of the theses submitted by the researchers of the Calcutta University are

superior to many of those that have emanated from persons trained elsewhere. I feel sure that any one who even glances at the theses submitted for Indian doctorates and those submitted for foreign doctorates, will be readily convinced that our scholars have produced more scholarly work. Our theses have, in many cases, come to be regarded as authorities on the subjects with which they deal.

What our young men have lacked is the opportunity for continuing their work. This is what we have to make good; and I live in the hope that the time is not distant when our countrymen will realise its importance. As a preparation for that day, we have to make a beginning, however modest it may be. Ignore it we cannot. This is the only domain where we can show any justification for our reconstruction. In fact it is—at least it ought to be—the very life of the University. I am advisedly using the cumbrous term 'Post-graduate studies' in preference to the simpler term 'Research,' because whenever this latter term is used, "the public expects some new machine, or a new cure, or something immediately and commercially valuable as its outcome." The aim of our Post-graduate department will be "to handle and provide facilities for those eager students who, at the end of their degree-course, are quite fit to engage, with great advantage to themselves and to the community, in further study, and in getting access, at first hand, to some of the sources from which their previous knowledge has been drawn—those promising students who would like to go on working for the advancement of knowledge, by research, and also by teaching." All educationists are now agreed that mere "education

of students is only one of the functions of the University; the other, not less important, is the extension of knowledge by investigation and research."

Scholars thus trained will prove very successful teachers in our Universities; that is why we are encouraging our research scholars to help us in the actual teaching. "Nothing is more important than to provide the future teacher with an incentive and a stimulus before he starts his routine work, in order that he may turn from the absorptive stage to the constructive stage in learning."

In this manner, "in a few years University training will be revolutionised. We shall be feeling and teaching throughout in a way which will be designed to elucidate and render available the knowledge we are putting into these young people. The result will be a great stimulation to the general growth of knowledge; because knowledge, in the abstract, without a close connection with concrete problems, definite problems, always grows sterile." The main point is to teach our students to make their knowledge available. This is meant to be the final stage in their training; it will impart to them initiative and ability to apply their knowledge to concrete circumstances, and thus make it more extensively fruitful. It has been rightly remarked that to send into the world young men who are learned and entirely receptive is an outrage on human nature. Our real purpose ought to be to put on the final touch of initiative and application of accurate general principles.

This does not mean that our present M.A. degree will have no value. The Master's degree will continue to have a value of its own; as providing that basis of knowledge

were forced into one standard mould. In all fairness to the Universities, each of them should be left free to work on its own lines. Conditions in the various provinces and in the various Universities are so divergent that what is good for one would be, not only not good, but distinctly harmful for another. Details must vary with the surroundings.

There is another general principle on which all serious-minded men—scientists as well as literary men—are agreed. That is, the essential features of true culture are the same, they have all along been the same—namely, to seek for unity amidst diversity. Plato is reported to have said that he would worship the man who discovered this unity. Search for laws—in all spheres of our activity—is nothing more or less than this search for unity amidst diversity. In this search our Indian thinkers of the past have not been lacking. They did not of course proceed on lines that we now call “experimental.” Perhaps they did not possess much experimental apparatus. But the want of such apparatus was more than made up for by the mental and moral apparatus with which they equipped themselves. And with such equipment they succeeded, more than 5,000 years ago, in reaching the highest synthesis—they succeeded in discovering absolute unity amidst diversity. This philosophy of unity—perhaps rightly called ‘monism’—has been characterised, and rightly characterised, as the boldest and highest pinnacle that thought can reach. This is not the occasion nor is this the place for discussing the logical and ethical consequences of this philosophy. But a student of this philosophy may be permitted to congratulate himself on finding eminent scientists of the present day slowly working up experimental methods, to that same

philosophical conception. Chemists and Physicists alike are fast approaching the truth that all manifestation is the outcome of a single entity or force. Of course these workers call it variously. But this also only corroborates the statement of the ancient Indian seer—*ekam sad vipra bahudha vadanti*, ‘there is but one entity, the learned call it variously.’ Our modern scientists have only to realise that this entity which they call a ‘force’ is itself only a manifestation of—or who knows, it may be the same as—the *one sat*, one entity, *chit*, ‘consciousness’ of the Indian seer. It is doubtful, however, if they will realise this until they carry themselves beyond the merely physical apparatus and equipment to which they are confined and by which their activities are circumscribed. They have to transcend these and supply themselves with that intellectual and moral equipment upon which the ancient teachers laid stress.

This bold conception carries with it the implication that the first principle of things must above all be sought in man’s own inner self which self however is not accessible to the same means of cognition as the things of the sense. This is where our scientific friends failed during the nineteenth century. We have no immediate perception of our body (or of any substance, whatsoever) from within. This our inner nature has been rightly compared to a house with many floors, passages and chambers, of which only a part is illuminated by a light somewhere within, which light by its very immanence is difficult to locate. It is the difficulty of realising the immanence of this source of light which has landed the modern philosopher into a maze of intellectualism from the vicious circle of which he finds no escape.

It is true that this philosophy carries with it an element of paradox ; while according to it, everything being a manifestation of the one entity, nothing beyond that entity can have any real existence, the empirical view of things teaches us that everything that we see and feel is real. It is the result of the solution of this apparent paradox that has been presented to us in the form of the pantheistic philosophy. The universe in all its manifold diversities is not anything beyond that one entity—the two are one and the same.

As the two final steps in realisation of the ultimate goal of existence, our teachers have posited the removal of all desires and the removal of the consciousness of plurality ; and the practical teachings leading up to these two ends are represented by two remarkable manifestations of culture which have gone by the names *Sankhya* and *Yoga*. All our practical philosophy is comprised within these two cultures which have to be carried on on parallel lines. As a preparation for these two cultures our life has been divided into four stages. The actual practice of the two aforesaid cultures had to be postponed till the later stages of life. During the earlier stages we have to fit ourselves for the strenuous work necessary for the later culture by a system of strict discipline ; not indeed by a routine process of drill and exercise, but by the rigid performance of our duties during the two earlier stages. The most strict discipline that one can undergo is during the life of the ordinary householder ; his endless responsibilities towards numerous individuals and towards society as a whole afford opportunities for a discipline the like of which cannot be obtained elsewhere.

For the due fulfilment of these responsibilities it is necessary for us to undergo training and to equip ourselves with the necessary elements of knowledge. It is here that the

first stage of studentship comes in. This stage is to last from the age of 7 upwards, for either 12 or 24 or 36 or 48 years, according to the aims and faculties of the individual concerned. During this stage the student is to be saddled with no responsibilities other than those of study and service of the teacher. He has to serve the teacher and attend to his lessons, and it is only after he has spent the requisite number of years, in no case less than 12 years, that he is allowed to go forth into the world and assume the responsibilities of a householder.

This is what you, young graduates, are going to do ; you are going to be sent out to-day by us into the world, to enter upon new responsibilities ; and on this solemn occasion I can do no better than address you the few stirring words that were addressed to the students leaving their teachers’ house more than five thousand years ago—words that are as true to-day as they were then ; and if you will bear them in mind in the battle of life, you will find that they will go a long way to helping you to continue worthy of the degrees to which you have been admitted. These words in their original Sanskrit form are too sacred to be uttered anywhere beyond the teachers’ sanctum. I shall therefore have to content myself with an English rendering of it.

“Be truthful in speech ; follow the path of righteousness ; neglect not your study, nor the work of teaching ; swerve not from truth, swerve not from advancement, swerve not from your duty towards God and man ; cultivate devotion to your mother, to your father and to your teacher ; engage yourself in only such acts as are above reproach.”

I cannot add to these noble words : so, like an old Brahmana, I conclude with the pronouncement of a benediction—

युष्माकं कर्त्तव्यं जगदुपरि समुद्भूतलावण्यवत्या
धन्या शैलेन्द्रकन्या विभुवनजननी विश्वमान्या वदान्या ।
निश्चाङ्कं शङ्कराङ्के तडिदिव लसिता प्रोत्सन्ती हसन्ती
रक्षा दक्षा विप्रशालिविलयकरी शङ्करी शङ्करोत्तु ॥

NOMOGRAPHY.*

WHAT IS NOMOGRAPHY?

Nomography is the name given to a new branch of graphical calculus. Etymologically, *nomo* means *law*, and *grapho* means *I design*; it means the graphical representation of formulæ or laws governing any number of variable magnitudes. The name has been used for the first time in 1891 by D'Ocagne, a French engineer and mathematician; it refers to a body of doctrine recently elaborated and developed, mainly by D'Ocagne. It deals with the theory, the construction and the use of special types of graphical charts for the representation of formulæ involving any number of variables.

Suppose we have an equation connecting a number of variables such that given the value of each of the variables but one, we require to know the corresponding value of the last variable. Nomography enables us to construct a chart from which we can simply read off this value, which could otherwise be got only by laborious calculations with the help of tables. Such charts are called *Nomograms*.

USE OF A NOMOGRAM.

In the generality of applications of mathematics to any science, the final stage is invariably a formula connecting a number of variables, from which, given the values of some, we require to calculate the rest. For this purpose, it is necessary to devise means which would be direct, simple, quick and as little as possible subject to error. Numerical methods are to a great extent direct and

yield results whose correctness or degree of approximation cannot be excelled; but they are in many cases laborious. Graphical methods satisfy the above criteria to a considerable extent and have always found favour with applied mathematics. Nomography deals with methods of perfecting these graphical constructions with a view to improving their usefulness. In all applications which require not more than a rough approximation, a nomogram is distinctive among all the aids to calculation. It furnishes the results of long and complicated formulæ with extreme rapidity. Though its construction depends on a knowledge of higher mathematics, its use can be taught easily and it can be placed in the hands of workers who are not highly specialised and who cannot make the necessary calculations.

Though of recent origin, Nomography has won recognition in several sciences, e.g., Applied Mechanics, Astronomy, Meteorology, Engineering, Aeronautics, and the science of Artillery.* It has also gained admission as a school subject and a chapter is devoted to it in some of the recent text-books on Algebra †. Its possibilities were brought out clearly by the part it played, during the last war, in company with other sciences such as electricity and chemistry which made giant contributions to the cause of destruction. The gunner in the firing line consults a nomogram to find out the probable range of the shot, knowing its velocity and direction of projection and the slope of the country. The

* For applications to Aeronautics and Artillery, vide D'Ocagne's *Principes usuels de Nomographie* (Paris, 1920.)

† See, for example, Darrell and Wright: *Elementary Algebra*, Part II (London, 1921); pp. 424-439.

* A paper read before a meeting of the Mathematics and Science Section of the Madras Teachers' Guild, by Prof. G. A. SRINIVASAN, M.A., L.T., Presidency College, Madras.

greatest possible velocity of a shell of known weight and size is read off a nomograph. The workman in the building trade obtains from a nomogram the stiffness of a beam of given dimensions. In short, like a headache cure which is advertised to be used wherever heads ache, nomograms can be used wherever you have a formula.

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For a study of the subject, the following books may be mentioned:—

Brodetsky: *First Course in Nomography* (G. Bell and Sons, London, 1920).

Hezlet: *Nomography* (R. A. Institution).

Runge: *Graphical Methods* (Columbia University Press, 1912).

No complete account of the subject can be got without D'Ocagne's own books:

(i) *Traite de Nomographie*. (Paris, 1899).

(ii) *Calcul Graphique et Nomographie* (Paris, 1914.)

(iii) *Principes usuels de Nomographie avec applications à divers problèmes*, (Paris, 1920).

For the history of the subject, vide *Encyclopédie des Sciences Mathématiques*, Tome I, Vol. IV, article on "Calcul Numerique."

TWO KINDS OF NOMOGRAMS.

In the short time at our disposal, I cannot go beyond the barest elements of the subject. I shall also confine myself to illustrations pertaining to the class-room. There are two kinds of nomograms—*nomogram of concurrent lines* or *abacus* and *nomogram of collinear points* or *alignment diagram*. Text-books deal only with the latter which are more important; but I shall follow the historical order of development and deal with abacuses first.

ABACUS.

Fig. 1 is an abacus for the quadratic equation $z^2 + xz + y = 0$... (1). It consists of three series of straight lines, one set parallel to the y -axis and corresponding to values of x ; a second set parallel to the x -axis and corresponding to values of y ; and a third set of oblique lines representing values of z . This is constructed by choosing two perpendicular lines for axes of x and y and by drawing the line

$$zx + y = -z^2$$

for each of a set of equidistant values of z such as 0, ± 0.5 , ± 1 , ± 1.5 , ... These lines form tangents to the parabola $x^2 = 4y$.

Given a value of x and one of y , let it be required to find the roots of the equation (1). We take the point P whose abscissa and ordinate are the given values of x and y and find the index of the z -line which passes through it. This is a root of the equation. If there is no z -line on the chart actually passing through P, we take the two consecutive z -lines one on either side of P and find, by interpolation by sight, what intermediate value of z must correspond to the line that would, if drawn, pass through P.

Taking $x = -2$, and $y = -22$, there is no z -line through P, but we infer that $z = -3.8$, $+5.8$ would very likely be the indices of the z -lines that would pass through P. These, then, are the roots of the equation, which agree well with the calculated values.

Here P is the point of concurrence of the three lines $x = -2$, $y = -22$ and $z = 5.8$, which are a set of values satisfying equation (1). Hence the name "nomogram of concurrent lines." A similar nomogram for the cubic equation $z^3 + xz + y = 0$ is to be found at page 60 of Runge's *Graphical Methods*.

Generally, given an equation

$$f(x, y, z) = 0$$

in three variables, we may represent values of x and y on two axes and plot the curve

$$f(x, y, z) = 0$$

for each of a set of values of z . These z curves, together with the lines $x = \text{constant}$, and $y = \text{constant}$, form a nomogram of concurrent lines for the above equation. In essence, this is the representation of surfaces by means of contour lines on a plane. Topographical maps, maps showing isobars and isotherms embody this principle and are examples of nomograms of this class.

TRANSFORMATION OF VARIABLES.

Now, there are certain devices employed to make the drawing of these z -curves as easy as possible. One such device is a *transformation of variables*.* I shall illustrate this by an example. Consider the simple multiplication formula $z = xy$... (2)

The z -curves, by proceeding as above, would be a series of rectangular hyperbolas (Fig. 2) which are rather difficult to draw. But by a simple transformation these can be rendered straight lines.

FUNCTIONAL SCALES.

This takes us to a very fundamental notion in Nomography, viz., the notion of *functional scales*. The ordinary or *metrical scale* with which we are all familiar, is one in which the distance from the origin to the point numbered p is proportional to the number p itself. But if that distance is proportional to $f(p)$ where $f(x)$ is some definite function of p , we have a scale of the function $f(x)$. The logarithmic scale [Fig. 3 (a)] is the commonest of functional

* *Anamorphosis* (D'Ocagne.)

scales and is used in Slide Rules. Scales

for $\sin x$, x^n , $\frac{ax+b}{cx+d}$ are other functional scales frequently met with in Nomography.*

It may be mentioned, in passing, that a functional scale when placed by the side of a metrical scale, constitutes a nomogram of a function of one variable or of an equation in two variables. Fig. 3 is obtained by placing on the left a metrical scale for y and on the right the scale for $\log x$; and forms an example of a nomogram of *juxtaposed scales* for the equation $y = \log x$.

Now, returning to equation (2), take logarithms of both sides and write $u = \log x$, $v = \log y$.

$$\text{Then } u + v = \log z.$$

If we take u and v as new co-ordinates, we get for a series of equidistant values of z , a series of parallel straight lines. Here the u - and the v -axes are not graduated to show equidistant values of u and v , but we mark on them points corresponding to the logarithms of a series of values of x and y and put alongside of these points the values of the x and the y . In other words, we lay on the u -axis not a simple metrical scale but a logarithmic scale. Fig. 4 shows the nomogram so obtained.

Given an equation of the form

$$\phi_1(z) f(x) + \phi_2(z) g(y) + \phi_3(z) = 0$$

where ϕ 's are functions of z alone and $f(x)$ is a function of x and $g(y)$ of y , we can reduce its nomogram to one consisting of the straight lines

$$u \phi_1(z) + v \phi_2(z) + \phi_3(z) = 0$$

for different values of z , by laying on the u -axis the scale of $u = f(x)$ and on the v -axis the scale of $v = g(y)$.

* Vide: D'Ocagne: *Calcul Graphique et Nomographie*, pp. 161—177, for an exhaustive treatment of functional scales.

NOMOGRAM OF COLLINEAR POINTS.

I now pass on to the second class of nomograms. Fig. 5 is an example of such a nomogram. It consists of three lines, each carrying a scale giving the values of each of the three variables, x, y, z . The condition that a set of values of x, y, z should satisfy a given equation results in the corresponding points on the scales lying on a straight line and conversely. Hence, given a value of x and a value of y , to find the corresponding value of z , we have merely to place a foot-rule (or stretch a thread) over the two points on the x and the y lines and read off the value of z at the point where the foot-rule (or the thread) cuts the z -curve. These lines carrying the scales may be straight or curved; they are called the *supports* of the x, y and z scales. To take readings, it is preferable to use a thin *slider* of about half an inch in width and of transparent material, with a fine straight line ruled in the centre.

Nomograms of this class have many advantages over the previous ones. They are easy to construct and present a simpler appearance, the abacuses being traversed by a network of curves. The reading is easier on the present charts; values of x, y, z not marked on the charts have to be arrived at by interpolation in both cases; but this is much more easily done and with greater accuracy on the alignment diagram. No wonder, then, that this class of charts are more commonly used. In fact, text-books on Nomography deal with these exclusively.

LINE CO-ORDINATES.

The construction of these depend on the idea of *line co-ordinates*. Figures in Geometry are commonly regarded as being built up of points, a straight line or a curve being

the locus or collection of an infinity of points situated according to definite laws. Here points are regarded as generating or *primary elements*. But we might also regard straight lines as primary elements and any geometrical figure can be built up of straight lines: a point is the assemblage of the infinity of straight lines passing through it; curves are the envelopes of straight lines touching them. This is the standpoint of what is called "the Principle of Duality" in modern Geometry.

Straight lines being regarded as primary elements, we have methods of representing their positions by two co-ordinates, just as we deal with positions of points. Take two axes, intersecting or parallel. Mark origins one on each. Then given any straight line, the intercepts it makes on these axes, measured from the origin, define the position of the straight line. The numbers which give the measures of these intercepts are called the *co-ordinates* of the line. If you take the infinity of lines passing through a given point, their co-ordinates must be connected by an equation, which is called the *line equation* or the *tangential equation* of the point. If we take parallel axes and if u, v denote the co-ordinates of any line, then the equation to a point is of the form

$$Au + Bv + C = 0.$$

Every line whose co-ordinates satisfy this equation passes through the point and conversely. If lines envelope a curve their co-ordinates will satisfy an equation of a higher degree*.

Though the Principle of Duality and the idea of line co-ordinates and tangential equa-

* Those interested in line co-ordinates may refer to Salmon's *Conic Sections*, Scott's *Modern Analytical Geometry* or Milne's *Homogeneous Co-ordinates*.

tions date back to the first quarter of the 19th century, D'Ocagne was the first to put them to practical use.

SOME ALIGNMENT DIAGRAMS.

I shall now explain briefly how these ideas are employed in the construction of nomograms. Fig. 5 is D'Ocagne's nomogram for the quadratic equation (1) p. 81. Take two parallel axes OU , $O'V$ with the origins O , O' marked on them. Let u , v denote the measures (to suitable scales) of intercepts made on these by any straight line. Then u and v are the parallel co-ordinates of the line. Consider the equation

$$z^2 + uz + v = 0 \quad (1')$$

where z is given a definite value. It is a linear equation in u and v and all lines whose co-ordinates satisfy the equation will pass through a definite point P . This point P can be located by any two straight lines whose co-ordinates satisfy (1) e. g., by $(0, -z^2)$ and $(-z, 0)$. Mark this point P with the value of z which gave rise to it. By taking, now, a series of values of z , say, 0, 1, 2, ..., we get different positions of P lying on a curve—the z -curve—which is graduated to show the z 's of the several points on it. Given a value of u and a value of v , take the corresponding marks on the u and v axes, place a straight line through them and read off the value of z at the point where it cuts the z -curve. Though the nomogram of Fig. 5 is constructed to give directly positive roots of equation (1'), it can be used to obtain negative roots by replacing u by $-u'$.

Fig. 6 is the alignment diagram for the equation (2).

Taking it in the form

$$u + v = \log z \quad (2')$$

where $u = \log x$, $v = \log y$, for each value of z , (2') gives a point, and for a series of values of z these points lie on the straight line (CC') . The u and v axes are graduated logarithmically, and the z -line also comes out to be graduated logarithmically but on half the scale of u and v .

Generally, any equation of the form (3) can be handled in this way. Instead of parallel axes, intersecting axes can also be used; see, for example, Whittaker's circular nomogram of the quadratic equation given in Whittaker and Robinson's *Calculus of Observations*. (A. & C. Black, 1924.)

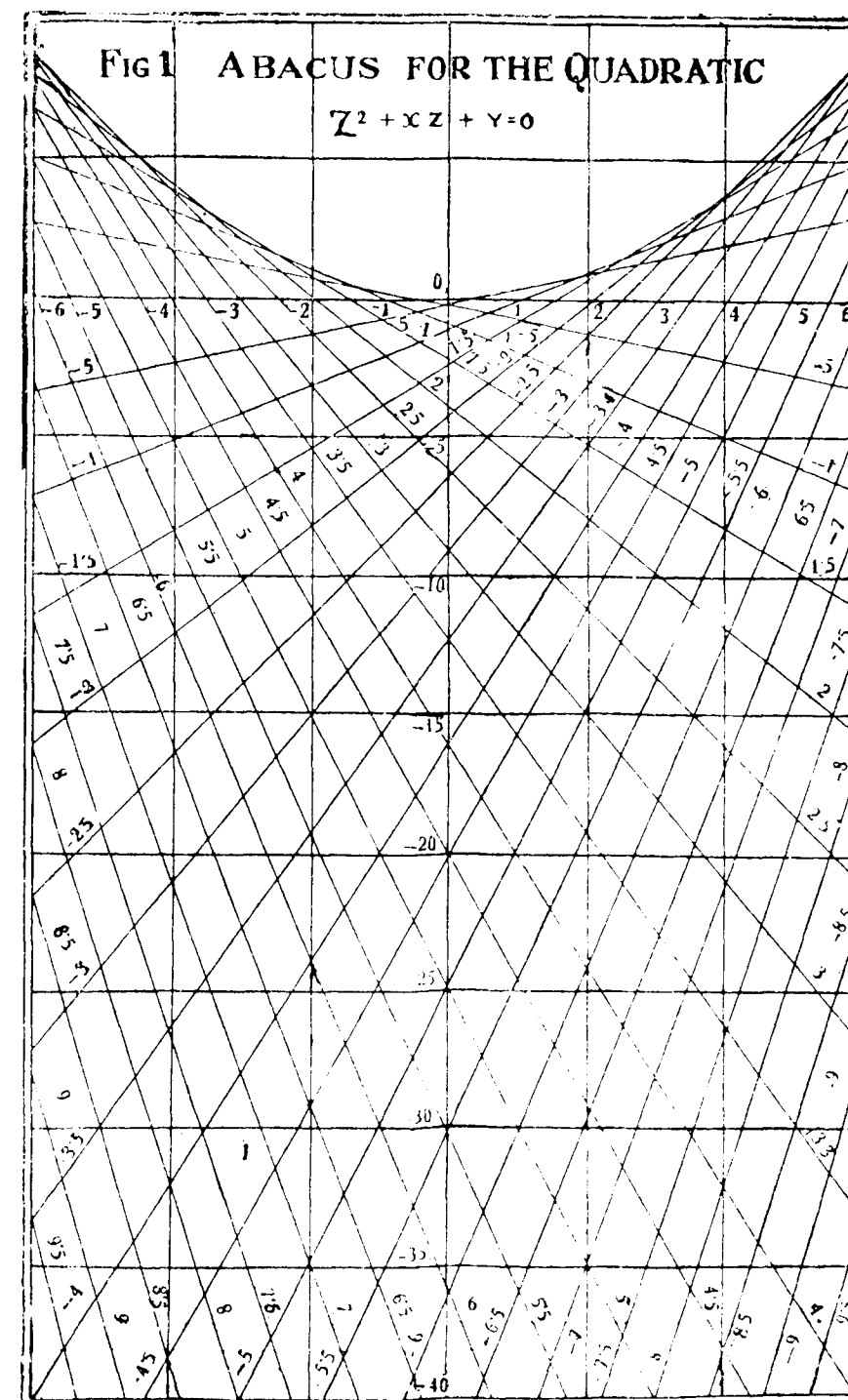
NOMOGRAM *versus* ORDINARY GRAPHICAL METHODS.

The above examples must have shown you clearly wherein consists the superiority of calculation by a nomogram over calculation by ordinary graphical methods. Taking the quadratic equation, for each equation obtained by giving a set of values to the co-efficients, we have to make a separate construction and for a different set of values of the co-efficients, the construction has to be begun afresh. On the contrary, the nomogram [Fig. 1 or Fig. 5] gives us once for all the means of dealing with *all* quadratic equations. A nomogram, then, is a single design useful for all particular cases of a definite formula or type of formulae.

The details of the construction and of the special adjustments for improving accuracy vary largely with the formula considered. Limitation of time forbids me from dealing with these or the methods developed by Nomography to tackle formulae involving more than four variables.

PLACE OF NOMOGRAPHY IN SCHOOLS.

I shall conclude by pointing out the place of this subject in school teaching. To begin



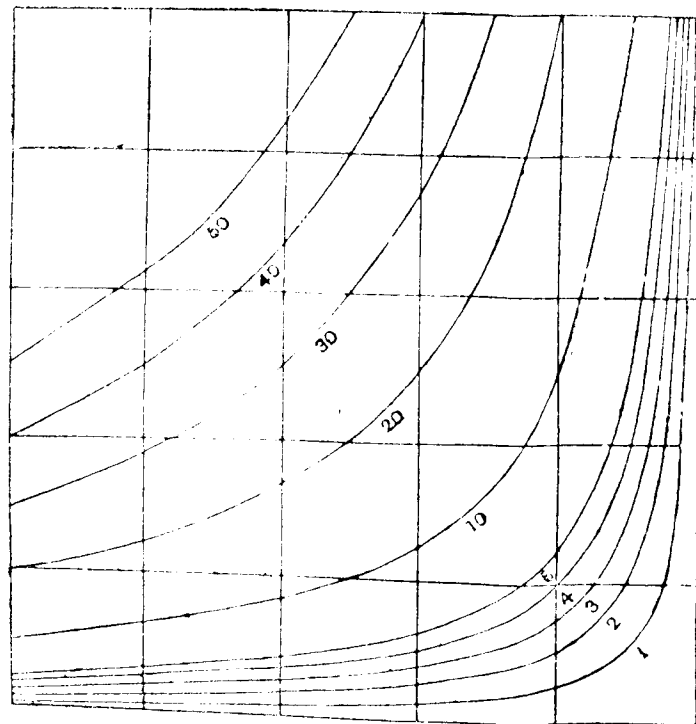


Fig. 2.

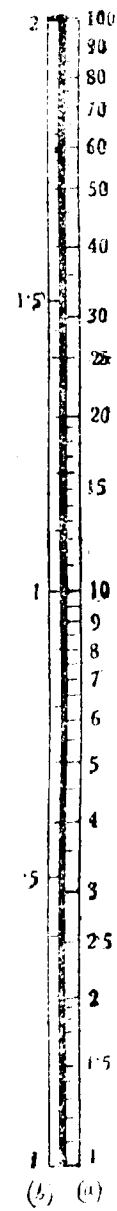


Fig. 3.

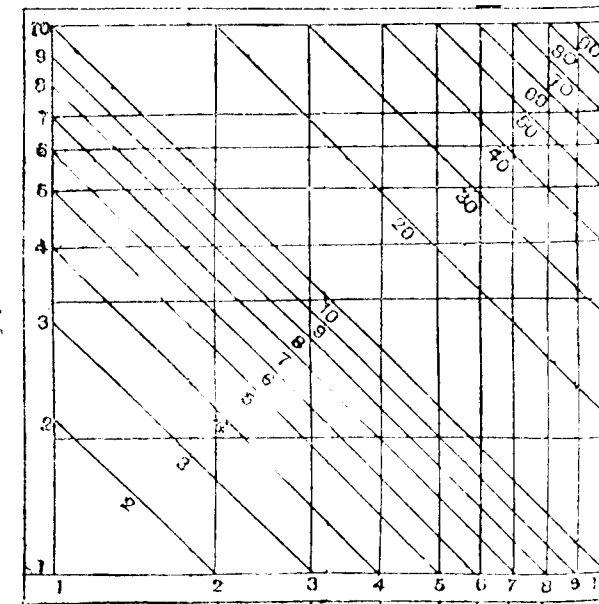


Fig. 4.

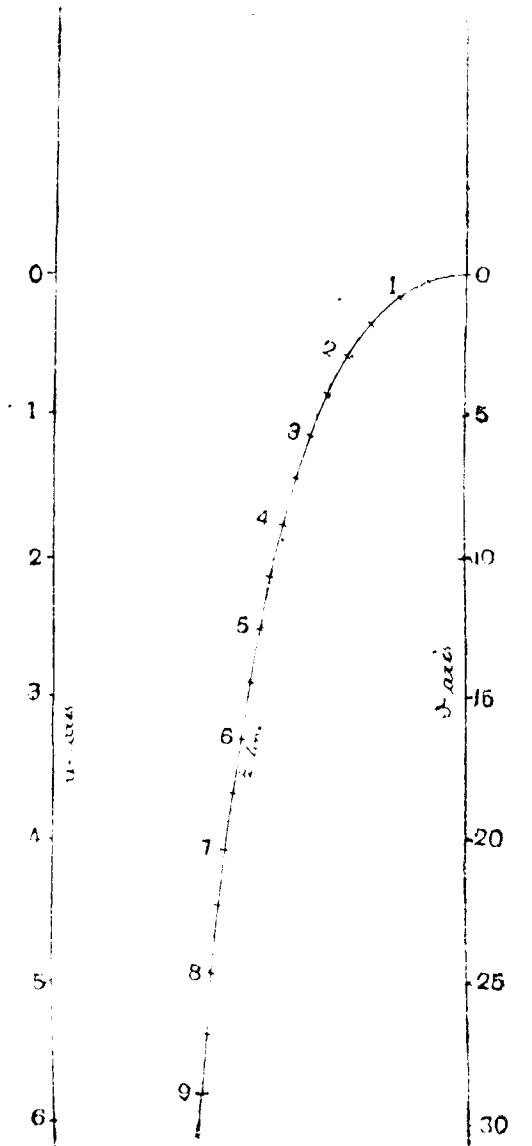


Fig. 5.

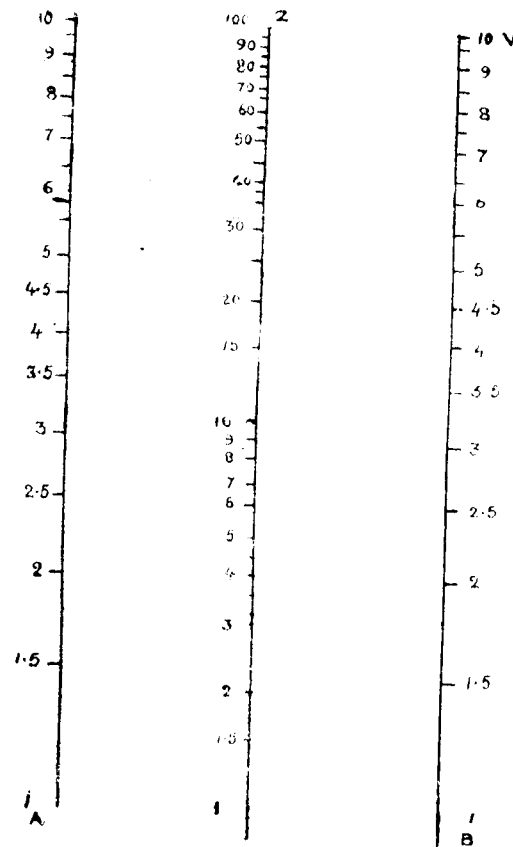


Fig. 6.

with, the notion of a functional scale, and its use, in combination with a metrical scale, as a nomogram for two variables, can be taught with the help of the logarithmic scale and the scale of x^2 . In the sixth form, pupils may be asked to construct a scale of chords or a scale of sines. These could be used to develop the function concept and to practise the art of estimation and interpolation by sight which are so necessary for a mathematical training.

Secondly, the foundations of the representation of functions of two variables are laid in the construction and use of topographical, rainfall, etc., maps, and maps for isobars and isotherms. The principle underlying the construction of these is the same as in the nomogram of concurrent lines. When the straight line and the quadratic graphs are dealt with, pupils may be asked to construct and use abacuses for the quadratic and cubic equations.

Lastly, the teacher might prepare alignment diagrams for some of the formulae that the pupils have to employ frequently—formulae in mensuration, such as the volume of a right circular cone, area of a regular polygon; in Physics, the period of a simple pendulum, the optical formula

$$1/f = 1/r_1 + 1/r_2, \text{ Ohm's law } C = \frac{E}{R}; \text{ in mecha-}$$

nics, $s = ut + \frac{1}{2} at^2$; and so on. Though it is not possible to teach the pupils the method of constructing these nomograms, it is very easy to make them use these correctly and expeditiously. This would stimulate, in the better class of pupils, a curiosity to know the details at least at some future date. Thus would the seeds of a true love of mathematics have been sown.

VAISHNAVA LOVE LYRICS

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MR. J. A. CHAPMAN, Librarian of the Imperial Library, Calcutta, brought out some time back, a small collection of Vaishnava Lyrics, rendered into English verse, with the help of his two Indian assistants, Messrs. Surendranath Kumar and Nanda Lal Dutt. Vaishnava poetry forms an important part of Bengalee Literature and is very rich through its sweetness, melody and harmony. The main theme of Vaishnava poetry is the love of Krishna, the divine cowherd of Brindaban and Radha, daughter of a prince and wife of Ayan Ghose. Prior to the advent of Chaitanya Deva, there existed a cult in Bengal, known as the "Sahajiya," which had its origin in the decadent Buddhistic School and required all devotees to worship and love young and beautiful women. Later on, this creed declined to the lowest depths of debauchery and sensual wantonness. This influenced poetry to a considerable extent.

The first singer of Vaishnava Love Poetry was Jayadeva, the Bengal poet of the 12th century A. D. Jayadeva wrote his "Gita Govinda" in Sanskrit and as his work belongs to Sanskrit Literature, he is left out of treatment here.

Vidyapati, the Maithil poet, and Chandidas of Bengal, are two names often uttered together. They were contemporaneous and there is enough evidence to show that they knew each other. Although Vidyapati did not write in the vernacular of Bengal, his poetry is not difficult to understand and it influenced the productions of later writers of Bengal. He lived at the court of King Shiva

Sinha of Mithila and held many important administrative offices. There is a story connecting him with Lachmi Devi, the queen of Shiva Sinha, but eminent scholars like the late Mr. R. C. Dutt and others disbelieve it as entirely untrustworthy. Chandidas was a Bramhin, the priest of a village-goddess at Nannur in the Birbhum district of Bengal, not far from where the Shantiniketan of Dr. Rabindranath Tagore is situated. He was enamoured of a young washer-woman and lived with her. Society made him an out-caste but the poet was not deterred in any way from composing verses in honour of his lady-love. A good deal of Vaishnava Theology comes in here and he even went so far as to address his beloved as "Vedamata Gayatri."

The selections in Mr. Chapman's rendering are from two publications of the Bangiya Sahitya Parishat (the Bengal Academy of Literature) and incidentally I have made extracts from the translations made by Mr. R. C. Dutt in his "Literature of Bengal" and those by Rai Bahadur Dr. Dinesh Chandra Sen, D. Litt., in his "History of Bengalee Language and Literature" and "Vaishnava Literature of Bengal," published by the University of Calcutta.

Krishna sees Radha among her friends, on the banks of Yamuna and love smites his heart. He speaks to his companions that his heart would find no solace if the lady were not his.

"Among the damsels there were three or four
Jewels of loveliness, but one was more.
Her charms into my heart went straight and deep,
And from my eyes love's fumes removed sleep.
On her is all my meditation.
I knew not once that so much pain
Could come of separation."—(Govindadas.)

And in another verse,

"She seemed
Charming, Friend—with flowers playing;
Ever smiling; and a glance,
Side-long, smiling soon was mine,
I was o'erwhelmed with passion."—(Chandidas.)

He desires for a sight of the maid,

"Make her come soon again, for then
My heart will eased be of pain,
The pain of the fierce, burning heat,
Kindled by those sweet, painted feet."

—(Vidyapati.)

Radha, too, is enamoured of the dark-skinned young man, who plays on the flute, in a grove of "Kadamba" trees, on the banks of Yamuna.

"Her lotus-face like lotus flower is faded,
Tears down trickling wash away the pigment
From her eyes."—(Chandidas.)

She questions her friends thus:

"Friend! who hath named that name?

Through me it steals,

My heart it thrills,

My soul it inflames

Ah! who shall tell

What sweet doth dwell

In that beloved strain!

I name that name

My soul's all aflame

Oh will he come again?"—(Chandidas—
Translated by R. C. Dutt.)

She is restless, she is looking fondly to the Kadamba grove if he comes there again, she is careless about her dress; she comes out of her apartments and goes in again lest the elders upbraid her for her shamelessness. She dreams that she had travelled to a distant land with her lover and he held her hands. But how can she tell him of her love? She is a frail and helpless woman, wife of another, and it would be a sin against all laws to break her marriage-vow. Timidly she asks the bee:—

"O whispering black bee, whisper in his ear
The pains that night and morning I endure:
Tell him my prayer—that, I being gone from here,
He pour of water the oblation pure."—(Vidyapati.)

The elders have guessed that there is something wrong with Radha, she is perhaps possessed of an evil spirit; she starts amidst her household duties, she moves about moaning to herself. Her sister-in-law hears some reports that Radha had been to fetch water from the river and had met Krishna there, who from that time had been frequenting the river-side. She heaps abuse upon Radha for her improper conduct.

"I have heard it mentioned on several occasions that you went alone once to the Yamuna side and met Shyam near the Kadamba tree. Since that time he is coming there too often and his flute plays your name. Thus you know each other." Radha is afraid:

"There is none to take my part;

None knoweth the anguish of my heart;

To whom should I then complain?"—

(Chandidas.)

Through the embassy of friends, the lovers are united and enjoy a happy time of bliss. But Krishna, the wily fellow, is lured by the love of other maidens also. Radha is waiting for him in vain. Her robes, her ornaments, the garland of malati-flowers, the spiced and camphored betels, what are they, if Kanu does not come?

"Some one unknown hath lured my Love away:
Broken my palace—who could think such sin?
How shall I live the whole night through till day;
Outside the joy all other pant within?"

Why do I not die quickly? Is there still

Hope in these breasts that only feel their woes?"—

(Narottamdas.)

A messenger is sent, but she comes back without Krishna. He is elsewhere.

"O my Lady," thus she spake,
"The hopes of Kanu that inspire
Thy loving breast have all been spent
Upon a stone, and thy desire
Has no prospect of fulfilment."—

(Paramanandadas.)

Radha falls in a swoon, pierced with these sad tidings.

Krishna is thinking of his beloved, sitting in a bower of flowers—the night is advanced, what accident might have overtaken her, the roads are snake-infested and beset with dangers and he prays that she may be safe. A little while afterwards, she appears:

"But here is the little maiden,

She comes, she comes! Oh, say

Were you, then all unmindful

Of the dangers of the way?

'Love conquers every danger quite,'

Says Vidyapati, and says aright."

In a dark night, on another occasion, when the sky is overcast with clouds, while lightning is flashing and there is biting wind in the world outside, Radha is waiting for her lover. But he does not come:

"Oh, how suffereth she, the sweet maiden!

Palace, and soft bed she left, and the comfort

there,

Unto the trysting-place for Kanu's love come

hither

But where is he now, where, where?"—

(Sivaramdas.)

Radha is suspicious that Krishna does not love her any more as he had failed to keep the appointment. She is displeased and when Krishna comes she turns away her face in anger and in silence. The poor lover has to appease her by various means:

"Smile and look, O Radha; look and smile to me
Wouldst thou kill the life in one who loveth thee?"

(Jnanadas.)

But she is obdurate and will not have anything of him. So Krishna goes away but the maiden is repentant of her unkindness :

"His own sweet words I would not hear ;
The humming bee now jars my ear.

Why did I let my anger grow ?
I fear that all his love will go.

The garland he made I would not take ;
My necklace now seems like a snake."—

(Govindadas)

Krishna is gone to Mathura. Radha is in grief and despair in the absence of her lover. "In the pangs of such a separation a woman could hardly live."

Radha laments

"Krishna has gone to Mathura. Alas, Gokula is deserted.

The bird Suka weeps in its cage.

The cows look up wistfully, and all their gestures point to Mathura.

No longer do shepherds and milk-maids meet on the banks of Jumna.

O maids, how can I go to those banks again and bear to see the pleasant bowers without him. The beloved groves where he and the maidens played amongst the flowers, how do they rise before me and yet I bear to live!"

(Vidyapati)*.

She is feeling that she would die if Krishna does not return. She says:

"I shall surely die, but to whom can I trust my Krishna?

O ye maidens, my companions, cover me in my last hour, with the name of Krishna.

O Lalita, friend of my heart, let the last sound, I hear, be the name of Krishna.

Burn not my body, O maidens, nor float it on the stream; but bind it on the boughs of a Tamala-tree; and let me rest for ever in its dark blue colour. If it should sometime chance that Krishna come to these groves

again, I shall be called back to life at the sight of him.

Sing in my ears, O maidens, the name of Krishna, that hearing it I may expire."

(Vidyapati)*

She begs her friends to go and tell him that Radha is pining away and he should hasten if he wanted to see her alive:

Krishna is back again and the lovers are once more happy. Radha says,

"Love! how shall I my feelings tell?

Be mine, in death and life,

In after-lives, in future births,

To be thy duteous wife.

Yes! to thy feet my heart be tied

By silken ties of love,

I offer all, my heart and soul,

I'll be your doating slave!

I've thought if in this wide wide world

Another friend I own,

In loving voice to name my name.

Alas, alas! there's none!

In earth, in heaven, in after-world,

Alas! who loveth me?

O! to thy feet I turn for help.

To thee alone! to thee!

Then do not spurn me, I am weak,

O! do not turn away

I've thought and felt, without thy help,

I have no other way.

If for a moment thee I miss,

A death-like trance I own;

I'll keep and nurse thee on my heart

E'en as a precious stone."

(Chandidas—Translated by R. C. Dutt.)

This is simple, touching, unmarked by any figures of speech, a contrast to Vidyapati, who is fond of similes, ornaments and embellishments. The appeal is intense. The whole night passes away, the lovers have so much to tell each other. Radha has tarried too long, she should depart ere the moon

grows pale. She entreats her lover to let her go:

"Oh, listen, Hari; have patience; Oh, listen unto me.

The hour of love is over; the stars we cannot see.

The advent of the morning—listen! the cuckoos hail.

Time there is no longer for pleasure for us two."—(Vidyapati)

Vaishnava Love Poetry differs a great deal from other love poetries of the world. It has a distinctive mark of its own. Leaving aside the physical descriptions and scenes of eroticism which make up a principal part of the atmosphere of the poems, there is enough that will please even the staunchest purist. This love is not love of the flesh, no physical union, but a love purely mystic, the ecstatic and rapturous joy of the devotee in communion with the Divine Soul. Radha is the type of the human soul in love with the Divine Being. Her pang in separation is the soul's pursuit after the glorious vision. "The soul like a holy temple welcomes the lord to the senses which are the doorways for that eternal fountain of beauty, music and fragrance. The soul wants to enjoy Him in a close embrace" and "The soul in its eternal separation from the Beloved One pines away for Him; it yearns to offer its necklace of love, its garland of tender emotions for the service of the Adored One." Such is the lesson of Vaishnava Love Poetry. In "the language of human emotions" the Vaishnava masters continually sing of the divine love.

"Oh lucky night that I spent, I beheld the moon like face of my love! My youth, my life became blessed and everything around assumed an air of joy. My home has become a true home to-day and my body a worthy one indeed. Providence has favoured me

to-night and all my doubts are removed."—(Vidyapati—Translated by D. C. Sen in his "Vaishnava Literature of Mediaeval Bengal.")

I end with a Vaishnava song written by a Mohamedan poet:—

"You do not choose right hours and times to play on your flute, my love. Out of season you play, and my heart goes forth to you without any control. When I sit in the company of my elders your flute calls me by my name. Can you not imagine, my love, to what shame I am put? From the other bank of the river you sound your flute and I hear its sound across the stream—from this bank. Do you not know, my love, that it is my luckless fate that I know not how to swim across the river."—

(D. C. Sen's Translation.)

"The last lines," says the historian of Mediaeval Bengalee Literature, "show that the sound of the flute comes from a higher world, and not having power to control the flesh, we cannot meet the god who plays it."

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* Translated by Rai Bahadur D. C. Sen, D.Litt. in his "History of Bengalee Language and Literature."

EDUCATIONAL ORGANISATION

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CENTURIES of political activity may yet be required to effect perhaps an efficient educational organisation in this Presidency. At the close of the first quarter of this 20th century and in the 2nd triennium of the Grand Reforms, what is the picture? Assuredly one of increasing chaos; confusion worse confounded. The main reasons are not far to seek. One is lack of continuity of policy based on an intelligent and fore-sighted knowledge of educational matters and the other is a perennial want of funds. The general outlook also is so far dominated by political activity—carrying as it does with it the pleasures of exercising powers without adequate accountability and often-times, of pecuniary advantages—as to militate against the realisation of Man as an indivisible unit craving for an all-round development for its full growth. Thus off-handedness governed by emergency and personal interest characterises the administrative methods and tone and no wonder that the Municipal Schools are the worst sufferers, being nobody's business from whatsoever point of view except as avenues for patronage or safety valves for administrative demoralisation. Indeed the whole fabric with everything pertaining to it—the teacher, the school, the subjects, the methods, the inter-school relations, the systems of grants-in-aid, management, control and finance—indeed the whole fabric is chaotically loose.

The evolution of order out of this chaos by trying to properly organise the whole educational machinery, at least a pious wish so far and therefore devotedly entrusted to the care of God as His special province, seems now to be completely despaired of and

expunged altogether from the horizon of practical politics as can be easily gathered from the Director of Public Instruction's Circular on the system of mutual contract between the management and the teacher, sometimes in vogue in Mission schools! Kind attention is invited in this connection to the remarks in the October issue of the *Educational Review* on the Revised Draft of the Madras Educational Rules. What a pause for education after twenty years' struggle (feeble as bound to be) for unification and standardisation and that in the midst of the boasted Reforms though still with a Diarchy even in matters educational as between the Ministers for Local Self-Government and Education!

The teacher's lot (thrice condemned) in this country so enthusiastically glorified—not flattered—at the last Oriental Conference is a very peculiar one! He has to educate not only the boys against the grain of most of their inclinations (wrongly as Sir Rabindranath opined but rightly as vindicated by Prof. Seshadri) but the parents, the managements, even the society at large and what is worse, the authorities and powers that be! If there is a shadow of truth in the theories of transmigration and Karma, those that choose this profession, too often said to be "noble" to deserve any noble recognition in this world's goods, seem to be driven to it by a course of pre-destination culminating in a whole-life prayaschittam. In a Court even of Law, the benefit of doubt is allowed to the accused whereas in the Tribunals of Finance the benefits even of superfluities and windfalls are strictly excluded from these accused as tenth-rate men which can be summed up in "call a man a dog and hang him," practised however unwittingly. The poor teacher is easily flattered by a condescending and blissfully ignorant "It is my earnest desire to know what you want and what you think of

the subjects, &c.," and "I am glad to associate myself with your noble activities and congratulate you on your laudable efforts." It is too much to think that the frame of mind which refuses to see even at this stage can be bettered by this knowledge so solicitously and obediently submitted to. It is simply adding insult to injury and reminds one of "స్వయమేన ఆత్మహతీకృత్య ఆశ్రుకారణం పృచ్ఛసి" of the Royal jester.

The greatest trouble is that the teacher himself has to be educated! The South India Teachers' Union seems to have undertaken this business in its attempts to start a fortnightly. From whatever kind of platform, the fashion of the day is to call for Teachers' Associations and District Guilds and they come into being in a variety of ways and for a variety of purposes. But they are the same languid and enfeebled bodies, harmless warblers, easily flattered and trusting too far with an attitude of mind beautifully described in

జానామి ధర్మం న చ మే ప్రవృత్తిః |
జానామి పాపం న చ మే నివృత్తిః ||
సాపి తేవేన హృది ధృతేన |
యాథా నియంత్రేనైవై తథా కరోమి ||

A few details deserve consideration in this connection.

1. The question of decadence—mental, moral and physical—is undeniable and the teacher is blamed. Very complimentary indeed! Where anything goes wrong, the teacher is to blame and no lack of it! This is only because he is nobody's child in the administration. I emphatically assert that a properly-discriminating person would only thank him for what he has been permitted to do singly or jointly in spite of a distressing economic pre-occupation of the mind, not to speak of a discrediting status generously accorded to

him comparatively. His services are wanted (the beast of burden) but not the man. I am ashamed to say that a slave owner bestows better care. Well, this complaint of decadence is universal and found in progressive countries like Europe and America, the reasons also being as plain. They are connected with (1) Personal equation inseparable from the growth of the democratic ideal, (2) Expansion and consequent deterioration, (3) Unemployment, (4) Change of outlook and re-adjustment of values—the teacher alone excepted, 5) Economic and competitive worry, a canker work, stronger than any other germ.

2. The vexed questions of scales and tenure and prospects. The least said, the best—as known to everybody and in all their aspects. Prospects are more "heavenly" than "earthly." The suggestion of the contract system graphically betrays the helplessness of the situation. However, I may say it that I am not at one with the South India Teachers' Union resolution regarding scales. They had better be based on the needs of the schools and the organization of the profession (if any should ever come) than on individual qualifications and particularly so in these days and be as in Government service. Nor am I able to find that the martyrs hail exclusively from the "Aided" so called private schools. Municipal Schools are in some respects worse situated and all Non-Government Schools share alike in this martyrdom. The Government, hitherto so solicitous, leaves now the so-called Self-Government Schools severely alone to the tender mercies of capricious Councils so that with perfect impunity scales can be raised or suspended or reduced individually or collectively; individuals discharged at sweet will and pleasure in spite of training cost incurred on them and additional expenditure

incurred in a variety of other ways. Still worse, scales revised by Councils lie in abeyance for want of Government sanction. Further every man in the town is, was or will be a Councillor. The Local Self-Government Conference of 1920 was buried on the day of its last session. The Appellate Committees as reconstituted do not command the same faith and Government has completely withdrawn itself.

3. Government Patronage. Here I do plead for greater share for the Non-Government public schools. The portals of the District Secondary Education Boards are shut against them. The S.S.L.C. Board very rarely turns its eyes to them. In the course of these 15 years, it has been constituted five times and thus at least 20 persons have had access and out of them, to the best of my recollection, only two hailed from public schools. I shall say here nothing of the Telugus. Does this bear out even a numerical proportion, not to mention 'Territorial'? Perhaps a study of the statistics *re* Examinerships, &c., reveals a similar state of things. Turning to the University, three seats only, the holy three, are allotted for Headmasters; numerically one for a hundred. This is not the place to ask for more and for some kind of distribution of the same. The point is simply this that when there was no statutory provision for any Headmaster, one from a private school was nominated whereas now when a statutory recognition is accorded to the claims of Headmasters and when all the three seats have fallen to the lot of private schools in a constituency as wide as the Presidency itself, it is not considered desirable to nominate even one from a Non-Government public school. I say this not in praise of any entry by the back-door but only in proof

of patronage. One difficulty seems to be that they are all under the care of the Chief Minister whose best attention is devoted to the activities of the Councils on the sides of politics, sanitation and medicine and not education whose progress is entrusted to another Minister. Thus are we stranded on a kind of Diarchy. Perhaps also the Government is more anxious to raise the status of the Councils than to help the helpless. They are the statutory instruments of Local Self-Government in all branches of human activities and for "popularisation" of any Government move; the bright stars on the Government mental horizon being bounded by political vision. No wonder, even God helps only those that help themselves.

4. The revised Madras Educational Rules are a disappointment inasmuch as they are substantially the same without any attempt at the organisation of the profession as a whole. Pray, not departmentalisation. The inter-school relations chiefly as between elementary and secondary schools, higher elementary and middle schools, are allowed to lie as they were. The anomalous differences between public and private schools are not removed. The scales in Elementary Schools are suggested on the basis of qualifications.

5. Grants and Subsidies-in-Aid from Provincial Funds. Here are found very strange anomalies. It is neither my idea nor is it feasible for me to compare the helps given to European and Non-European schools or the helps given to various types of Non-European schools; and much less to compare the sums spent respectively on administration, Directorate, Inspectorate, Model Schools and aids on the teaching staffs or equipment or buildings,

What have to be pointed out are (1) the inadequacy of the aid specially on the teaching staff, (2) the lack of uniformity in the ratios of the aid; full, 2/3 or half or even less and lump sums, (3) the non-insistence on certain conditions precedent to grant such as scales and salaries, (4) questions of backward classes and fee-concessions to others.

The disorganisation and consequent dislocation are indeed heart-rending. The State surely functions for the growth and development of the whole man and the whole country. Enough of this farce in the name of education, certainly the noblest in the line Divine. The number sacrificed of precious lives, the greatest and noblest asset of the nation, is appalling. Where is the use of Health Weeks and Baby Shows and Eugenics without a proper organisation of educational effort and the profession? What a strange situation for this country of long-standing glories, far flung but still strongly alive! Education, to be compulsory and the teachers, to demand a status; perhaps only to be followed by compulsory voting in the wake of Western civilisation, in this Bharata Varsha where every man and woman had a profession ready to hand with their Dharmas and the State principle of action was governed by "ಜನಾರ್ಜುನ ಕರ್ತವ್ಯ" and where even the administration of Law was placed above pecuniary considerations. When will India come into her pristine glory? Sooner than later, surely whisper the sound vibrations culminating in Aum! Tatsat!!

THE RELATION BETWEEN THE TEACHER AND HIS PUPILS*.

I AM glad that the subject of this evening is of such a type as not to render conflicting opinions possible. Because, all are at one in thinking that the relationship between a teacher and his student should be one of perfect harmony. It may perhaps be questioned why there should be a discussion at all in most of the Associations when a unanimity of opinion exists on the subject. As all know that 'old order changeth giving place to the new,' a discussion of an oft-debated theme is meant to draw out fresh and more valuable ideas to be added to the rich store furnished to us by eminent educationists. That is the only plea for my attempt at opening the subject.

None denies that an indissoluble bond of "the silver link, the silken tie, heart to heart, mind to mind, body and soul combined," should ever unite the teacher and the pupil at all times. This social bond is the highest form to be aimed at in the field of learning. No doubt there are briars and thorns in the path but the teacher, 'it is, who should get clear of all obstacles. A successful solution of difficulties will be possible only when the teacher happens to be all that is desired in him. In fact, he must be a storehouse of learning, an exemplar of morals and a sportsman of a very high order of merit. The possession of all these gifts will undoubtedly demand the esteem of his pupils rather than his forcing it from them.

Still, teachers there are who have all the desirable qualities and do not find it possible to exact obedience from their pupils. Not in

* A lecture delivered to the Secondary-Grade Pupil Teachers, by Mr. K. SUBRAMANIA Aiyar, Assistant, Govt. Training School, Tanjore.

book-learned skill but in using it; not in preaching ideals of self-sacrifice, love of fellowmen, duty to God, Crown and Country, but in practising them himself can there be good effect.

He must make them feel that implicit obedience to the call of duty alone can make them successful in the world. They must realise the spirit of the passage in "The Light Brigade," "Theirs is not to reason why, theirs is but to do and die."

Opening thus, their eyes to the value of obedience in the world of both thought and action, the teacher should do well to study the individual moods and tastes of each boy in the class. Though this knowledge may, at the outset, seem to be not essential, it is the backbone on which the body politic of what we call "Harmony," rests. The more we know the likes and dislikes of each boy, the more likely are we to suit our mode of imparting instruction according to the general taste of our class. Secondly, when a pupil is aware that the teacher is like another parent full of affection and knowledge of his own shortcomings, he does not grudge to be corrected. He thinks that his teacher can detect even his slightest fault wheresoever he happens to be. While therefore a pupil's consciousness that his teacher is an ideal detective officer gains strength, he is seldom prone to err. So, it gradually comes to the point that the personality of the teacher is regarded as an omnipresent factor in the student world. Such a unique position is well worth enjoying for a teacher who is at once a father and a torchlight of the moral, intellectual and physical education of his pupils.

If, as idealised before, a teacher is recognised to be by the boys, the relationship

between him and his pupils is bound to be happy. For, it is well-known that love begets love, reverence begets reverence and confidence begets confidence. When pupils get to feel that they have found in their teacher a safe guide for them in all aspects of education, it needs no prophet to tell us that they will look upon their teacher more as a god than as a mortal. This is a natural tendency to pupils who have an innate reverence and love to objects which touch their hearts. A tendency for hero-worship latent in pupils must be kindled and brought to light with the growth of their minds. Yet, it is not easy to kindle their emotion. It is the pupils that must love the master for what he is worth at first sight and resolve to idolise him as their living god upon earth. A teacher who manages to conquer the hearts of the pupils for a hero-worship can alone be said to have fulfilled his mission quite well.

Perhaps this view is a bit one-sided. A moment's reflection upon its practicalities will convince us all that the teacher must necessarily belong to this class, for, his lot is thrown amidst young men who would become the citizens of to-morrow. Unless the teacher inspires them to noble ways and acts and secures their willing obedience and hearty co-operation, he is as good as not having served in the profession at all. An apology has now to be made out for such teachers as do not approach the ideal. It is not that they do not know how to discipline their pupils and win their hearts but circumstances beyond control handicap their work. They are either placed among unruly pupils whose illiterate parents refuse to send them to schools where severe disciplinary measures are enforced or the teachers themselves out of sympathy are over-lenient towards their

pupils who break loose from moral restraint and descend from one vice to another. With a moderate show of consideration, such sad results could possibly have been averted.

Again, an accusation for taking so pitiless a view against the pupils is likely to be levelled against me. It is not my opinion that pupils should be flogged—as obtained in all public schools in England some years ago. All that I emphasise is that consideration of undue sympathy should not blind the teachers to the fact that they are shaping like a potter at his wheel the career of many a young man and that therefore they should remove all deformities of mind, body and soul in their youngsters. When considerations of a serious nature weigh more than humane sentiments, it is believed that almost all will fall in with me in thinking that punishments should be given as a corrective of the breach of morality.

Some are of opinion that the discipline of consequences can work very well. It means that a pupil should learn his course of action is wrong in consequence of the evil effects flowing therefrom. We are not thinkers and theorists but have to work in a groove that must fit the pupils up for true citizenship. No amount of tall talk can have any effect in bringing round hard and stern-willed pupils and no amount of troubles they experience in launching on foolhardy schemes can teach them a lesson. It is just like allowing the weeds to grow in abundance in a flower-garden and trying to remove them when the buds have fallen a prey to the canker. To teach a child that fire scorches on its feeling the flame is practical to the bone. But, if that be allowed, the child peeps into a well, takes the shadow for

itself and drowns therein. So too, lads of twelve and fifteen, if permitted to go astray and profit by their experience, they become doubly unfitted for the battle of life because neither does their dissipated mind relish wholesome ideas nor is their heart willing to be controlled by the dictates of reason and commonsense. Hence it is that teachers should mould the thoughts and actions of their pupils by administering the rod of justice, if need there be for it. Unless the twig is bent while pliable, the iron struck when hot, it is trying to buy cattle a day after the fair. On the ground of its impracticability, the discipline of consequences can hardly be recommended.

Having so far seen how punishments of a drastic nature also have to be resorted to by the masters in their relation to the pupils, a comparative study of the condition of education in the days of the Gurukula system with that of the modern system will show where the shoe pinches and how it can be rectified.

In the typical Hindu education of the golden age of the Gurukula system, the aim was holiness and the method was to bring the child under the personal influence of the teacher. The child left home and lived with the teacher as the teacher's own family; and living with him the boy did the house work, fetched water, swept the garden while he was taught the various things he should learn to be a cultured man. A subtle examination of what was taught shows that true elements of education were given. As the teachers knew that Indian religion permeates in every action of life, they taught the boys the holy scriptures. In fact, studies were so organised with the aim of giving a

synthesis and bringing the individual to a centre in life so that he grasped life not as a series of parts but as a whole.

Another reason for a perfect harmony between the master and his disciples was that teachers formed second parents of pupils whose well-being was their chief care. The parents of those days entrusted their children to the care of teachers who richly deserved the confidence placed in them. They held themselves responsible for the building of mind and morals even in embryo and when left to do as they chose, the teachers used all possible means of correcting the faults of their pupils either by the use of physical force or by threats and admonitions.

As those teachers were the literary dictators of their age, they enforced any discipline which the parents did not question at all. Boys were like soldiers in barracks and hardly knew what freedom would have been. Whatever the master said the boys repeated and memorised for fear of being rudely handled in crossing his wishes. The teacher was a Minotaur or a Hercules and the pupils stood stock-still at a grin or a roar of his. The terror they infused into the pupils so made the boys dance to the master's tunes "in counterfeited glee," and wonder "how a small head could carry all he knew." That was the discipline otherwise called the martinet's discipline the masters of those days enforced on their pupils who gave honour and obedience wherever they were due with a high sense of duty. How Ekalavya passed through a course in archery in the presence of a clay idol of Drona and how willingly he parted with his finger when the master demanded it as a fee for his blessings, will bear out the nature of the relationship between a teacher and his pupils.

But times have changed. The laxity of discipline in modern homes is partly respon-

sible for the moral degeneration of to-day. Parents do not put faith in the teacher and his potentialities of improving their sons in mind and morals. This lack of confidence between the teachers and the parents results in the pupils' neglecting the teacher as a factor in disciplining them at school. They are ready with the answer that they are the children of an age which advocates Equality, Fraternity and Liberty in social and political life and that therefore they must breathe an air of freedom both at school and at home.

It cannot be ignored that their contention has no background. Freedom of thought and a feeling of brotherhood have been recognised to be good ideals of education. There may be meaning in their asking freedom to observe Nature and enjoy her charms without being forced to read Nature through books. They are justified in asking for freedom to play games of their own choice, read books of their own tasks—barring unhealthy volumes,—and visiting places of interest they like most. But it would be suicidal to their interests if they are allowed to sit in the class or loiter about as they choose. To foster into them a spirit of republicanism of a chaotic type would be to produce an army of young, ill-organised, fool-hardy men neither able to get on well themselves nor useful to the land of their birth.

Our common experience in the class-room has given us numerous instances of pupils refusing to obey orders. The reason for it can be sought more in the master than in his pupils. If, to begin with, the teacher shows himself to be capable of giving a kind treatment and at the same time sitting tight over the delinquencies of pupils, they would behave with caution towards him. If, on the other hand, he is ever jocund and tries to enforce discipline on a particular occasion, he is hardly able to do so with success, for, the

pupils know how best to deceive their master and are not slow to use the art they have learnt. Therefore it is, the necessity for an uniform conduct of the teacher to his pupils becomes imperative.

A consistent behaviour on the part of the teacher must be supplemented by the creation of an atmosphere of freedom for the pupils. The pupils must feel that their master will also laugh and exchange ideas freely with them when there is opportunity for it. To spread a feeling of the kind, the master should know which would please his boys most and use it to cheer them up for future work. He should not pass for a justice of the rod for ever but the pupils must recognise him to be highly sympathetic and kind towards them and should think that his punishments are unavoidable in correcting the pupils. For a beginner in the profession, it is very difficult to inspire confidence but once it is successfully done the teacher may rest assured that three-fourths of his work is over. Dr. Rabindranath Tagore, a poet of the purest ray serene, has, in his article on "The School Master," pointed out that disciplining the boys in an atmosphere of freedom is alone worth having. There is a world of sanity behind the view because it is based on the growth of mind in an air of freedom. Nature, it is well-known, is the safest guide in training the sense organs through which impressions are carried to the child's brain and the child is educated in the true sense of the word. It must be borne in mind that conditions in our parts are not those in Bolpur school where "Viswabharathi," is working according to the poet's ideals. The poet himself happens to guide the institution and some of the teachers who have dedicated their life energy to the

institution are Tagore's own disciples—all giant intellects whose minds have become thoroughly disciplined in their magical association with Tagore. While appreciating the poet's swallow flights of spiritualistic ideals, we cannot but own our inability to adopt his mode of disciplining the boy's mind and will as best as Tagore has done. We can try to copy some of his unique means such as the teacher's personality as a factor in discipline and Nature as a nurse of the boys' mind and morals. For instance, when pupils visit a flower garden and make observations of the shape of a flower, the change of the colour of leaves and the bending of a branch, the teacher can snatch those opportunities of connecting Nature and Man and showing the interaction between the moods of Nature and the moods of Man. No doubt this requires a great deal of imaginative exercise to begin with but after a few lessons the pupils will receive ideas quickly, forcibly and well. From all these arguments, it is clear that some latitude should be allowed to pupils to make discipline effective. The best way of so doing it is to train the boys in Scouting. The Scout Movement has the weight of unanimous approval in the educational world and no school should be slow in organising it. As it is meant to train up young men to realise the value of honour, obedience, loyalty, kindness to fellowmen, self-sacrifice and similar lofty ideals, the Scout Movement should be popularised in schools where it can unfailingly establish a cordial relationship between the teacher and the taught.

In some of the schools, it appears they have "The Boys' Court of Honour,"—an organisation of boys with constituted authority to try cases of juvenile offences and decide the nature of the punishments to be

meted out to the delinquents. This system is remarkable inasmuch as it embodies in itself the germs of democracy. But it is also likely to keep aloof the teacher's discretion in dealing with saucy pupils. Perhaps, the judgments of the "Court of Honour," if subjected to the alteration of the teacher may make the institution a good disciplinary machinery in schools.

All our observations point to the fact that harmony should be the watchword between the teacher and his pupils, that freedom should be given not at the stake of moral looseness of boys, that it is more on the teacher than on the boys the cordial relationship depends for its strength and that therefore the Scout Movement and the Boys' Court of Honour should be popularised as a good agency in fostering high ideals to students.

If the teacher is what he is desired to be and if the pupils prove themselves what we expect them to be, then, our motherland can boast of owning Cæsars and Nelsons, Bismarks and Gladstones, Gokhales and Goshes, Tagores and Sarojinis. Only then, can India's position in the scale of nations be secure.

CHEMICAL PROBLEMS AND THEORIES

FIRST PART

BY

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"REFORMED HISTORY TEACHING."*

TO know what one wants to do is admittedly an essential thing before we begin to do the work in earnest. This is not so easy to attain for there is great difference of opinion among the innumerable workers in the field. We are not agreed as to what it is that we exactly want to do in the work of education. I am sure every one of the teachers who is actually engaged in the work and every one in the street who peeps into the school world now and then feel that there is something wrong somewhere in the system of our educational work. Some cry wild about the farce of education, some speak about the charming days when they were at school and some others are enthusiastic about reforms and new proposals in the educational work.

SOMETHING WRONG SOMEWHERE.

True there is a unanimous feeling that all is not well. So far we are all agreed. But when we come to the question of suggesting remedies, then comes the struggle. We are not able to lay our hands exactly in the spot where the disease is located. Some think that it is in this subject or in that subject. Enthusiasts in each subject wish to focus the whole work of our school on that particular subject and proclaim from house-tops that every phase of educational activity can be made out of his particular subject. Some gifted with rare powers of eloquence and biting language fall foul with the syllabus, turn to attack the organization of educational work in the province and use their powers

* A paper read by Mr. V. NATARAJAN, B.A., L.T., Govt. Training School, Tanjore, at the Sixth Annual Conference of the Madras Non-Gazetted Educational Officers' Association held at Madras on the 31st December 1924.

towards the Inspection work or the distribution of grants. But I should think there are many who make common cry against the poor teachers themselves. It is neither possible here, nor is it necessary, to devote our time in defending the work of the teacher and in exposing the various circumstances beyond his control which go to shape his character and the type of his work. What I propose to do is to make an attempt towards coming to an agreement in our work. This is more important as a first step than the equally important task of how best we can arrange the work and successfully carry it through.

NO ORGANISED EXPRESSION FROM THE TEACHERS.

I can only make an attempt to place before you the importance of such a unanimous agreement in our ideal of work, for, I am painfully aware that the lack of such an agreement produces confusion in our ranks. Among the various kinds of workmen who fill the world the teachers seem to be the most disunited and disorganized. We lack that coherence and definiteness in the ideal of our work which we often see and admire in others. Other workmen seem to have a definite goal and they seem to be united in working forward towards the realisation of it. We lack the mutual support and encouragement which we find in other workers. We are bent on being hyper-critical, we are prone to pooh-pooh the work of our own comrade in the rank and as often as not try our best to belittle the work of our fellow-workers. This weakness lends a handle to others to beat us with. It is probably because we teachers are doing more intellectual work than men in other professions that we spend our energy in picking holes in the work of our own comrades. I may probably mention that in

our province generally we lack that unanimity of ideal and the more so in our teaching profession. That is the reason why we stand confused and dismayed in our work, why we often bungle in our helplessness and wring our hands feeling that we are little men having nothing to do in the serious task of nation-building. I may be wrong in putting forward this view, for there are many among us who may realise the greatness of the task the teacher is entrusted with and who may be ready to take me to task for thinking otherwise. But I am sure that every one of us present here feels in the innermost recesses of his heart that there is something wrong somewhere and I only say that the wrong lies in the lack of solidarity of opinion among us and the want of an organised expression from us.

AIM OF OUR HISTORY WORK.

Let us therefore formulate what the aim of our work is. I am not anxious to place before you the stale and oft-mentioned ideal of education. It will be more necessary if I am reading this paper to an audience of laymen. But here we form a Conference of actual workers in the field of education. It will be out of taste and presumptuous on my part to talk about it. But still to have the ideal always in our view, to have the ideal included in our daily prayers, and even to have it implanted in our minds in every detail of our work only strengthens our work and materially helps towards the successful realisation of the ideal. I intend therefore to formulate the ideal of our work and proceed to show how in a particular department of our work, namely, history teaching, we are confronted with various difficulties, because of the want of that united expression of our ideal, because of the absence of a sort of

mandate from the Teachers' Union and because of the lack of sufficient co-operation and encouragement from among our own comrades in the field.

OUR CONCEPTION OF HISTORY.

It needs no repetition here that history work in our schools is often relegated to the back-ground. It is still one of the less important subjects of the school curriculum, even though in recent years people, feeling as they do the throbbing sensation of national life, cry in vain that our school work is not good, because of the indifferent kind of our history teaching. The chief cause of the trouble, so far as I can realise in my experience of ten years' work as a teacher of history, is the absence of a uniform outlook of history. History is the story of national growth. Our aim is to illumine the present through the past. We live upon the heritage of the past—a heritage of which we are proud. The many stages of that complex organism which we call national life have been gradually evolved from a primitive social state. This process is continuous and ever changing to meet the changing needs of man. This continuity of the growth of development in human society is the great truth which we want to impart in our history classes. We have to reconcile ourselves to the present and realise that the present is the outcome of the past. What we are to-day, what we think we do now, and what we enjoy now is the result of what our fore-fathers have thought and done in the past. History means a knowledge of human nature. This knowledge of human nature is got more by personal acquaintance with various men. The man has to feel himself a member of a country and then he must be able to hold his own in the face of competition and at the same time to

live on amicable terms with various people. To know all the great men of the country by personal acquaintance, our opportunities are limited. It is here that history comes to our aid. We therefore strike that personal aspect in our history lesson and make history the school of human life. We want our children to plunge and swim in that school.

LET CHILDREN LOOK FORWARD TO A HAPPY FUTURE.

We generally fail to emphasise in the course of our work the idea of development and progress. We do not ourselves many of us feel consciously, that there has been any progress in the evolution of our country. Some there are who actually believe and say that the golden age of mankind was in the past, that we are now running headlong into the downward path, and that there is no possibility of a happy life for humanity in future. In other words, we are pessimists. We do not feel buoyant in our work. We have lost that enthusiastic interest in making the children who pass through our hands to feel pleasant in life and look forward to a happy country and society. Let us not instil our pessimism into the children of to-day who will make the nation of to-morrow. It has been often remarked that teachers as a class, as years roll on, grow discontented cynics and patient pessimists. Though there may be some truth in the remark, and though there are truly real causes which go to build this kind of character and temperament in teachers, let us honestly try to have that cheerful outlook on human life and that bubbling optimism which is contagious. It is against the grain of Indian sentiment to grow cynical, for we might have very often heard old people remarking when youngsters

wish to imitate them in denying some of the comforts of life—as for example—

“ஆயிரம் காலத்துப் பயிர் நீ!
குறுத்தைக் காயப் போடாதே.”

Do we not wish our children to grow well and be happy? The life for which we educate our children is so serious that we should be doubly ready to grant them a sunny dawn of life! May the plan and our work therefore correspond to these wishes and purposes. Let us look forward to the dawn of a brighter and happier ideal community. Let us not merely drag on a humdrum prosaic existence and forget the dawn of a brighter and more glorious future. I wish some rejuvenation expert gives us some injection for buoyant optimism. Let us remember not to cry down in the face of our children, din into their ears, that the present is worse than the past and the future more hopeless, and thus make the children begin to believe and feel that life is miserable and that no happiness is in store for them in future.

“இது எல்லாம் உருப்படுகிறது ஏது! எங்க காலத்தில்
எப்படி இருந்தது. ஏது! காலம் வரவாக் கெட்டும்
போச்சு!”

This kind of feeling and expression strikes at the root of our national life. The solidarity of society, the very structure of the nation fall to the ground because our children gradually get soaked into this unemotional indifference, and this detached cynical feeling. They feel no incentive to thought and action, they feel chilled and lose the warmth and throb of life and grow without any pleasure of happiness in life and feel no delight in looking forward to the future. Do children who grow to be such members of the nation contribute to the happiness and prosperity of the nation? How then can we work to cement

the various sections of our nation if in our own house we are divided?

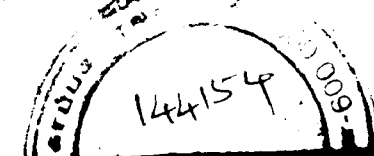
WE ARE PROGRESSING!

Let us therefore come to a definite understanding that the history of our country has progressed. Even children realise the immense progress made by human society. They are able to feel the march of things. They understand the vast progress made in our material surroundings. But the general growth of progress in national life is not often visible but requires to be seen through with the guidance of the clever teacher.

Our scheme of history work has not merely to be planned with this aim but the History teachers have to be soaked and immersed in this ideal so that our lessons are always permeated with that influence. We want to get our children not merely to be interested in the past, not merely to visualise the scenes of long ago, not merely to make the past seize upon them and make them hear the tale but to make them get a deep and abiding interest in and reverence for all things which are the relics of the past, an abiding and cheerful interest in the present life and a sense of a pleasant looking forward to a happy future.

MORAL VALUE OF OUR HISTORY LESSONS.

In our History lessons we are often anxious to emphasise a particular moral value. The majority of us teachers are filled with the idea that we are to select the lives of great men, to elevate them as heroes and to hold them before children for praise and imitation. In our stories we often attempt to draw the moral that goodness always prevails in the end and that wickedness always meets with its desert. It is not often possible to show in our History lessons that virtuous men always



prosper in the world and that the wicked always suffer. Children are able to see that murderers and intriguers succeed as well. Again this attempt to pin a moral leads children to measure goodness by success, and they gradually learn to love justice and truth not for themselves but for the material advantages that are supposed to accrue. It is better to make children feel, believe and realise that for every false word or wicked thought, for unrighteous deed, for cruelty or oppression, for lust or vanity, the price has to be paid not necessarily and always by the actual offender but paid it is by some one. The wicked man makes his family suffer, the wicked boy makes the school black, the rogue and the criminal make the society suffer, the cruel king or a false minister makes the country suffer. Here is the essence of that fellow-feeling which we wish to develop, that national feeling which we wish to build. Again in attempting to picture our heroes as ideal men we have to suppress much that is evil, and as history teachers we are distorting true history so that history teaching may have a good moral effect. But we are not to suppress the ugliness or the brutality of the past, the very existence of which may probably help us to realise that there has been progress. Some of us attempt to label our historical characters as good or bad. It is a difficult task. The world has both good and evil mixed together, every man has both good and bad though in varying degrees. Examples can be found for anything in history and our attempts to place before children types of characters which suit particular virtues for imitation or condemnation must be very judiciously done. Human character is a complex thing and we can only place certain aspects of it before children.

THE REAL MORAL RESULTS.

The moral results of our history teaching therefore are very real and very important but they must follow indirectly. Our aim is more to help children to understand as a whole the world of human activity, the world in which they live. Then our history teaching will assuredly have a good moral effect.

Of the moral results that we expect from history teaching the first is the growth of a broad and tolerant outlook. This broad outlook is necessary for strengthening the national life of our modern day. To the vulgar man everything which cannot approach standards of familiar decency or a type with which he is ever acquainted, such a thing is often ridiculous, strange, or uncouth. He looks with contempt at his next-door neighbour or at one who is not of his community or sect or one who does not perform ceremonies or rites which he is accustomed to perform. Hence there arises a want of sympathy and tolerance which is the main obstacle to fusion.

The historical atmosphere we give especially in our later lessons must therefore attempt to destroy the narrow atmosphere of the child's home or village and must open his eyes to looking for other people's beyond the mountains or beyond the rivers.

* History, then is the study of national development. It makes us realise our indebtedness to the past, our present condition, our hopes and duties for the future. We are fostering in our children a spirit to carry on the torch of progress handed down to us from generation after generation.

This and this has my country given me
What and what can I give my country.

It is this desire to carry on the progress of the nation that is at the root of all healthy patriotism.

HOW TO DESCRIBE OUR MODERN NATIONAL LIFE.

It has been pointed out that we have to keep in view this basic principle while planning our history work. The end and aim of the history work is to trace the development of the nation in order to give the boys an understanding of our national life to-day. We are here confronted with vague doubts as to how exactly we can describe the national life of our country to-day. In England or the United States the history teacher wishes to give the children a sound knowledge of the evolution of the country as one of the great nations of the world. An English boy looks back with pride upon the work of his forefathers—the glorious and mighty British Empire; he knows how his uncles or cousins went to India or Australia and returned as millionaires or heroes; and he is delighted at the visions of his glorious future in the British Empire. What shall we do here in India? We have to discuss it frankly to focus our attention and decide about it. Let not our resigned pessimism colour the outlook we provide our children. What shall we place before our children as the national life to-day?—the evolution of India to its modern condition. How the strong central Government for the whole of United India under the British for about a century has helped towards fusing India into a nation, has made us to believe ourselves forming one country and one nation. We want our children to be acquainted with the well-being of our people at different periods of our history, the conditions which led to the growth of different sects, the circumstances which brought into our fold apparently divergent elements, the chances which favoured the establishment of British dominion all over India thus giving

the country the blessing of a strong united central Government which has paved the way for the happy realisation of a united national life and the moulding of a national character. We want our children to understand and appreciate the social and religious life of the people in different periods, to realise the economic conditions, to know the value and volume of the industries and the trade of the country in different periods, the circumstances which led to the decay of some of the flourishing industries of the past, the modern condition of international trade and world competition and the struggles of the nation to take a handsome part in the world trade of to-day. We want our elder boys to admire and appreciate the noble heritage we have inherited from the past, to feel proud of the magnificent contribution the country has made to the volume of human thought and philosophy, to love and study the brilliant pile of literature, art and music and in fine to feel glorified in the thought that they are members of no mean nation.

AN IDEA OF THE CONTENTS OF OUR HISTORY WORK.

We have to interpret our present day national life in all its varied aspects in the light of the past and while at the same time we have to increase the child's knowledge of mankind and to rouse and develop the interest and sympathy of the child towards the nation as a whole. We have therefore not merely to touch upon political history but to recognise the value of social, religious, and industrial history. We read about church history and economic history when we read the History of England but very rarely do we touch upon these topics when we are teaching Indian History. We have very often neglected to study and appreciate similar movements

in Indian History—the growth of monastic life, the progress of Cave temples and Universities and so on.

I do not propose to give in detail a regular syllabus in History conceived in this light. But I would mention that in the arrangement of our lessons especially in the Third Form we may divide our work into topics. Instead of linking Governor-General after Governor-General and giving fragments about a topic we would find it better to give a whole view of a particular topic. And in the High School stage of our work we are much handicapped. There is a syllabus of British Empire History and Geography for Forms Five and Six. And there is the optional history work. But there is the Fourth Form where the history work is not often well defined. Some do the Hindu period in Indian History, some do the Modern period, some do the whole of Indian History in stories, some do also the whole of English History in stories, or outlines of the general history of the world.

In the High School stage it is necessary to complete the survey of the evolution of Modern India by studying the social and industrial developments in the latter half of the nineteenth century, and the enormous progress in the twentieth century. Though we may begin to do something of this work in the Third Form [because nearly half the pupils in the Third Form discontinue their educational career and so we want to give them some idea of the modern conditions], yet the High School is the best ground for studying this portion in more detail. How far has the syllabus helped us in this direction? How far have we planned our lessons in this light? To give an idea of the contents of this work let me mention a few topics, such

as the sudden changes that have come about in the social life of our country; the expansion of Indian interests—Kenya, South Africa, British Guiana, etc.; the growth of the present Indian constitution, and some events in England's and world's history bearing on Indian life to-day. We must contrast, for example, agriculture in Vedic times and in modern times, agriculture in India and in American prairies; spinning and weaving as an item of household work from our ancient days; villages and towns once famous for special kinds of dhoties and sarees; modern centres of spinning and weaving; modern industries in India; sources of raw materials and markets; competition between human labour and machine labour; industrial revolution; the use of iron and coal and the decay of cottage and village industries; the progress in the means of communication, contrasting a journey to Rameswaram some hundred years ago; modern international commerce and the world-wide market; decay of villages and over-population in towns; decay of landlords, many glorious and ancient families now extinct; the enormous growth of the number of vagrants and unemployed; migration outside our province and outside India, comparing and contrasting English colonisation in other lands; the growth of pauperism and the decay of national prosperity. The teacher can try to picture modern national life and attempt to produce some faint echoes of improvement to better modern conditions. Here we can find some reasons for the old people talking of the glory of life in their times, the charm of life in the days when they were young. Such topics as the protection and development of Indian industries, the question of high prices, unemployment and poverty, what has been done to solve the

problem of the poor and the unemployed in other countries, what we can do to improve the material welfare of the nation, the Poor Law of England where the Church and the State form one united whole and the difficulties staring at the social worker and the utopian dreamer in India; modern tendencies of organisation of employers and workmen; growth of trade unions, the struggle between capitalists and labourers; the idea of national wealth and equal distribution, workmen's share in the wealth produced; the idea of partnership in the production of wealth, co-operation and co-operative industries; the condition of the working classes and the depressed classes; the growth and the increase in the standard of living; the problem of health and sanitation and the duty of the State; the question of housing the poor and providing work for the unemployed, the growth of humanitarianism in State administration and national life—these are some of the topics which the History teacher has to bear in mind while framing his lessons in the High School. Then again we are confronted with the modern topics such as the commercial value of our country being a part of the glorious British Empire, Imperial Preferences, Federation, Empire League and Conference, International Treaties and the League of Nations. These questions can only be comprehended in full significance in after school-life and because nearly sixty or seventy per cent. of the High School boys put a full stop to their educational career by leaving the school, we have to give elementary notions about these topics in the High School so that the young men may complete the knowledge in after school-life. The range of topics outlined above appears to be too ambitious and it is not possible to include in the lessons all the topics and details. At least let us realise what will be more necessary in the modern period. Let us at least aim

high and definitely and let full freedom be allowed to individual teachers to outline their work to suit particular conditions. I think I have said enough to emphasise the necessity of revising our plan of History work in the High School. But this work cannot be done solely by the History teacher. People expect a great deal of him. He cannot conveniently do the work of teaching and at the same time prepare the history material. We want our learned scholars to prepare the history material and help the teacher in the realisation of the aim of history teaching.

THE PLACE OF CIVICS AND CITIZENSHIP TRAINING.

Again there is the problem of civics and its place in the History syllabus. In the lessons for Third Form are included lessons on how we are governed and what we can do for our country. Some take civics to mean a study of how we are governed. Here again we have to bear in mind that the form of government is something progressive. Some take civics to mean a knowledge of the duties and rights of citizens; and they wish history teaching to be the foundation of a good citizenship training. Here also we have to remember that the ideal of what an intelligent good citizen ought to know and ought to do is itself a progressively realisable ideal which is accomplished years after boys leave the school and which is itself growing century after century.

AGGRESSIVE PATRIOTIC COLOUR.

We have therefore to define a clear high goal of citizenship interpreted according to human and modern national ideals. The Germans began the plan of focussing the chief aim of the school work in this direction—that of fostering a love for the father-land, that of consciously learning to excel the other nations in every phase of human activity. This has been condemned by some educa-

tionists as aggressively patriotic. Good educationists wish to prepare the children for an ideal community. However, it will not be out of place here to trace the system of German education in this direction. Since the battles of Jena in 1805, Prussia began with the one single purpose of developing the nation to a height of greatness in everything. In the course of a century of concentrated work in this direction, Prussia became Germany and was well on the road to achieve the desired result. The aim of History teaching, in fact the aim of education in general, was the cultivation of patriotism and therewith the right comprehension of the then present day needs, which comprehension coupled with genuine patriotism would pave the way towards tremendous efforts to satisfy the needs of the nation. She was anxious to nourish and develop that national feeling once placed in the forefront as the aim of education. Here she tried hard to stifle at their very birth those elements of disunion which threaten the very structure of national life. The Germans talked frequently of the besetting sin of their nation—disunion. "Discontent is in our blood. Disunion lights its path. We lack patriotism. We always think that other people do things better than ourselves." It was the eternal cry. A century of strenuous work made Germany one of the foremost nations of the world. In the thought that other people always worked better than themselves, they did not give up their work, but they persisted with an admirable singleness of purpose until in almost every phase of human activity the Germans excelled the other nations of the world. The German teacher was an idealist. Let us remember this idealism is a necessity especially when we know that the life for which we educate our children is so serious that we should be doubly ready to grant them a sunny dawn of

life, also that this idealism needs to be kept within bounds for the constant appeal to the emotional side leads the child away from the interests of practical life. In our schools there is no danger from over-emotion but rather from the opposite—that of the calm unemotional indifference of the teacher.

WHAT WE WISH AND WHAT IS BEING DONE.

Some, nay many of our modern educationists and laymen of the day, wish to follow the German plan in our education. It is certainly necessary that pupils should have on leaving school some knowledge of how they are governed and what their rights and responsibilities in the State will be. It is rather difficult to make even adults realise that rights and duties are correlative terms. Some insist on duties first before claiming rights, while others forget the duties but clamour for rights. The subject therefore is not one which is naturally attractive to children. The history of the complicated machinery of the Government is dull and lifeless. How can we trace the evolution of administration in a series of lessons? It is said that a child is interested in its environments and demands explanations. But really children are not interested with common place present things but are much more interested in the stories of the primitive past. Yet it is clear that we have to teach the pupils the important landmarks in the growth of Indian nationality.

In elementary schools attempts are made to teach civics systematically by beginning the lessons with well-known institutions and offices—the post office, a police court, a municipal election and similar topics. The teacher does much in the way of interesting his pupils with the present and gradually leads them to learn the huge machinery of administration. Such a teaching it is hoped will serve to present the history of the country

in its true perspective and bring out clearly the progressive nature of the national institutions of the day. In the middle school course topics dealing with the growth of national government are to be included in the general scheme of history. It would not be possible to have a comprehensive study but the children can be made to learn incidentally the main forces which have contributed to form the modern Indian nation.

CITIZENSHIP TRAINING NOT THE AIM OF HISTORY LESSONS.

But knowledge of the development of national life alone will not necessarily make our pupils good future citizens. A mere knowledge of the present form of government will not be enough to secure that citizenship training which we have described before. Some people wish us to believe that without history citizenship has no root and without citizenship history has no fruit. It sounds beautiful but it is not true. The aim of history teaching is not direct citizenship training however much we may in our patriotism wish it.

Moral training has to shoulder more this task of citizenship training than mere history teaching. The drawing up of a formal code of moral instruction for the school is not enough for citizenship training. We must look for such training more in the discipline and moral tone of the school rather than the direct lessons in the class-rooms. The recognition of authority, the performance of school functions, the participation in school societies and games will bear fruit in developing a sense of duty and responsibility to the school community. This is the moral foundation of good citizenship training. The boy feels himself a member of the school community and then when he leaves the school he feels himself a member of the society and the nation. The school work must therefore

include different kinds of activity which would serve as a preparation for life, that is to say, boys are to be trained in such work which provides co-operation and which contributes to the betterment of the school community. In later life we have to live rubbing shoulders with our fellow-men in society and if at school we learn to live in co-operation and to work for the betterment of the community how happy will be that nation full of such people? Many schools provide little towards such a training for citizenship. It is a matter for painful recognition that even in society we are lacking in that social spirit and that fellow-feeling and spirit of comradeship. At any rate let our schools try to improve the situation by fostering that social spirit among our boys. But the work of the school has to be continued in after-school life by such agencies as the religious associations and festivals and co-operative societies, political and literary clubs, and such like. In fact the citizenship training that we can give at school cannot be in any way direct, although we can give the children the growth of the nation and give them a picture of modern national life in all its varied aspects. The citizenship training so provided can only be indirect and even though you may attempt to provide opportunities for developing the social spirit the work will be imperfect and useless if not continued in after-school life. The teacher can at best provide only the early process of such training. A good ideal citizen cannot be evolved out of a boy as soon as he leaves the school. There are various other factors in after-school life which help the growth of that ideal of citizenship. It will therefore be unjust and impossible to make school work alone shoulder the responsible task of citizenship training. It is no doubt a ghastly failure of education if at school we fail to train boys in self-education

and self-realisation which are necessary for that after-school education.

NATIONAL HISTORY INCLUDES SOME MUSLIM HISTORY.

In order to give children a really intelligent view of our national history, we have to include in our scheme of history-work some lessons on the growth and spread of Islamic peoples. This Islamic History is more essential than world history. Our nation contains some eighty millions of Musalmans who have made India their home. The history of the nation should include therefore some lessons on Islamic history. No doubt we give lessons on Alauddin, Babar, Akbar, and so on. But we must also touch upon the growth of Islamism, its progress in Western Asia and Northern Africa and its spread to India, stories of some of the great Caliphs as Omar, Harun-al-Raschid, stories of Mecca and Baghdad. These are some of the topics that should find a place in the scheme of our history work.

WAYS AND MEANS TO DO THE WORK.

Having now defined the aim and scope of our work, having now decided the contents and the subject-matter of the scheme of work we must now find ways and means to carry out the work. There is no use of individual teachers working on really intelligent and useful plan of work. The majority of our teachers must be able to carry out the scheme of work we decide and it is left to the various teachers' associations and headmasters of schools to find out practical ways to help and encourage the teachers in their task.

SUITABLE TEXT-BOOKS.

In this direction we are greatly handicapped by the want of suitable text-books—

books of the type dealing with History as we have now defined. No doubt we don't want the books to tell us distorted history, for we do not want to distort history to suit a particular aim. There can be only one aim and that we have already stated. And history can be told only in one way: and if there is any distortion, it is no history at all. It has already been pointed out that we cannot omit or hide anything of the past which may appear vulgar or barbarous to our modern conceptions of conduct and standards of morality. We want to emphasise progress and in the same way we want to show the evolution in our standards of morals. What may appear barbarous or vulgar to our modern conception might have been quite common in the past, might have been nothing extraordinary or vulgar. Let children realise that in the evolution of the life of the people our modern conception of humanism, civilised conduct and so on has also evolved. And so we are not competent to judge the events of the past as vulgar or barbarous. It is this sort of thrusting manufactured opinions and judgments about the events of the past, furnished as we are with modern conceptions, that spoil the successful realisation of the aim of our history teaching. Most of our text-books therefore err in this direction of thrusting manufactured opinions and judgments to suit some motives. For example, let us not have in our text-books the one domineering feature—that of hammering into the minds of the children that the Nabobs and Rajahs in the various kingdoms ruled badly and that they were profligate debauches or unworthy statesmen; let us not drive them to think that all those who fought and struggled against the spread of the East India Company's rule in India as rebels and

traitors. On the other hand, let us make them unconsciously believe and realise that the establishment of British Rule in India came as a providential gift to the rescue of a disunited India. Again let us honour those who fought and fell in the wars with the Company not as traitors and rebels but in the same way as Boadicea or Robert Bruce or Oliver Cromwell is held up to admiration by teachers in England. Again let our text-books having this one aim—that of national growth forget to describe the often usually exaggerated and ill-founded plundering raids and cruel punishments and horror-striking events. Some events may appear horrible to us now. But the evidence we have of the truth of those incidents have to be carefully examined and sifted and the events have to be tested according to the then existing standards of morality and good conduct, before we label them as vulgar or barbarous. Very often the evidence we get of an incident is an exaggerated version meant to rouse the sympathy or to appeal to the pity or to stir feelings of vengeance or some such thing; or it is a glorified version just to satisfy the vain egotistic feeling of an emperor, or the event described may be according to the then standard of power and greatness, an attempt to show off to posterity how a powerful king can do anything to please his whim and fancy. Therefore let us be careful in describing events which may appear vulgar and barbarous to modern eyes. Special attention has to be paid in describing the conquests and expeditions of Muslim Kings. Let us be guarded in not allowing ourselves to be carried by similar motives which moved particular authors in describing events in the manner they have done. Let us not attempt to clothe and colour particular events

with a view to stir up emotions which might lead to bigotry or hatred. It was pointed out some weeks after the momentous Hindu-Muslim Unity Conference, by Dr. Seal, that one of the ways of fusing the apparently conflicting elements, the Hindus and Muslims in our nation, is to teach the history of our nation in a reformed way. No doubt many of us history teachers have often realised that we want some codification of our aim and some overhauling of our text-books in this direction. But it required Dr. Seal to announce it through the A.P.I. Here again is an illustration of what I said in the beginning that we lack an organised expression.

NO OBJECTIVE HISTORY TEACHING.

Some may consider an attempt to reform the teaching of history in this direction will result in distorting history to suit a particular motive—that of strengthening the rising edifice of the nation of to-day, that of wishing to fuse the two apparently divergent elements to form a nation. Some may think, it is asking us to forget and forgive the events of the past. It means as much to say: "How the Hindus have suffered? Have they not been mowed and massacred by the Muslims? And now we have to omit narrating and describing this because we fear that the barrier between the modern Hindu and Muslim would increase and the chances of fusion into a nation would become remote." I firmly believe that this is not the attitude that we are to take. Such an attitude implies something like the story of the wolf and the lamb. Because your father cruelly wronged me, I am waiting for an opportunity to pay you in the same coin. An analogy is always bad.

But I only wish to show that for events, which happened centuries ago the wounds of which by the efflux of time ought to have been softened and healed, let not people harbour malice and a desire for vengeance. This appeal is not only to the Hindu but to the Muslim as well. We read of few instances at least, though not so numerous as in the case of Muslims, where Hindu kings have recked vengeance upon the Muslims. Some may also point out that the Muslims, who were the rulers till recently, have every right to feel incensed at the loss of that power; and it is but natural that the old feeling of animosity against the Hindu is bound to be revived. Are we not attempting to train our children to become members of an ideal community and an ideal nation? Is not our aim the formation of character? Character does not include the developing of a feeling of vengeance. It may be because one country nurtures a feeling of vengeance on another country for some wrong or usurpation done in the past, that we have to record in the history of the world of the wars between one country and another, wars which occurred because of a desire for vengeance. It may be true that it is the sense of shame and the depth of degradation that drives a country to develop an organised nation. Was it not that desire for vengeance, that strong emotion for wiping an insult received in the battle of Jena 1805 that drove Prussia to grow and develop systematically that aggressive type of patriotism which was described before, that made Prussia to grow into a German Empire which threatened Europe?

PURSUIT OF TRUTH.

But here in our country it will be outrageous to develop that vengeance among our-

selves. We are living in one country for many centuries, in a country which we have learnt to call our home and which we are proud to call our motherland. And we have lived so long in that country blessed by the *Pax Britannica* that we have nearly forgotten the existence of two different elements and have almost blended ourselves into a nation. As to creating and developing a spirit of malice or vengeance, it is against the ideal of our work. We are striving to make our boys realise the ideal of the brotherhood of man, the broadened ideal community of the world. Let us be quite sure that we want to give to all our children a wholesome and happy dawn of life, a cheerful outlook, and a right realisation of it as they grow older, of its hopes and its duties, and the work of God which gives him happiness. Let us give them all the treasures of Nature and hide nothing. There must therefore be no particular motive or objective teaching in history. Particular lessons in history may have particular aims. But the general aim of history-teaching cannot be objective, except in so far as we are all of us searching after truth. It often happens that in the effort after some motive, one sacrifices the light, warmth and joy of hero-worship in all lands and in all times. Truth can never be repulsive and it requires no ulterior object behind it. It requires no rhetorical ornaments or covert clothing. And the pursuit of truth is at the same time arduous and fascinating. Let not the historian therefore fall into the clutches of the politician, who wants to preach democracy in the U. S. A., or absolutism in Germany before war, or Bolshevism in Russia. Let him not fall into the hands of the ethical student, for it is not a historian's business to judge whether Shivaji acted rightly or wrongly in

killing Afzal Khan or whether Suraj-ud-Dowla was cruel or savage in a particular action. Let him not fall into the hands of the religious teacher or the artist, for the pursuit after truth is and must be the historian's single aim.

CHEERFUL OPTIMISM.

The history teacher cannot be in the right sense a historian. Let us therefore get historians who will provide history teachers with true history. All the history teacher can do, when he has been provided with the material, is to choose his course and arrange

his work day after day, presenting his facts as far as he can truthfully. He can still try faithfully to present both sides of a problem. He can avoid being blindly patriotic. Instead, he can be patriotic with open eyes. He can let the future generation have some idea of India in the past, of the wealth of her achievements up to modern days and of the possibility which can yet make the nightmare of the pessimist flee away into the mist of the forgotten things, and which can overcome the evils of the present as of the past by the wholesome growth of an awakened nation.

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*Asst.-Master, The Mrs. Perin Mem. High School,
Jamshedpur.*

AT the root of all progress—social, political, moral—of a country is education of its young. It is a truism hardly needed putting in black and white but considering the coldness that it has received from our countrymen, I think it will not be quite out of place to make a brief survey of the state of affairs in our country up to the present times.

People of our country even the educated public gave very little thought to the subject. They had the idea that it was partly the business of the State as regards finance and administration and partly the business of the teachers as regards methods and internal management of the schools, and that they had scarcely anything to do with it. The result is that nothing so long has been done as regards spread of education and popularising it among the vast mass of people and to-day one is struck at the abnormally and lamentably small proportion of literate men in India. India to-day can bear no comparison with any civilised country in this respect. There is a loud cry for democracy and Swaraj in Government but in my humble opinion, the attainment of these would be easier if there is a wide diffusion of knowledge first and without it the condition will be no better than as it was characterised by James Madison, the third President of the U. S. A. and the most active statesman in educational work, in the following words:—"A popular government without popular information or the means of acquiring it, is but a prologue to a farce or a tragedy or perhaps both." The truth of this statement will be sufficiently corroborated by the fact

that the Non-co-operation and other political movements could not keep their hold long with the populace. If these movements have at all been kept alive in any way, it has been done by educated men only. Thus we may say with Thomas Jefferson, another earlier statesman of U. S. A., that "it is an axiom in my mind that our liberty can never be safe but in the hands of the people themselves, and that, too, of the people with a certain degree of information."

It is a happy augury, however, that both the statesmen and the politicians of our country have at last diverted their attention to this subject. Many provinces are busy with finding out means for giving effect to a system of compulsory primary education among their people. Many provincial governments have made munificent grants towards the opening of new elementary schools. On the other hand the Swaraj Party have intended to give their attention to village organisation and along with it, to its necessary preliminary, elementary education. It will be a happy time indeed when we shall find all parties irrespective of political creed or mutual differences will put their heads together for this common cause of finding out a practical solution to this problem of the spread of elementary education in our country.

Though many resolutions were passed in provincial legislatures and many schemes were brought forward by committees formed for the purpose, no definite steps could be taken anywhere owing to the stringency of funds. Our country is poor. Many costly and ideal schemes may be suggested but such schemes are sure to be a dead letter. Our government is not the government of Fredric the Great of Prussia, or of Maria Theresa of Austria, and our people, too, are

not the people of America and similar other countries where they voluntarily contribute large amounts for education; hence a scheme in order to be really suitable for our country must take into consideration the economic condition of the country. It must be cheap and at the same time, as far as possible, sound.

Such a scheme in my mind, is the Monitorial System of Bell and Lancaster. Though the system has been associated with two foreign names, it is itself indigenous and was once a common system in our country. At the present time when education is making great progress as regards its aims and methods, when the educational world is so full of new ideas, new schemes, new methods, new experiments, many will perhaps laugh at my feeble attempt to rescue from oblivion a scheme that has already become a century old and antiquated. It is really an inadequate substitute for a national system of schools. But though it has become antiquated in other countries we have no grounds to complain as we are educationally so much behind the other countries. We have to begin things afresh and half a loaf is better than no bread. Then again the scheme owing its origin to our country has a special applicability here. Before entering into a discussion of the scheme let me first give a general outline of it.

In 1797, Dr. Andrew Bell published in England an experiment in education by means of monitors which he had made some years earlier in an orphan asylum in Madras. By him and especially by Joseph Lancaster, another schoolmaster, the system was developed. The system of both the persons was about the same. "Through the use of a few conduct monitors and a sufficient number of

teaching monitors drawn from the more advanced students, and through a system of organisation and of method, it was possible for one teacher to direct a large number of pupils. With Lancaster the ideal, which he himself realised before he was 20 years of age, was for one teacher to control a school of 1000 boys. Thus in the absence of any willingness on the part of the people adequately to support schools, with the Government opposed on principle to contributing for such purposes, and with the religious bodies wholly unable to cope with the needs of the times, the Monitorial System made possible some general attention to public education." * This was what the Monitorial System did in England; in America, however, its influence was far greater and of a still more far-reaching character. When it was introduced into the United States it was first used for teaching reading and catechism. The plan was soon extended to the teaching of writing, simple sums and spelling and later to instruction in the higher branches. A number of monitorial high schools was organised in different cities of the United States and it was proposed that the plan should be adopted in colleges, too. The system was very popular from about 1810 to 1830. In a number of cities the first free schools established were Lancasterian schools.

The advantages cannot better be described than in the following words:—"The great service which the Lancasterian System rendered in our country was in accustoming people to schools for the masses of the people, to contributing to their support as individuals and in gradually educating the people to look upon education as a function of the State. In addition to this, it introduced a

* Monroe: History of Education, p. 724.

better system of grading, since all Lancasterian schools were rigidly graded on the basis of Arithmetic work, and also on the basis of Spelling and Reading. Hence it was possible to promote in the one subject without in the other. Moreover it brought in a better arrangement and classification of material and a better organisation and discipline of the school.* Thus we realise that the advantages of the system are not negligible and how it paved the way of establishing the free primary schools in countries like England and U. S. A. by creating the willingness of the people to contribute largely to the cause of education. When it was of so much service in those countries, it is not at all unreasonable to hope that it would render similar service to our country too. The system does not cost much. With the grants of Provincial Governments, Local Bodies, Municipalities, District Boards and Union Boards the establishment of at least one such school in every village is possible. We cannot possibly think of costly buildings and furniture at the present stage and the tradition of our country does not teach our people to hanker after these. Ours is a country where woods and forests were the seats of learning. "Even after the forest was no longer used, Indian Universities were ever built in scenes of natural beauty, surrounded by lovely gardens fragrant with blossoms and shady with trees, surrounded by a high wall with guarded gates The influence of natural beauty on the development of the mind is little thought of now-a-days, when a Civic University is founded in Birmingham, in Leeds, in Manchester."

"The number of students attached to an Ashrama or Vihara in Ancient and Medieval

* Monroe: History of Education—pp. 725-26.

India sometimes surprise one. But in a forest there was plenty of room, and in the Vihara the spaces were large; one court-yard in the University of Vikramasila accommodated 8000 people."† Now that the Open Air Schools are being so largely advocated no objection can probably be raised against the holding of schools in the open. Shady forests may not be available now but in its absence erection of big shades open on all sides is not a very costly affair. As regards the large number of students under one teacher, having such a time-honoured tradition in its favour it will be no new thing. The objection that the work will be extremely formal and mechanical and that no true conception of education will be recognised can be met, however, by saying that if a proper scheme for adopting the system be formulated the danger may, to some extent, be averted. Even if the defect be still there, there is no cause of disappointment as it will at least be a move in the right direction and if anyhow a beginning can be made the system may be replaced by a sounder and better one as the people begin to realise its necessity.

My intention, in this paper, is not to say that the existing Primary Schools should be replaced by Monitorial Schools. What I mean is this that in order to spread and popularise elementary education the establishment of many more elementary schools is indispensable and when sufficient funds are not forthcoming and it can be deferred no longer, these Monitorial Schools may be opened at once over and above the existing schools in all villages and towns and the

† Dr. Annie Besant's Convocation Address to the University of Mysore.—(*The Educational Review*, November 1924.)

Union Boards and other Local Bodies may be entrusted with the work of giving effect to it. When sufficient number of schools are once established, making elementary education compulsory will not be a very difficult task.

These schools, however, will not be able to attract boys of the labour class. They have often to keep cows and do similar work to support themselves. For them Evening Classes on similar lines must be necessary appendages to those schools. If this is done I have every reason to believe that the country will in no time be able to drive illiteracy from among its people. Education is a life-long process. When illiteracy is once banished and the avenues of knowledge are made open to the masses the country will be teeming with health, wealth, and happiness.

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Maharaja's Collegiate High School, Mysore.

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Opinions:

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Prof. P.V. SESHU AIYAR, Presidency College, Madras, writes:—"Mathematical Problem Papers" by Mr. A. A. Krishnaswamy, M.A., L.T., is intended to supplement the problems given in ordinary text-books used in Colleges for the Intermediate Examination. The author has attempted in his book to co-ordinate and correlate the several mathematical principles contained in the various subjects of the Intermediate course. The book also contains many interesting questions in the elementary theory of numbers and also questions taken from Ancient Indian Mathematical Treatises, which feature will create in the student an interest in mathematical research and the history of Ancient Indian Mathematics. The book will serve as a useful supplement to the ordinary text-books used by the Intermediate students and I hope it will meet with the encouragement it deserves at the hands of the mathematics lecturers in Colleges.

SRINIVASA VARADACHARI & CO., Triplicane, Madras.

POST-GRADUATE STUDIES IN BOMBAY.

The Government of Bombay have accorded their approval to the following regulations regarding a revised scheme of University Post-Graduate Studies adopted by the Senate:—

The aim of the University should be to award the Master's or Doctor's degree in recognition of satisfactory original research work wherever this is possible. For the present, the present system of testing the efficiency of candidates by means of examination should continue, but that of doing so by the character of original research produced should be introduced whenever this is possible, and, in such cases, the two should run side by side till the time is ripe for the complete elimination of the former system.

The University should be the initiating and directing body in the development of the new system of Post-graduate work.

In organizing the work, the University should invite the co-operation of Colleges in the teaching and direction.

The lines of Post-graduate work which are ripe for development in the new direction are (in addition to Sociology and Economics in which the University already has a school which would work in with the present scheme) (1) Sanskrit and the allied languages, (2) History, more especially Indian History, (3) possibly Mathematics.

If this general scheme be adopted, the sections of the University Library concerned with the needs of research students in the subjects whose development is undertaken will, of necessity, have to be strengthened.

In order to carry out its initiating and directing duties, the University should appoint a Board of Management and a Board of Post-Graduate Studies; the former would be responsible for the regulation of the business side of the scheme; the latter, which would consist of the Professors of the University, of the Colleges and of others who are prepared to assist in some measure in the work of students, would either through individuals or Sub-Committees make arrangements for the direction and supervision of the actual work. The Syndicate would appoint both these Boards.

Though the scheme would be launched in the first place in Bombay, nothing should prevent the recognition of a mofussil Professor as a University teacher under the scheme, if he is prepared to fulfil the conditions required of him by the Board of Post-Graduate Studies.

Any student who wishes to appear for the Master's degree by research, would have to be registered as a research student under this scheme, and the conditions under which he is to work would have to be approved by a competent authority appointed by the Board of Post-Graduate Studies.

The Syndicate should set apart for the purposes of this scheme a sum of Rs. 24,000 per annum in the first instance. As it would absorb the present provision of Rs. 7,000 for Post-graduate lectures, it would mean an additional cost of Rs. 17,000 per annum. If it develops, much more money would later be required. This would be in addition to the provision made for the Library.

The University buildings would be the centre for the new organization.

The scheme does not contemplate, in the first stage, the employment of any wholtime Professor or Lecturer by the University, except in its own School of Economics and Sociology. It is clear, however, that the natural development of the scheme will be towards the establishment of similar University research schools in other subjects whose development is undertaken.

It is expected that in the first instance there will be not more than twenty Post-graduate research students in each of the subjects whose development is undertaken, including those dealt with in the present University schools.

So far as the University teachers under the scheme are members of the staffs of the Colleges, negotiations regarding their appointment should be made through the College concerned, and any remuneration, it is decided to pay, should be paid to the College.

The following regulations have been adopted in the matter of Post-graduate training by research:—

The University shall undertake the Post-graduate training of students by research, and students who have been registered under this scheme of training shall alone be able to take the degree of Master of Arts by research, as provided for in the regulations for this degree.

The control of this Post-graduate research training, including that in the University's School of Economics and Sociology, shall be vested in a Board of Management, to be appointed annually by the Syndicate, consisting of nine members. This Board shall be responsible for the allotment of the funds assigned for this purpose by the University and for the general business management, subject to the sanction of the Syndicate.

The actual research work shall be done under the direction of a Board of Post-Graduate Studies, which shall be appointed by the Syndicate and shall consist of the Professors of the University and of Professors selected from Colleges and of others who are prepared to assist in the research work.

The subjects in connection with which the organization of such Post-graduate studies by research shall be made at present are: (a) Economics, (b) Sociology, (c) Sanskrit and the allied languages, (d) History, more especially Indian History, (e) Mathematics.

The Board of Management shall submit to the Syndicate in November each year its Budget proposals for the following academic year.

Any student who wishes to appear for the M.A. or Post-Graduate degree by research, must be registered as a research student under this scheme, and the conditions under which he is to work must be approved by a competent authority appointed by the Board of Post Graduate Studies.

The University buildings will ordinarily be the centre for the organization of Post-graduate training by research, but the Board of Post-Graduate Studies may approve of any arrangement proposed in any particular case.—*The Mysore Economic Journal*: January 1925.

D. H. H. SCHOOL TEACHERS' ASSOCIATION, TIRUPATI.

At the request of the Secretary, Devasthanam Hindu High School Teachers' Association, Tirupati, we publish the following Resolutions passed at its meeting held on 27-1-25:—

1. That all non-language subjects except C. Mathematics and Commercial subjects may be taught through the medium of Vernacular, the Scientific and Technical terms being retained as they are.

2. That the changes may be first introduced in the Fourth Form from the next school year (1925-26) and continued to the end of the S.S.L.C. Course.

3. That the presence of a Head Teacher in the class to supervise the work of his colleagues lowers their prestige in the eyes of their pupils, indirectly also undermines their disciplinary powers and further results in strained relationship between them. It is further of opinion that the object of supervision, if necessary, may as well be achieved by periodical conferences of teachers and general suggestions and guidance by the Head Teacher concerned.

Reviews and Notices.

OUR SCHOOL.

We congratulate Mr. D. G. Kale, ex-Joint Editor, "Indu Prakash," for bringing out the excellent little pamphlet on the genesis and history of the New English School, Bombay, started and conducted by Mr. T. A. Kulkarni, now the Principal of the Nasik Arts College of the Gokhale Education Society. Within a brief compass of 48 pages the brochure before us gives in vivid details how the school came into existence through the enterprising zeal of Mr. Kulkarni, unaided by anything but the resources of his own mind, his patience, pluck and tenacity to stick to his own ideals at any cost. Within a period of four years, the school became a centre of influence in the City, an experiment in many new kinds of activities conducted by the pupils of the school. The fruit and culmination of Mr. Kulkarni's hard work is the Nasik Arts College, the opening ceremony of whose building was performed only the other day by His Excellency the Governor of Bombay. How the founder, organiser and the centripetal force of these educational activities struck those who came to be associated with him at the start either as pupils or fellow-workers is well-brought out in this pamphlet, the first of its kind to be published, at least, on that side of India. The Secretary of the Old Boys' Union of the New English School, Mr. D. G. Kale, deserves to be sincerely congratulated on the publication. And the work deserves to be appreciated all the more, considering the difficulties under which it was brought out. The example is worth emulation and we trust it will not go in vain.

"THE ERANAKULAM COLLEGE MAGAZINE": THE GOLDEN JUBILEE NUMBER.

It is with great pleasure that we acknowledge the receipt of a copy of the special Golden Jubilee Memorial number of the "Ernakulam College Magazine" covering over 150 pages and containing many fine illustrations. It is intended to serve "as an appropriate souvenir of the auspicious event" of the Golden Jubilee of the College and "as a miniature College Cyclopaedia." The authorities concerned deserve to be congratulated on this number which is as instructive as it is interesting on account of the informing matter and attractive illustrations.

H. H. The Maharajah of Cochin has been graciously pleased to allow the institution to be

named after him and hence hereafter like the famous College (now Colleges) of Trivandrum, it would be called Maharajah's College. The Maharajah has also sanctioned the raising of the institution to the status of a first-grade College which marks another step in advance in the history of education in the progressive State of Cochin.

The two articles dealing with the History of Education in Cochin and that of the Ernakulam College deal more or less with the same topic as the College has been for half a century the centre wherefrom Western culture has radiated to the very nooks and corners of that tiny State. The Vernacular education is looked upon merely as a stepping-stone to English education and the old indigenous system of study of Sanskrit Vedas has fallen on evil days and we are sorry to hear that even the Nambudiri youths have been tainted by the prevalent commercialism and do not care for the old world learning which is 'unremunerative.' The History of the College is a noble record of splendid work done by successive Principals like Messrs. Sealy and Cruickshank, Davis and Barlow. The institution had at one time on its staff the veteran educationist of South India, Prof. K. Sundarama Aiyar and the late Mr. R. S. Snepdard of annotation fame. Some of the old boys have acquitted themselves creditably well in the battle of life and the College is justly proud of them. Prominent among them are the late M. P. R. Sundara Aiyar, Mr. P. Narayana Menon, the present Dewan of Cochin, Mr. T. R. Ramachandra Aiyar of the Madras Bar, the late Mr. Veyra, Chief Secretary to the Govt. of Travancore, etc. In recent times the Ernakulam boys have distinguished themselves in All-India Competitive Examinations like I. C. S., I. F. S., F. C. S., etc.

There is bound to be a good deal of repetition in the case of articles which deal mostly with the reminiscences of 'old boys'; but each writer has his own view point and pronounced individuality and hence all of them afford interesting reading. One dominant note is struck in all of them, a deep sense of loyalty to the old *Alma Mater* and gratitude to the various teachers who 'licked into shape those young barbarians.'

In the article dealing with the Maharajahs and Dewans of Cochin and their connection with the College, one misses the vigorous personality of Sir P. Rajagopala Acharya who won his spurs as an able administrator in Cochin and from there went out as Dewan of the neighbouring State of Travancore; nor do we see even a photo of him in this volume which is full of photos; perhaps "thereby hangs a tale."

The 'Who is Who' of old boys is a very useful reference list. It is, we hope, not exhaustive and it deserves to be made fuller and more up-to-date.

The Proceedings of the Jubilee celebrations is very interesting reading especially the Section V dealing with the Literary and Art Exhibition, which was organised at the suggestion of Prof. Sundarama Aiyar who owing to his physical disabilities was not able to be present there personally. That at such short notice they were able to collect so many exhibits consisting (in the Literary section) of 127 original works in English and Malayalam, 25 Text-books, 24 Translations, 30 works edited and 30 more Manuscripts—all by the old boys of the College, reflects much credit on the organisers and shows also the fertility of the intellectual soil of the State. There was an Art Section and a Handicraft Section also.

There were the usual Public meetings, Speeches, Garden parties and entertainment of various sorts. Altogether the whole function seems to have been a grand success.

There was an element of seriousness underlying the whole Tamasna and the formation of an Old Boys' Association shows that they mean business. This business-like spirit is best shown by the very last sentence of this special number which is an earnest appeal to all the old boys to "remit their subscriptions—as a tribute to their *Alma Mater*—at an early date."

We wish the Magazine and the College all success.

"THE INDIAN REVIEW," THE SILVER JUBILEE NUMBER.

We have received the Silver Jubilee number of the "Indian Review" (January '25) which is double its usual size containing over a hundred illustrations bound attractively in a silver-tinted jacket. Discussions of all topics are generally conducted in the *Review* and it has served usefully all these two decades and over. We have known Mr. G. A. Natesan from his college career and he has always been a social, energetic and pushing young man. He has all along been a shrewd business-man. We congratulate Mr. G. A. Natesan on the successful Jubilee celebration.

"THINAKARAN."

We have received the first two numbers of *Thinakaran* (தினகரன்), a Tamil monthly, edited by Mr. Raguvaanamar, Head Tamil Pandit, Hindu High School, Triplicane. We are glad to find it is written in good Tamil and contains varieties of topics—education, literature—stories and politics, with illustrations. The second issue contains a calendar for the month—a very useful adjunct to the Magazine—we trust it will be continued. We heartily welcome it to our ranks.

The budding Editor assumes the role of a past-master, in his first issue and defines the duties and functions of journalists, and also makes a sweeping aspersion that Tamil periodicals subsist on the translations of English papers—with a solitary exception in favour of the Tamil *Swadesamitran*.

It is got-up well. The annual subscription is Rs. 5. Published in Triplicane, Madras.

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SOME PRESS OPINIONS.

1. "Mr. Sapre is a master of his intricate subject and of the English language. He writes with a clarity and conciseness that are worthy of high praise."—*The New Statesman*, London, 11-10-24.

2. "While there are matters on which difference of view is possible, I consider that the standard of accuracy is in every way satisfactory, having regard to the great difficulty of the task."—*Dr. Berridale Keith*, University of Edinburgh, Scotland.

The Educational Review.

In view of the consideration of the question of the compulsory military training of students which is now before more than one University in India, it would interest our readers to know that Japan has taken an important step in the matter of the military education of her youth: "From the beginning of April this year, every school from the Middle grade upwards, will have attached to its staff an army officer whose duty will be to infuse martial ideas into the minds of the youths of the land." He is not to be subject to the authorities of the school, but will be expected to be responsible directly to the War Office. The example of Germany should be enough to warn people against an excess of the infusion of martial ideas into the minds of the people, though at present, Japan's reduction of her standing army from twenty-one to seventeen divisions probably offers her some excuse for entering upon the step indicated above. In the case of India, however, centuries of peace have emasculated the people to such an extent, that there cannot be any danger arising out of compulsion in the matter. As for the educated classes, their physical degeneration and want of courage are so notorious that the experiment of compulsory military training may very well be given a trial, to see if they can be galvanised into new life.

The Government of the United Provinces has just received an educational trust as the result of the generosity of the late Mr. Kamta Prasad, I.M.S., to which wider attention deserves to be drawn. The trust is to be vested in the Vice-Chancellor of the Allahabad University, the Director of Public Instruction, United Provinces, and the Principal, King George's Medical College, Lucknow, and is to consist, for the present, of two Research Scholarships of the monthly value of Rupees one hundred each, the condition being that the scholarship-holders should devote themselves, in the Science department of the Allahabad University, "to the chemical analysis of such of the Indian medical plants as have not so far been analysed. The work of chemical analysis is to be systematically done and in this connection the works on Indian Medical Plants by Col. K. R. Kirtikar and Major B. D. Basu are to be consulted." There is great scope in this country for the study of Indian medicinal plants, though we are conscious of the fact that some work is already being done in the line at one or two centres in India. Side by side with the attempts at reviving Ayurveda which are evident in the country, it is desirable there should be a systematic investigation into the medicinal plants of which such a large number are used in the Ayurvedic and Unani systems in India. The systems cannot otherwise be based on a scientific footing. Another advantage is likely to be the addition of a large number of

cheap medicines to the Western system of medical treatment which has gained such extensive vogue in India.

We are not surprised that some of the so-called 'national' schools and colleges of Bombay, started as the result of the Non-Co-operation movement are being closed. We have always held it was a mistake to have led an attack on schools and colleges and while we are glad that the Non-Co operation movement has given up this item on its programme, it is certainly a pity that the misguided young men, who left their education under the wrong impression of doing something patriotic, have in most cases ruined their careers once for all. One of the most astonishing features of the circumstance is that the leaders, who were so violent in their appeals in inviting these young men to leave their schools and colleges, do not seem to be worried at all about the ruin which has now overtaken them. Considerable sums of public money have been wasted on the maintenance of these institutions and we have no doubt that the numerous subscribers are seriously disappointed with the results. There are 'national' schools and colleges of this kind at other centres also and the sooner there is an end to the farce of educating young men in them the better for the country. It is best to acknowledge that the whole Non-Co-operation movement in relation to education was a colossal mistake, and close down the institutions which are dragging on a miserable existence. We

commend a Chinese proverb to the people concerned: "It is not wrong to commit a mistake, but it is wrong not to acknowledge it even after conviction."

The Associated Press has come out with a long message giving an account of some new schemes of Rural Secondary Education in Madras. Rural Secondary Education said to have been adumbrated by the present Ministry of Education in Madras. We are told that the powers of District Educational Officers are to be increased with a view to more effective supervision and the S.S.L.C. scheme is to be modified, by laying more emphasis on practical training and manual or vocational courses of instruction. It is proposed to make special provision for pre-vocational training in High School classes. While appreciating the desire of the Ministry of Education, "to make the schools strive to put the student in touch with the many varied interests of men and matters, the aims and conditions of living, and thereby develop a spirit of sympathy and co-operation so that he may acquire the means of individual growth and social membership," we must protest against making vocational education *compulsory* in the High School classes. There must be many whose ambition is to take up ultimately higher courses of University training and it would be wrong to compel them to undergo training in vocations like carpentry. The proper course is to bifurcate the classes in such a manner as to provide for the training of people for

vocations as well as to equip them for University courses of education. We should be glad to see the new 'scheme' come into operation at an early date.

The education of Anglo-Indians and Europeans in India has been a somewhat neglected subject in India till recently. The former community has unfortunately kept itself aloof from the educational systems of the country out of notions of false pride while the latter class of people have never made any serious attempt at providing for the education of their children in India. We are glad to find the European Schools' Improvement Association is stirring and making itself useful by granting financial assistance to various European Schools in the country—a sum of Rs. 65,000 having been sanctioned for the purpose for the year 1925. The foundation of the Association is due to a splendid benefaction of the late Sir Robert Laidlaw and the amount is held in trust by a Committee in England of which Sir Campbell Rhodes is the Treasurer. We wish the institution all success and hope that the movement will result in an effective advancement of European education in India.

In view of the constant agitation in various parts of India for the use of vernaculars as the media of instruction, it is interesting to know what success has attended experiments already made in the direc-

tion. The agitation is often uninformed and based on mere vague sentiment without any appreciation of the practical difficulties involved. The latest report of Public Instruction in the Central Provinces and Berar has got some facts which have a special bearing on this problem and which deserve to be more widely known. It is said that in the year under review, two High Schools, which had introduced the vernacular in the previous year as the medium of instruction, abandoned it and reverted to English. The general trend of the reports received would seem to indicate that the standard of attainments in the Vernacular section has deteriorated in English, but has improved in classical languages, history, mathematics and science. One Headmaster however reports that as the result of the deterioration in English, the position of the pupils who are proceeding to the University is rather serious. We have heard much in recent years of the desirability of making Hindi the *lingua franca* of India, but there is a complaint that Hindi characters take much longer to write when compared with English and that a candidate takes nearly double the time to answer the questions. It is observed that "the greater efficiency of the English language as a means of expression of accurate thought and also its adaptability of condensed expression, coupled with the rapidity with which one can write in English, proved advantageous to boys in the English section, particularly in science and geography."

It is apparently not in the Presidency of Madras only that the problem of using vernaculars as the media of instruction is complicated by the presence of more than one language, because we find that the Director of the Central Provinces and Berar also draws attention to the same difficulty.

In continuation of the remarks we made in our last number on the renewal of interest in Indian Art

The Fine Arts in India. in this country, we are glad to note that the enthusiasm is spreading to more than one province. His Excellency Sir George Wilson of Bombay, presiding over the prize-giving of the Sir Jamsetjee Jeejibhoy School of Arts the other day, made some interesting observations on the need for the cultivation of the Fine Arts in India in an atmosphere of the old Indian traditions. "The real object of a School of Art," he said, "should be not to impose any style from without but to give the students the fullest opportunity for self-expression, and the technical grounding by which alone they can be enabled to give their message to the world." He was sorry that the spacious times of Jehangir and Shah Jehan had passed away for ever, and it was not possible to encourage everything that was desirable in the department of art. Times had changed and the question of funds was one which was staring many a desirable project in the face. The activities of the Bengal School of Art are well-known and in recent years the Bombay School has

also been coming into prominence under the direction of Principal Galdston Solomon, and we cannot help recurring to the poverty of results in Madras. In spite of a recent Government resolution on the subject, may we venture to ask for some attention from the Government to the Madras School of Arts, so that this reproach may be wiped away at least in some measure? This is a matter which we commend to the attention of our publicists in Southern India.

The Educational Minister on Rural Education. Presiding over the anniversary of the Teachers' College Teachers' Association the other day at Saidapet, the Minister of Education, Sir A. P. Patro, made some interesting remarks on the subject of revising the curricula of Secondary Schools in such a manner as to bring education in them nearer their environment. He appealed to the teachers that when they went back to the various districts and work in an environment which had already been founded for them, they should study the local conditions and must adjust their work to do so. It was in this direction that the curriculum had to be changed. Only in the realisation of this idea, he said, lay the success of the educational organisation in the country. These sentiments will be appreciated by all those interested in the problems of education, but there are two limitations in the application of these principles to which we should like to draw attention. The adjustment of education to rural sur-

roundings cannot be at the expense of the needs of a liberal education. The boy, again, who is in a village school, is not intended only for rural activities in all cases and the system must provide for the encouragement of talent destined to play a prominent part in the learned professions or in public life. We hope it is intended to keep these circumstances in view, in any attempts at reforming the curricula of our Secondary Schools even in rural areas.

The Andhra University. We are glad to hear that the Andhra University Bill is making progress and it is intended to appoint a special officer to do work in that connection. We hope the Government of Madras will be lucky enough to get a suitable person for the office, one who is full of energy and thoroughly familiar with University organisation. It is desirable that he should not be merely an official conversant with only the usual routine of educational work, but one endowed with some breadth of

vision capable of viewing University problems in the most liberal spirit of national culture. The special officer should be expected to travel over the entire Andhra country, studying the available resources, evoking support for the scheme by interviews, lectures and other kinds of propaganda, and preparing the way for the establishment of the University. It is idle to expect that the Government will be able to establish a University of a very desirable, modern, up-to-date type entirely out of its own resources and the scheme is bound to be very unsatisfactory, if not entirely ineffective, if popular effort does not come forward to take an active part in the materialisation of the scheme. The special officer should be capable of helping in the drafting of the University Bill and in seeing it through the Legislative Council. The Government would also need his services in organising the preliminary work of the University after the Bill is passed into law. We hope that before the present Ministry reaches the end of the tenure of its office, the University will be an accomplished fact.

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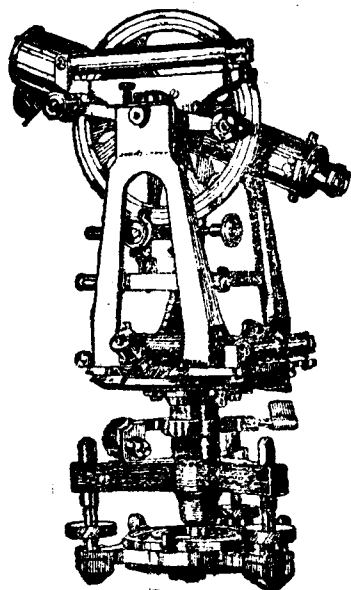
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