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THE PHARMACEUTICAL SOCIETY OF INDIA

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SOME ASPECTS OF PHARMACY

A. N. LAZARUS, M.P.S. (India)

AND

K. VENKATAPATHY NAIDU, M.P.S. (India)

The Mixtures

MIXTURES are preparations of drugs in solution or suspension and represent the commonest form in which medicines are administered. They are more readily absorbed into the system when administered by the mouth than other forms of medicine as the ingredients are either in solution or in a fine state of division. It should be noted that in the case of solutions with the same as, or lower osmotic pressure than that of the blood, absorption is more rapid than with concentrated solutions of higher osmotic pressure. So when concentrated solutions are prescribed it would be a good general rule to sufficiently dilute the mixture when used. Another general consideration is that the mixture should as far as possible be made agreeable to taste and smell. But these are considerations within the scope of the prescriber.

The duty of the Pharmacist should be to prepare the mixture as prescribed using his special knowledge to make the preparation as elegant as possible and he should co-operate with the prescriber in making the preparation meet the purpose for which it was prescribed.

The following considerations should be borne in mind:—

1. *Absolute purity of all the ingredients and the containers used.* Mixtures are preparations with water and are liable to promote the growth of bacteria if the water used is not sterile. An uncleanly-made mixture may give rise to undesirable fermentative changes before the mixture is consumed and so it is desirable to use either sterilised water or freshly distilled water not only in the preparation of the mixture but also in washing the measure glasses and bottles with their corks as well as the funnel and the cotton or muslin used for filtering. The cotton used should be clean and preferably sterilised. Avoid manual contact with the constituents of the mixture. Blowing the dust from the bottle, cork or measuring glasses, etc., by the mouth or wiping them with the hand or the table duster are dangerous habits and persons with such habits should not be allowed to handle the preparation of mixtures. The mixture if it is a solution should be filtered to remove any suspended impurities such as bits of cork, pieces of foreign bodies, etc. Suspensions should not be filtered. If any precipitate is formed as a result of interaction between the components it could be dissolved by means of a suitable solvent with the consent of the prescriber and then filtered or suspended with gum and dispensed without filteration. The precipitate should not be filtered off and the filtrate alone dispensed.

2. *Complete Solution of all soluble ingredients.* The dispenser should see that every soluble component of the mixture is completly dissolved and not left back undissolved either in the measure glass or on the filter. If sparingly soluble substances are prescribed they should be separately dissolved with the aid of heat if necessary and then added to the mixture. If the amount of such sparingly soluble substance prescribed is greater than its solubility would permit it should be suspended or the mixture should be suitably diluted, after getting into touch with the prescriber.

When heavy and viscous fluids like syrups, glucose, glycerine and honey are prescribed it is a good rule to add water to measured quantities of these fluids and reduce their consistence before incorporating them in the mixture. Otherwise such thick fluids would be likely to be left either in the measure glass or on the filter.

Essential oils should be completely dissolved in spirit and should be added towards the end before making up the mixture to the required quantity and then the whole mixture filtered. Similarly spirituous preparations of essential oils should also be added in the same manner. This applies only to small quantities of essential oils. If larger quantities are prescribed they would tend to separate out as droplets if the above procedure is adopted and in such cases it is desirable to suspend the oils in the mixture by means of gum. The same principle applies to resinous substances.

3. *Use of suspending medium for insoluble substances and precipitates.* All heavy precipitates, insoluble substances and oils should be suspended by means of a suitable suspending medium such as acacia or tragacanth. Insoluble substances of a light character such as light carbonate of magnesia do not require such suspension, the patient being directed to shake the bottle before use. A label "Shake the Bottle Before Use" should be pasted on the bottle in the case of all suspensions. The subject of suspensions and emulsions is a very wide one and will be dealt with separately.

4. *Use of special methods where necessary.* The use of special methods may be necessary in certain cases. In such instances instead of starting the preparation of the mixture blindly and then encountering difficulties half way, thus entailing a waste of the ingredients and time, the Pharmacist should study the prescription and formulate beforehand his plan of preparation. This method should be entered in detail in the margin of the prescription book against the prescription so that when the prescription is presented for repetition the same procedure may be adopted.

A few examples of mixtures requiring special methods in their preparation are given below:—

Salol when prescribed with castor oil to make an emulsion should not be dispensed after grinding castor oil, salol, gum and water together. The salol should be dissolved in the castor oil, if necessary by the aid of heat and the solution of salol in castor oil should be emulsified in the usual manner.

Acetyl salicylic acid should not be suspended in gum if prepared in alkaline solution such as sodium bicarbonate but if prescribed in a neutral or acid solution it does require such suspension as aspirin does not dissolve.

Quinine sulphate should be dissolved by adding the minimum quantity of dilute acids such as dilute sulphuric acid or hydrochloric acid but quinine salicylate cannot be dissolved by acids as there would be a precipitate of salicylic acid. Such a substance should be suspended by means of gum. Esters of quinine like quinine ethyl carbonate should not be dissolved in acids as they would be readily hydrolysed but should be dispensed suspended in gum.

Mixtures containing iron and vegetable extracts and tinctures containing tannin would result in the formation of ink like products and in such cases it is permissible to add a little citric acid, with the prescriber's permission if possible, to decolourise the mixture.

The use of acids and gum above stated may be minimised or eliminated if the remainder of the prescription contains acid or gummy substances. It would thus appear evident that the procedure ought to be modified according to circumstances.

5. *Finishing of the prescription.* The bottle in which the mixture is dispensed should be well corked with a suitable cork to prevent leakage. The label giving the directions as to the administration of the mixture should be written legibly in simple language and should be properly and neatly pasted on the bottle. The bottle should be neatly packed in clean paper and sealed before delivery.

STABILITY OF ASCORBIC ACID SOLUTIONS

PROF. CARL A. ROTHENHEIM, BOMBAY

THE use of ascorbic acid in medicine has increased greatly since its isolation in a crystalline form. The knowledge of the chemistry of ascorbic acid is essential for its therapeutic use. Ascorbic acid is a weak monobasic acid having the formula

$$CO-C(OH) = C(OH)-CH-CHOH-CH_2OH.$$

It gives a sodium salt $C_6H_7O_6Na$, while the oxidation product is neutral and behaves like a lactone of a hydroxy-carboxylic acid. The acidity of the ascorbic acid is due to an enolic hydroxyl group. It is well known that solutions of ascorbic acid are unstable and oxidise rapidly in alkaline medium; therefore it cannot be used in conjunction with oxidising substances. In order to study the stability of ascorbic acid solutions the following experiments were carried out:

Five per cent. solutions of ascorbic acid were made in double distilled water and the ascorbic acid contents were determined at intervals by titrating the solutions with N/10 Iodine solution using starch as the indicator. Table I, below, shows a typical example:

TABLE I

Days.	Ascorbic acid in grams per 100 c.c.
0	5·0
5	4·928
10	4·840
20	4·709
30	4·576

It will be seen from the above table that there is a gradual fall of concentration of ascorbic acid. It was also seen that the deterioration of the ascorbic acid was less if the solution was stored in the refrigerator (5–8°C.) and in the dark. The pH of this solution was found to be between 4 and 5. Solutions of ascorbic acid deteriorate even more rapidly if left exposed to the air at room temperature (30°C.) or at higher pH values. It was also seen from our observations that dilute solutions oxidise more rapidly than stronger solutions.

For therapeutic and clinical use a solution which is stable is essential and it was thought that a sodium salt would be more stable. For this purpose molecular proportions of ascorbic acid and $NaHCO_3$ were used, *viz.* 176·1 gms. of ascorbic acid was neutralised with 84 gms. of $NaHCO_3$. The pH values of these solutions were between 6 and 7. These solutions were titrated at different intervals against N/10 Iodine solution in presence of H_2SO_4. Out of a number of results one typical example is shown in Table II, below.

TABLE II

Days.	Ascorbic acid in grams per 100 c.c.
0	5·00
5	4·962
10	4·962
20	4·928
30	4·928
1 year.	4·928

It is seen that the solution is quite stable.

From the results of other experiments it was also found that neutralised solutions with higher pH values deteriorate more rapidly. For example, a 5 per cent. neutralised solution with a pH value of 8, gave after 20 days an ascorbic content of 3·696 per cent.

The stability of neutralised solutions gives us a method of using ascorbic acid for injections. A solution prepared as above by neutralising with $NaHCO_3$ was filled in ampoules and sterilized at 110°C. for 45 minutes in an autoclave. The ascorbic contents of these ampoules were found at different intervals as shown in Table III.

TABLE III

Days.	Ascorbic acid in grams per 100 c.c.
0	4·962
30	4·962
100	4·962
1 year.	4·962

It is found that the solution is quite stable. This shows that a solution of ascorbic acid neutralised with $NaHCO_3$ with pH values between 6 and 7 is suitable for injections.

INDIGENOUS DRUGS OF ECONOMIC IMPORTANCE IN INDIA

A. SELVANAYAGAM, M.P.S. (India)

The War in Europe has created a difficult problem for the profession of Pharmacy in India. The drug resources of India are vast and India could supply the major portion of the World's requirements of medicinal herbs. But unfortunately the collection and marketting of the medicinal drugs grown in India has been so haphazard, that the Pharmaceutical Profession has been mainly dependent on England and America for their requirements of quality drugs. The difficulty of obtaining shipping facilities and prohibition of export of certain drugs, chemicals and medicinal herbs has almost paralysed business in many wholesale Pharmaceutical works. During the last Great War, an attempt was made to stimulate the production of medicinal drugs from sources in India, but directly the war was over, imports from abroad at competitive prices killed these attempts and made India once more dependent on exports from Europe and America.

We shall confine ourselves in this article to drugs of vegetable origin. These consist of medicinal plants, herbs (fresh and dried) gums and gum resins. A list of the most important plants is given below:

Acacia Indica
Aconitum Napellus
Aegle Marmelos
Atropa Belladonna
Balsamodendron Myrrha
Butea Frondosa
Cannabis Indica
Capsicum Minimum
Carum Copticum
Carum Carui
Cassia Fistula
C. Angusti folia & C. Acuti folia
Chenopodium
Cinchona
Elettaria Cardamum
Ephedra Vulgaris
Eucalyptus Plants
Ferula Foetida
Gaultheris Procumbens
Ipomaea Purga
Lobelia
Papaver Somniferum
Psychotria Ipecacuanha
Ricinus Communis
Rheum Emodi
Santalum Album
Strychnos Nux's Vomica
Swertia Chiretta

Cinnamon, Zeylanicum	Tamarindus Indica
Citrus Aurantium	Taraktogenos Kursi
Colchicum	Hydnocarpus Whitianae
Citrullus Colocynthis	Taraxacum Officinalis
Convolvulus Scamonia	Terminalis Chebula
Coriandum Sativium	Thymus Vugaris
Croton Tiglium	Uncaria Gambier
Datura	Valerian
Digitalis	Zingiber Officinalis

The world's supplies of many of these drugs are from India, while others for want of systematic cultivation, are only obtainable from wild sources and therefore cannot be depended on for quality and therapeutical effect. Medicinal plants which are therapeutically most important are generally of a poisonous nature and the source from which they are obtained is therefore an important factor.

Climate, rainfall, nature of the soil and time of gathering, have great influence on the active principle of the plant. Sometimes plants grown under identical conditions in the same locality, show variations in their therapeutic action. It is therefore necessary that these plants should be systematically cultivated so as to ensure maximum therapeutic efficacy. A number of farms for growing medicinal plants were started in the Nilgiris Hills after the last war, and the following were some of the important plants cultivated:

Atropa Belladonna	Digitalis Parpurea
Hyoscyamus Niger	Mentha Piparata
Psychotria Ipecacuanha	Stramonium

Taraxacum Officiniale

There was a very good demand for digitalis leaves from the Nilgiris plantations, but it gradually died down as the collected drug was found to be variable in its therapeutic effect. Competition from Europe further contributed very largely to the closing of the plantations in the Nilgiris.

There are a number of vegetable drugs in the British Pharmacopæia, which are not indigenous to India, but for which there

are Indian varieties. Some of the most important Indian varieties are:

Red Aconite. The Indian variety contains a higher percentage of alkaloid and should be preferred to the imported drug.

Indian Aloes. This could replace the imported variety as it has been found in no way inferior to Aloes Socotrina, of which about Rs. 25,000 worth is imported.

Artemisia Maritima. (Santonica). Several species of santonica are found in the Himalayas—Artemisia Brevefolia grows abundantly in Kashmir and Artemisia Martitima in Kurram Valley, N. W. F. Province. But the yield is lower than that of the Russian plant.

The price of santonin is going up and may go up to Rs. 400/- to 500/- per pound. It is quite possible to produce santonin at a reasonable price in India.

Cassia Augustifolia. The Indian senna is recognised in the B. P. and is grown extensively in the Tinnevelly District. It is chiefly exported to the London Market, but the price obtained is 1/6th the price of Cassia acutifolia, which is a product of the Sudan.

Chenopodium Ambrosoides. The Indian variety of the American worm-seed are common in many parts of India but all specimens do not yield the active oil. Experimental cultivation was started in India, but was abandoned owing to the low yield of the active principle ascaridole. It has been found that intensive cultivation and liberal use of fertilizers with proper method of distillation, would yield a good oil. Though it is not so much in demand since the discovery of the anthelmintic properties of carbon tetrachloride and tetrachlorethane, still the current price, about Rs. 16/- per lb., would pay to cultivate the plant for extraction of the oil.

Cinchona Bark. The principal sources of the cinchona bark are the Government Plantations in Bengal and the Nilgiris. As the bark obtained from Government Plantations was not enough to supply the demand for quinine alkaloids, tea planters were encouraged to plant cinchona trees in their plantations, but this has since ceased, as the cinchona ledgerina plant, from whose

bark the world's supply of quinine is obtained, is difficult to grow except under optimum conditions.

Cinnamomum Camphora. India is practically dependent on foreign countries for her supply of camphor. Attempts to grow the tree in India were not successful, owing to the high cost of planting and the poor yield of camphor. But there are a number of varieties of camphor-bearing plants: *viz.*, the Blumea, belonging to the natural-order '*compositæ*', which would be a good source for camphor. The plant Blumea Balsamiflora grows abundantly in Burma, and therefore if camphor were extracted from it, the total output would be quite sufficient to meet India's requirements. The camphor tree is now grown in one of the Nilgiri Estates, and camphor is extracted, but whether this will be a commercial success, will have to be seen, owing to the increasing competition with synthetic camphor, which has become so popular that it is extensively used for religious functions in India. The principal business of the German Firm, Schering-Kalbhaum, was the export to India of Synthetic Camphor, the value of the business totalling several lakhs of rupees.

Ephedra Vulgaris. A number of species of Ephedra grow in India, and have been found to be quite as rich in alkaloidal content as the Chinese species. There is no reason why with proper care in collection, Indian Ephedra should not be able to supply the world's market for this drug.

Eucalyptus Globulus. This is not indigenous in India. It has been introduced in the Nilgiris where it grows very well. The oil is distilled from the leaves. It is estimated that 30,000 lbs. of oil is produced in the Nilgiris. It is however a small scale industry as the plantations are in small patches all over and transport of leaves is very difficult. The usual procedure to set a small still where the plants are being filled for firewood, at the same time collect as much leaves as possible from the nearest plantations and move on to some other plantation where there are sufficient leaves for the distillation. The price is half of what Australian oil fetches though as a matter of fact the Nilgiris oil is much more valuable from a medical

point of view than the Australian oil which contains Phellandrine which is very irritant to the Bronchial Mucosa. Proper publicity would bring out the virtues of Indian Oil and thus raise the market price.

Euonymus Atropurpurens. The Indian species contain almost the same medicinal principles as the American Plant, and could be used in India instead of the imported article.

Gaultheria Fragrantissina. This plant grows in the Nilgiris and is a source of Gaultheria Oil. Of late, synthetic methyl salicylate has ousted the natural oil, but with the shortage of supplies owing to war, natural oil of wintergreen could be put on the market on a profitable basis and could even be used for manufacture of aspirin.

Gentiana Lutea. This is an imported drug. Several species of gentian found in India, they are not suitable for medicinal purposes, but picrorbiza kurra, found in the Himalayas, has medicinal value. If the Medical Profession in India recognises the value of this drug, as a good bitter-tonic, it can be made to replace the imported gentian root.

Glycyrrhizæ Glabra. The root is imported from Europe, Asia Minor and Turkestan. Though the plant is grown in the Punjab and in Burma, the drug has not been collected to any appreciable extent in India.

Hamidesinus Indicus. The Indian Sarasparilla: Though largely used in Indian medicine, its use in allopathic medicine has died down.

Hyoscyamus Niger. This plant grows all over the Western Himalayas. It is systematically cultivated in state nurseries in Kashmir and Saharanpur, U. P., which should make it possible to supply India's demand for this drug.

Opomea Turpeth. This is now official in the Indian Pharmacopœia, and could be used in place of Jalap, which is an imported article. It is however not much in demand, for it has not been brought to the notice of medical practitioners. The Government

Medical Stores should be able to introduce this in Government Hospitals instead of Jalap.

Mentha Piperata. This plant was grown in the Nilgiris farms, and a good supply of oil was obtained, but owing to the competition by Japanese Oil, this industry has ceased.

Picrasma Quassioides. This has been found to contain the bitter principle quassin, which is identical with the official picrasmin and should be able to replace the official drug.

Podophyllum Emodi. This plant, known as Indian podopyllum, is now official in the Pharmacopoeia, but all the podopyllum used in India, comes from American sources. This is due to want of proper scientific cultivation and collection. Owing to the shortage of supplies arising from the present international situation, Indian suppliers will do well to organize the collection of this drug.

Psychotria Ipecacuanha. Though this is not an indigenous plant, good quality of ipecacuanha root can be grown in India. The Government of India started an experimental plantation of ipecacuanha in the Nilgiris and Darjeeling, and this has been found to be successful. Owing to the difficulty connected with the growth of the plant, production has not been on a large scale in India.

Strychnos Nux Vomica. India holds the monopoly of this drug. It is chiefly exported for the extraction of the alkaloid strychnine, and there is no reason why the manufacture of the alkaloid should not be undertaken in India, so that this may be exported instead of the seeds.

Swertia Chiretta. This Indian drug is official in the B. P. and there is no reason why it should not be used to replace the imported gentian of the Pharmacopœia. It should be brought to the notice of the Medical Profession, who seldom care to prescribe this drug.

Scillæ Indica. This drug was official in the 1914 B. P., and if its cultivation and collection is improved, it can compete successfully with the imported variety.

Valerian Wallichri. Indian Valerian: This drug is found in Kashmir and the Himalayas, and by careful cultivation and collection, it can be substituted for the official imported valerian.

India has within itself all the soils and climates of the world and can grow every vegetable drug under the sun including even those drugs which are at present not indigenous. India can afford to meet all its drug requirements and can in addition afford to supply the rest of the civilised world with drugs of every description, *if only suitable attempts are made.*

INCOMPATIBILITIES AND THE METHODS OF AVOIDING THEM

J. S. GANDHEKAR, B.A., M.P.S. (India)

(*Continued from Vol. 1, No. 2, P. 70*)

Physiological Incompatibility

This is the same as pharmacological incompatibility. Strictly speaking, this is outside the domain of a Pharmacist, but an account of incompatibilities would be incomplete without a mention of physiological incompatibility.

This type of incompatibility is mainly due to the pharmacological action of a particular drug, which is antogonised by that of another and, when such is the case both the drugs in question are said to be physiologically incompatible or antogonistic. In many a case there may not be any chemical or physical incompatibility at all between the two drugs, but their antogonism is seen only in their action on the body. So far, medical science has not known any single drug which can fully and completely counteract the action of another drug on all points, though the profession is quite aware of instances of partial antogonism. For instance, opium contracts the pupils (pin point pupils occur in case of opium poisoning) and has a depressant action on the respiratory centre, whereas belladonna dilates the pupils and stimulates the respiratory centre. The action of aconitine on the heart is counteracted by that of digitalis and, strychnine and brucine counteract the action of bromides and chloral on the cord.

The physiological incompatibility in prescriptions may, in a few cases, be due to error in prescription writing and, in such cases the dispenser should give the benefit of doubt to the prescriber if he cannot have access to him. For instance in

℞

Strychnine Sulphate	gr. i
Potassium bromide	ʒvi
Aqua distillata ad	℥vi

Strychnine and bromide are put together in a mixture. There is an instance not only of chemical incompatibility with the resulting physical incompatibility between the two, but also their actions on the body are different. One should admit that one often comes across such a prescription as the above one, and the matter should be referred back to the prescriber.

In the majority of cases, therapeutical incompatibility in prescriptions may be quite intentional on the part of the physician, for he might have prescribed one drug to nullify or counteract a little the undesirable effect of another drug in order to give relief to the patient and, in those cases the physician would, if noted carefully, have paid great attention to the dosage used. In the prescription

℞

Potassium bromide	ʒi
Tincture belladonna	ʒss
Syrup	ʒvi
Aquam ad	℥vi

though potassium bromide and belladonna have opposite effects on the nervous system, yet we find them together. One is meant for giving mental calmness to the patient and the other (note the small dose used) is added to give relief to the spasm of the smooth muscles.

Among the physiological incompatibilities that are intentional, antidotes may be included. The antidotes could either be adsorbents, or precipitants or physiological correctives, otherwise called, corrigens.

Charcoal and kaolin are the two adsorbents that are generally used in cases of alkaloidal and bacterial poisoning. These adsorb the poisons by surface action and thereby prevent them from being adsorbed by the tissues. The precipitants on the other hand, precipitate the poison by combining with them to form an insoluble compound thereby making it inert. Tannates and substances containing tannin are generally used as precipitants in alkaloidal poisoning.

Physiological correctives are legion. Many of the official preparations of drugs are based upon this principle. Many of us would have known the constipating effect of iron in the treatment of anæmia. But the constipating effect of iron could be corrected by a saline purgative such as magnesium sulphate. And this is what exactly any physician would do, and, that is why we often come across prescriptions containing iron preparations, having magnesium sulphate or other laxative as one of the ingredients.

As many will know, senna can be used as a laxative as well as a purgative, according to dosage. When used as a purgative in large doses it causes griping. Senna in the form of Black Draught or Mist. Sennae Co., is largely used in habitual constipation and, in the constipation of pregnancy and, to prevent its griping property, some medical men add a few minims of tincture of hyoscyamus, which acts as a sedative on the intestines, thereby relieving the patient of the griping pain, which might, in some cases, be caused by the black draught. The black draught itself contain ten per cent of compound tincture of cardamom mainly as a corrective for the griping property of Senna. In constipation due to the disorders of liver colocynth is often given in combination with aloes and mercury. But colocynth has the griping property, to prevent which hyoscyamus or belladonna is always given with it. And hence pillula colocynth et hyoscyamus happens to be a valuable preparation.

Rhubarb when given internally performs two definite functions in the intestines. In large doses it increases the secretion of intestinal glands and the peristaltic movements and thus acts as maild purgative. Rhubarb, as is known, also has the effect of

arresting the glandular secretion of the intestines, causing constipation. So preparations of rhubarb given alone, first cause purgation and, then constipation and, to prevent the latter, as well as the griping property, it is often mixed with an equal quantity of sodium sulphate or other purgative. And hence Gregory's Powder or Pulv. Rhei Co., happens to be a valuable preparation.

The special group of drugs that are known as astringents are antagonistic to purgatives. This action is due to their coagulating action on proteins and production of contraction and shrinkage of tissues and diminition of secretion. The astringents include a large class of substances.

For instance, opium and chalk act as intestinal astringents by diminishing the secretions and peristalsis. Opium due to its astringent action reduces the intestinal secretion and, due to its central effect diminishes the rectal sensation, in consequence of which the defecation reflux becomes sluggish. Hence opium acts as a sedative, astringent and anodyne to the bowels. On account of the above actions of opium it is a valuable remedy in lienteric diarrhœa. After the expulsion of the offending matter in diarrhœa and dysentery, one or two doses of opium is usually given. In the case of diarrhœa it is usually given along with castor oil, to bind the bowels after relieving the intestines of the offending material, thus giving relief to the patient.

Physiological incompatibility is a vast subject and mention has been made of only a few cases.

A TRIP TO BARODA

S. SHAW, B.Sc. M.P.S. (India)
AND
K. S. KRISHNASWAMY, M.P.S. (India)

The Senior Pharmacy Students of the Madras Medical College were fortunate enough to visit the Alembic Chemical Works at Baroda during the Michaelmas Holidays of September, 1937. The original idea of visiting the Government Medical Stores at Madras was given up in place of a more ambitious tour to Bombay and

Photograph of Pharmacy Students who visited Baroda.

Baroda. The tour was made possible, owing to the keen interest and efforts of Dr. S. Rajagopal Naidu, M.B.E., Professor of Chemistry, Madras Medical College, who wrote and obtained permission from the authorities concerned, to entertain the party at Baroda at the expense of the company, provided they bore their Railway fares from Madras to Baroda and back.

The party consisting of twenty members left Madras Central Station on the 25th of September, 1937, in high spirits, as that was probably the first trip to the North for most of them. The journey to Baroda was thoroughly enjoyed, and the route between Poona and Bombay was much appreciated as they had to cross the whole of the Western Ghats.

Adequate arrangements were made at Baroda for the party not only to visit the works, but also other places of interest. The Chief Chemist was kind enough to take the party on two successive days round the Works and explain in detail the workings of the various departments and plants.

Spirit was found to be distilled on a very large scale from the fermented juice of the Mahwara flowers, obtained from the neighbouring districts. The valuable by-products obtained in this process were also recovered, namely carbonic acid gas, fusel oils and aldehydes.

As the Ruler of the Baroda State was away, permission was obtained to visit the Palace and the beautiful gardens surrounding it. Here were seen several of the beautiful original paintings of the well-known Indian Artist Ravi Varma.

On the third day morning the party left for Bombay and spent another three days there in sight-seering and visiting places of chemical and pharmaceutical interest, chiefly Haffkin Institute, where the whole process of preparation of anti-cobra serum were shown in detail and also the various stages of sterilisation of their products. Another important institution visited at Bombay was Messrs. N. Powell & Co. where not only pharmaceutical preparations like tinctures, spirits, ointments, etc., are prepared, but also up to date surgical instruments.

Thus ended a tour of the most useful and instructive type for Pharmacy Students. Such tours to Manufacturing Centres are essential to Pharmacy Students and should become a regular feature in their studies. It is up to the Association of the College also to help as much as possible such tours. A word of thanks are due to Messrs. Natarajan and Gandheker, members of the chemistry staff of the Madras Medical College for accompanying the party in their official capacity and also to the other members who made the tour a grand success.

EMULSIONS IN COSMETICS

H. J. BROUGHTON, M. P. S. (India)

Classification.—For the purpose of classification, emulsions are usually divided into two types, *viz.*, the oil-in-water (O/W) and the water-in-oil (W/O). As an example of the oil-in-water type we may take vanishing cream; and cold cream is exemplary of the water-in-oil type. But this differentiation must not be considered arbitrary on formulæ alone; rather are the types controlled, more or less, by methods and conditions of manufacture. To illustrate this observation, take for example a cream made up from bees-wax, liquid paraffin, borax and water, where the major portion of the ingredients is oil and fat and where the emulsifier is the borax bees-wax combination. Immediately on manufacture this cream is found to be an oil-in-water type of emulsion. But this will usually change to a water-in-oil type after standing for a few hours, eventually settling down to the latter type. The addition of a small proportion of stearic acid tends to hasten this change. In other cases a slight change in temperature is sufficient to alter an emulsion from one type to the other.

A simple test to distinguish the type to which an emulsion belongs, is to see whether an oil-soluble dye or a water-soluble one diffuses more evenly through it. If the former, then it is a water-in-oil emulsion; if the latter, oil-in-water.

Choice of emulsifier and manipulation. One of the difficulties which the Pharmacist up against is correct manipulation in

the manufacture of emulsions. According to the emulsifier he employs, so should he know whether the best results could be obtained by vigorous stirring or by slow. For instance, in an emulsion containing triethanolamine stearate, liquid paraffin and water, the stirring should be slow if satisfactory results are to be obtained. Another important consideration in selecting and employing an emulsifier is whether it should be used at room temperature or whether heat should be applied. A combination of cetyl and stearyl alcohols, approximating a wax-like solid, is a very efficient emulsifier for producing a non-separating white cream. Satisfactory results are only obtained, however, when it is used at a temperature above 60°C.

Overcoming defects in emulsions. Separation in emulsions is undesirable both from the point of view of elegance of the product and that of the buying public. On this account limes and glycerine, which is an emulsion prepared by mixing together a vegetable oil, such as almond oil, and lime water, and which separates on standing into two distinct layers, is not appreciated as it might be, could this apparent defect be overcome. It may be here stated that the principle underlying the formation of this emulsion is the initial formation of soap between the lime water (which is a weak alkali) and the oil, the soap then acting as the emulsifier. There are on the market many emulsifiers with which non-separating creams, may be formed examples of which are calicum oleate, calicum stearate, triethanolamine stearate, morpholine, etc.

"Creaming" in emulsions is the phenomenon whereby the emulsion becomes concentrated at the surface on standing, similar to the formation of cream in milk. When this occurs, there is a likelihood of the emulsion breaking up, owing to the fat or oil globules coalescing in the concentrated stratum. This condition can be avoided to a certain extent by passing the emulsion through a homogeniser, a machine in which the emulsion is forced under pressure through a minute aperture, thereby causing the dispersion of the oil globules into very small droplets. Another method of overcoming "creaming" is to choose an emulsifier whose specific gravity is intermediate to that of the oil and water.

One of the bugbears attached to emulsions made up from vegetable oils is their tendency to become rancid. Hence a very important aspect of the subject is the preservation of the emulsion after manufacture. This was a difficult proposition in the days gone by, but the introduction of the esters of parahydroxy benzoic acid have made it a comparatively simple matter to preserve them.

As in other pharmaceutical preparations, we have incompatibility in emulsions. Taken generally, spirituous preparations which are anti-emulsoid such as tinctures, and solutions of salts are usually incompatible with these emulsions. But salts which are definitely alkaline in reaction, such as the phosphate of sodium, usually assist emulsions, as combining with a portion of the fat the alkali produced by hydrolysis forms soap, which acts as auxiliary emulsifier. The way to overcome incompatibility, where removal of the causative substance is impossible from the formula, is at least to minimise its deterrent effect, by dilution. The spirituous preparation is well diluted, and added to the emulsion in small quantities at a time, preferably towards the completion of the manufacture of the emulsion.

ADVICE TO COMPOUNDERS

An Address delivered to the South Arcot Compounders' Association

J. S. GANDHEKAR, B.A., M.P.S. (India)

It gives me great pleasure to be present amongst you this evening, as a representative of the Pharmaceutical Society of India, on the occasion of the First Anniversary of your Association. I have been enjoined by the President and Members of the Pharmaceutical Society of India to convey to you the felicitations of the Society and its best wishes for your growth and prosperity. It is indeed a laudable venture that the compounders of the South Arcot District should have united themselves into this organisation. I hope many other districts in this Presidency as well as elsewhere in this country will follow your splendid example.

To-day, the status of the profession of Pharmacy in our country as illustrated by the position of the compounders is not very high. The term "compounder" itself appears to be an objectionable one, and seems to carry with it a position of inferiority so far as our country is concerned. Originally the compounders were recruited to supply the needs of the military department, the main work required of the compounder being elementary pharmaceutical manipulations, most of the medicines supplied having been imported ready made. There was thus no need for persons with high pharmaceutical training, as there were no complicated and intricate operations involved in dispensing. This was the state of affairs about a century ago. Pharmaceutical science has advanced by leaps and bounds during this period, but the trained compounder of to-day is no better than his counterpart a century ago. Practically no one in our country whether amongst the members of the medical profession or of the general public has worried himself about this state of affairs, since most of the medicines especially patent medicines are imported ready-made. But it is a great pity that it is not realised that this country with its vast resources, by its free importation of such ready-made medicines has been very liberal in its treatment of pharmacists abroad, while stinting to its own pharmacists even the rudiments of education absolutely necessary for the practice of the profession. So charity does not appear to begin at home here in this respect.

The low standard of general education, or in some cases even no standard of general education allowed for the training of the compounders, the poor standard attained, the poor pay and the consequent low standard of living, all these have resulted in such lack of self-respect and sense of responsibility amongst most of the compounders in our country as to make even the term "compounder" appear to carry with it a stigma.

Even with such a low standard of training given to them, except in government service, the compounders have no safeguards against competition by untrained men. Most unfortunately in our country, the public cannot discriminate between a trained man and an untrained man; and both types of persons are treated alike by them, their sole craze being cheapness. Just as untrained persons

compete with trained compounders, in a few cases, the trained compounders themselves compete with medical men in their practice, such as giving intravenous injections, and going about with stethascopes jetting out of their pockets, and in the eyes of the public the possession of a stethascope seems to be the only qualification needed for a medical man.

Through the efforts of the Pharmaceutical Society of India, the Government have recently raised the standard of general education necessary for compounders to that of the S.S.L.C., and have improved the training to some extent though not to the desired extent. Most of you would have known that the training given to the compounders in the General Hospital at Madras to-day, is by a Qualified Pharmacist, and you really find some improvement in the training that is given to the compounders there. I sincerely hope that the scheme of appointing qualified pharmacists to teach the art of dispensing to the compounders in all the district hospitals will soon be realised.

Poverty and the consequent indifference to a sense of responsibility happen to be the causes of want of unity and a spirit of brotherhood among the members of the profession. As long as unity and spirit of brotherhood are lacking prosperity in the profession would be an impossibility. There is no use in calling ourselves members of a spiritual race and there is no use in offering prayers to God if we are not able to see with brotherly eyes the living God in man.

Another great defect, that is noticeable among the members of the profession is the separatist tendency. In a profession like that of pharmacy which can be called democratic there should not be a separatist tendency. The profession of pharmacy is a part of the medical profession and every one in the field has a specific duty to perform. The medical man alone cannot carry on the work smoothly and easily without the assistance of a pharmacist. Every one should work in co-operation with the others and there should be among the members a spirit of solidarity. The separatist tendency is due to lack of realisation that we all have a common cause to serve.

Every illness has a remedy. In a like manner the lack of unity and a lack of a spirit of brotherhood, which are due to poverty and the absence of a sense of responsibility can be overcome by organised effort. Though as a district society you have some opportunity to meet and discuss topics affecting the community, yet you should all belong to a central organisation which has an interest in your common welfare and which is dedicated to help you. With pardonable pride, I can say that you nave such a central organisation in the Pharmaceutical Society of India, which was started about seventeen years ago. Throughout this period the Society has been patiently exerting all its endeavours to improve the profession and its prospects in every way possible. It played an important part in the activities of the Drugs Enquiry Committee in 1929-30. Let me also add that the Society has played an important part in getting the Government to revise the Compounders' course to its present form. The Pharmaceutical Society of India has a journal of its own 'The Pharmacist'. As the title itself suggests, the journal is devoted to the cause of Pharmacy in India. The Pharmacist is the mouthpiece of the Pharmacists in India and a medium for representing the grievances of the Pharmaceutical Profession in this country.

May I also venture to suggest that you should improve your general education wherever it is lacking by cultivating studious habits and improving your professional knowledge by constantly reading books and journals relating to the Science of Pharmacy. You should regard yourselves as students throughout your lives, for acquisition of knowledge can never be final or complete.

If I may venture, may I also exhort you to cultivate a high sense of self-respect without the arrogance that usually goes with an inferiority complex.

Sound health of body and of mind and cultivation of clean habits are essential to the status of an individual in his profession. One who has a real spirit of brotherhood can never be unclean in his thoughts for to such a man prosperity of a brother member in the profession is like his own.

Though we are living in the 20th century A.D. we the Members of the Profession of Pharmacy in India are in a state in no way better than we were in the 20th century B.C. In England, Europe and America and in almost all countries excepting India the profession of pharmacy holds an unique position and the status that it carries is mainly due to its members though the public and the the State are also responsible to a certain extent.

The diginity which the profession of pharmacy in the West maintains is due to the high standard of education that is insisted upon those that aspire to take up the profession. There they have separate institutions for pharmacy where the subjects are taught by well-qualified teachers with a reputation. The members of the profession have a very high sense of responsibility for they consider themselves to be the trustees of public confidence and safety. The natural result is that they are not only efficient but treated well by society. They are therefore prosperous. Naturally the Pharmacist in the West is better placed than his counterpart in India. As he is better placed in life he maintains a certain standard below which he will never stoop. The Pharmacist in the West is treated with the same degree of respect as a medical man. When the members of the Profession of Pharmacy in the West are so well placed in life as they are today, naturally you find their organisation well established having a decisive voice in the economy of the nation. They are able to dictate their needs and to get them. For instance, all the Pharmacists in Great Britain have a central organisation namely The Pharmaceutical Society of Great Britain through which they are able to achieve their aims.

The best way of achieving success is to deserve it in every manner possible. It is only through painstaking effort that knowledge can be acquired. In this life's merciless struggle there is no room for the unfit. Therefore let me exhort every one of you to try and keep abreast of the times by acquiring not only theoretical but also practical knowledge and by holding frequent meetings at which lectures and demonstrations are given in pharmaceutical subjects by those well experienced in the art. I would also suggest that such of you las possess the requisite

general education to try and qualify for the Diploma Course in the Medical College as also for the newly instituted University Degree in Pharmacy. You should also agitate that as in the case of school teachers you should also be given facilities to study in private and to qualify not only for the S.S.L.C. but also for the Intermediate, so that you might be enabled to acquire the Higher Diploma and the Degree in Pharmacy, if you so desire. Ascent may appear to be steep and difficult but once the start is made with set determination the results achieved would be surprising.

" Heights by great men reached and kept
Were not attained by sudden flight,
They while their companions slept
Were toiling upward in the night ".

The potential resources of our country are enormous. Every one of you has a great future before you if only you would make an effort to prepare yourselves for the task ahead. Great pharmaceutical industries have to be built in our country and it is only by absolute competence that we can hope to build up such enterprises with success. Let me therefore entreat each and every one of you **to try with all humility to improve yourselves in every way possible.**

Last but not least let me exhort every one of you to be true to yourself and to God, in the words of the poet

" Through winds and tides one compass guides
To that and thine ownself be true."

THE CHEMISTRY AND MANUFACTURE OF MALT FROM CHOLAM

I. H. N. FIGREDO, M.P.S. (India)

Malt powder and malt extract can be prepared form cereal grains. In Europe, malt is prepared from barley. As barley is grown in very small quantities in India, an efficient substitute has been found in CHOLAM (Andropogan Sorghum). This grain yields a malt with a higher diastasic activity than barley malt.

Principles of Malting:

The most important condition for the production of satisfactory malt is to keep the temperature low and fairly constant. When cholam is wetted and kept at a low temperature, it begins to germinate. During this process, certain enzymes are produced in considerable quantities, in the developing germ. The starch present in the cereal is converted to maltose by the action of diastase, an enzyme. This enzyme is secreted by the germinating grain, for the purpose of providing the plant, with soluble carbohydrates. This diastase is not able to dissolve the cellulose-covering of the cells containing the starch granules. The young plant secretes another enzyme, cystase, which dissolves the cellulose wall and exposes the starch to the action of diastase. The starch is first converted to malto-dextrin and then to maltose according to the equation:—

$$\underset{\text{Starch}}{5\ (C_{12}H_{20}O_{10})} + 4H_2O = \underset{\text{Maltose}}{4\ (C_{12}H_{22}O_{11})} + \underset{\text{Dextrin}}{2\ (C_6H_{10}O_5)}$$

Simultaneously with the changes, in the carbohydrate material, the proteins of the grain also are hydrolysed, into peptones and amino-acids. Thus, during the process of germination, complex changes take place in the grain with the result, that active enzymes are developed and the insoluble carbohydrates and proteins of the grain become soluble. In other words, the starchy and proteinous material is changed into a form more easily digested by delicate stomachs. In addition there is present the enzyme diastase, which is capable of helping the digestion of starch. The process by which these changes are induced in the grain is technically known as "malting" and the foods prepared with malt on this basis are called "malted foods" or "predigested foods".

For the preparation of breakfast and invalid foods, having malt as their basis, one should expect the malt to possess a large amount of easily soluble material and a high diastasic activity. If the malting is properly done, all the changes mentioned would take place and the diastase would be at its maximum activity, so that when the malt is powdered and extracted with warm water, the diastase would convert the unattacked and insoluble starch,

into soluble dextrins and sugars. It is thus clear, that the criterion, for a good malt is the amount of extractive matter it is capable of yielding and its diastatic activity.

Method of Manufacture of Malt:

Malting consists of a number of operations, the most important of which are (1) Steeping, (2) Couching, (3) Flooring, (4) Withering and (5) Drying.

(1) *Steeping.* The object of steeping is to permit the grain to absorb water necessary for germination and for this purpose, the grain is soaked in water in large cisterns, for periods ranging from 24 to 72 hours or even more. Barley absorbs 45 per cent. of water by weight and cholam takes water as shown below:

Period of Steep.	*Water per cent.*
24 hours	35·74
36 do.	37·30
48 do.	40·60
72 do.	43·70

The water is drained off at regular intervals and the moist grain is left exposed for some time, for the aeration of the grain. Fresh water is again introduced and the grain is left to soak. This is repeated a number of times, during the peroid of steeping. The duration of steeping and the frequency of change of water should be regulated with due regard to the conditions of temperature, which should be kept low. Too low a temperature would be unfavourable for the growth of the germ and a higher temperature would favour a development of lactic and butyric acid fermentations and the growth of moulds later on, and the resulting malt would be of poor quality, with a low yield of extract. The growth of moulds is further checked by adding calcium bisulphite to the water before steeping.

(2) *Couching.* At the end of the steeping period, the water is drained and the grains are transferred to the malting floor in conical heaps. The heaps are sprinkled with water, from time to time for about twenty-seven hours. The temperature inside the heap rises, and it is kept down by the sprinkling of water. During this stage, the grains begin to germinate.

(3) *Flooring.* The grain is spread on the floor, in a layer of a ew inches depth and is left for four to five days, till germination s complete. In the cold weather it would take longer. It is of the ıtmost importance that the temperature of the malt house should ›e very carefully controlled and every precaution should be taken ıgainst undue rise of temperature in the couching and flooring ›rocesses. Slow germination with moderate supply of moisture ıas been found to be the most advantageous. It has been found that 25°C. is the highest average temperature, at which a satisfactory malt can be obtained from cholam. Increase in temperature forces the malt with the result that a large proportion of carbohydrates and proteins are used up in the growing embryo, and this is a loss. During the flooring process the grain is turned over two or six times a day. During this stage the grain sprouts, the acrospire grows upwards while the radicle grows downwards. If crushed, the grain gives the odour of freshly cut cucumber.

(4) *Withering.* During germination, when the stalk has reached the size of the grain itself, practically all the stratch has been acted upon by the diastase. The growth of the plant should be stopped at this stage, by withholding the supply of moisture and withering the roots. This is done by drying in a kiln, at a temperature of 40°C.

(5) *Drying.* The object of drying is two-fold; firstly moist malt does not keep sound, even for a short time; secondly it is here, that the completion of the diastatic conversion of starch into sugars and dextrins takes place. The drying is carried out in stages, in a properly equipped kiln, the floor of which is heated by a furnace. The grain is spread on the floor of the kiln to a thickness of about four inches and the temperature gradually raised. On the first day the temperature is about 40°C., on the second day 50°C., on the third day about 60°C. and on the fourth day 70°C. At this stage a pale malt is obtained. If the temperature of the kiln is allowed to go higher than 70°C. destruction of the diastase takes place and caramelization of sugar occurs and a low yield of extract is obtained. If the drying has been properly carried out the grains will be tender and dry, easily crushable and floury.

The finished malt is ground into powder and passed through a fine sieve. The fine meal that passes through the sieve is easily digestible and possesses high diastatic activity. It should now be put into air-tight tins or bottles. The coarse portion that is retained by the sieve is converted into extract of malt by macerating with an equal weight of water for six hours, then adding six times the original quantity of water at 30°C digesting the substance for one hour at 50°C., straining under pressure and evaporating the liquid over a water bath or in a vacuum pan until the extract reaches to the consistency of thick honey. It has a Sp. Gr. of 1·375. The residue after extraction with water forms a nutritive and easily digestible cattle food, especially for milch cows.

100 lbs. of cholam on an average yield 80 to 85 lbs. of dry malt of which 60 to 65 per cent. is capable of being extracted with hot water. Every portion of the malt is capable of being utilized in some form or other.

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Editorial

THE WAR AND THE SUPPLY OF DRUGS.

SOON after the war broke out most of the business firms dealing in drugs were apprehensive that there would be great difficulty in the supply of drugs to this country from abroad. But experience has since shown that there is no difficulty in the importation of drugs both from Great Britain and America, sufficient to supply the needs of the country. Efficient substitutes for some of the specialities which had to be imported from Germany are also procurable from other countries. There would thus appear to be no fear of any difficulty, about the supply of drugs from abroad. A certain amount of delay and extra cost is however inevitable considering the extra price that the manufacturers themselves have to pay to procure raw materials and the extra freight and war risk insurance which adds to the cost of the product before it reaches India. Thanks to the action taken up by various local governments there has been no appreciable profiteering in drugs and most of the drugs are procurable in the market at reasonable prices.

Many persons without practical touch with the existing circumstances in our country state, though with the best of patriotic intentions, that this period of war should be India's opportunity to manufacture drugs, especially synthetic drugs, on a large scale in our country. Countries which have large natural resources of coal and have large scale coal and other industries can afford to manufacture synthetic drugs but India does not possess these

advantages. A chemist may produce in his laboratory beautiful crystalline compounds weighing about a gramme or two. The question of cost does not count here. The question of wastage is not taken into account. But he looks at the beautiful compound, admires it and makes sweeping assertions about the possibilities of such synthesis in our country on a large scale and states that crores and crores of rupees could be saved to the country if only the State would step in and encourage such synthetic industries. He also forgets for a moment that the raw products have to be imported from outside India and does not seem to understand the actual conditions prevailing in our country. India after everything is said and done is an agricultural country and its main industry is therefore agriculture. Cultivation of drugs that can be grown easily in this country would appear to be the best contribution that India can make to the drug needs not only of this country but also of the rest of world. No country can produce everything under the sun. The idea of self-sufficiency in everything is an illusion.

At present most of the vegetable drugs growing in our country are not cultivated but grow wild in forests. Drugs growing in forests cannot be depended to be of constant quality and it is only by scientific cultivation that a high standard of quality of drugs could be produced. So India should plan the farm cultivation of drugs on a large scale and this would be of benefit not only to the agriculturists but also to the country.

When the cultivation of drugs of good quality comes into existence, attempts may be made to develop the extraction of alkaloids and other active principles from the plants grown in our country. For such industry the country should manufacture the various solvents necessary for these extractions. The only solvent available at a cheap cost is water. Such solvents could only be produced by heavy chemical industries. There does not appear to be any prospect of such heavy chemical industries unless and until large deposits of sulphur are discovered at some future date in the country when there would arise a sulphuric acid industry without which a serious beginning cannot be made in the other heavy chemical industries.

India is one of the largest starch-producing countries in the world and the starch industry could be brought into existence in the form of malt and glucose industries. At present India imports all its glucose and malt from abroad. There has recently been talk of cottage industries in this direction but if quality and quantity are to be assured, only factories employing machinery and methods of scientific control could appear to have any chances of survival against competition from abroad.

The cattle wealth of India is enormous and India can well afford to supply its needs in biological drugs such as sera, hormones, etc. Instead of vaguely talking about the past greatness of our country and the future greatness that awaits us, we should take stock of the present and build on it.

THE PROPOSED CENTRAL LEGISLATION ON DRUGS

The Central Government appears to be going ahead with the proposed legislation regulating the quality of drugs and medicines to be imported into this country and also of those drugs and medicines which are manufactured in the country. The enforcement of such legislation will be impossible without a responsible profession of Pharmacy, the members of which should have received adequate training in the Profession. Before the legislation passed by the Central Government comes into force in the Provinces, the Provincial Government should pass a legislation controlling and regulating the practice and profession of pharmacy, so that only properly qualified persons should be allowed to handle the storage, sale and dispensing of drugs and medicines. Without the co-operation of a responsible Pharmaceutical Profession, legislation merely about drugs alone would be unsatisfactory in its working. It is therefore hoped that the Provincial Government will set to work on the proposed pharmacy legislation, so that the legislation on drugs and the pharmacy legislation may come into force simultaneously. Properly speaking, the pharmacy legislation should precede the Drug Legislation.

Mr. Thomas Henry Bennett, M.P.S. (Great Britain) one of our Honorary Members, who had been in charge of the Pharmaceutical Department of one of the First Grade European Pharmaceutical Firms in Madras, left Madras on the 1st January, 1940 to take up an appointment elsewhere in India. The Society thanks him for his kind co-operation during his stay in Madras and wishes him success in all his undertakings.

Mr. Bennett always maintained a high degree of professional dignity and ethics. On account of his sterling qualities, he was well liked by the doctors of Madras.

During his period of service in Madras some of our members had the opportunity of discussing with him topics pertaining to Pharmacy and as is expected of every member of that great organisation—The Pharmaceutical Society of Great Britain—his store of pharmaceutical knowledge was always of the highest order.

ANNUAL GATHERING OF THE PHARMACY STUDENTS OF THE MADRAS MEDICAL COLLEGE.

The students undergoing the B.Sc. Pharmacy Course and the Diploma Course in Pharmacy in the Madras Medical College had a pleasant social gathering on the 11th November, 1939 to which some of the old Pharmacy students of the College were invited. After photograph and refreshments the students assembled in the College hall. Dr. J.C. David, Professor of Pharmacology presided over the function and Dr. S. Rajagopal Naidu, M.B.E., Chemical Examiner to the Government of Madras and Professor of Chemistry, Madras Medical College, gave an address on the Prospects of Pharmacy in India. He referred to the importance of Pharmacy to the country and the need to develop a properly trained and responsible Pharmaceutical Profession in the country. He referred to the existing Pharmaceutical industries in the country and to the necessity for developing these Industries to meet the requirements of the country. He exorted the students to make full use of the opportunities of study available to them. Dr. David in concluding traced the evolution of the teaching

of Pharmacy in the Madras Medical College up to the inception of the degree course and congratulated the students who were about to leave the college on the efficient training they had received.

The function came to a close with a vote of thanks to the lecturer and the chairman proposed by one of the students.

ABSTRACTS

The determination of Paraldehyde. D. J. T. BAGNALL, and A. R. TANKARD. (*Analyst* 1939, Vol. 64, Page 857).

Medicinal Paraldehyde is usually a mixture of various polymerides of acetaldehyde, together with impurities, such as metaldehyde $(CH_3CHO)_x$, which is poisonous and has been stated to be invariably present in traces in paraldehyde. Diacetyl peroxide, acetic acid and acetaldehyde are also usually present, but the amounts are restricted by the limits tests of the British Pharmacopœia.

Metaldehyde is determined approximately by weighing the residue from the evaporation of the paraldehyde in vacuo at room temperature, allowance being made for any inorganic impurities present.

Acetaldehyde is determined by the hydroxylamine hydrochloride method of the British Pharmacopœia, bromophenol blue being used as indicator.

In absence of water and other impurities the amount of acetaldehyde present in paraldehyde, up to a maximum of 20 per cent. may be deduced from the specific gravity; percentage weight of acetaldehyde $= \frac{1.000 - \text{sp. gr.}}{0.00237}$

According to Craven, the effects of acetaldehyde and of acetic on the m. p. of paraldehyde are as follows:

Acetaldehyde, per cent., by weight	0	2	4	6	8	10	12	14	16	18	20
Melting-point, °C (depression)	12·5	10·1	7·6	5·3	3·0	1·0	·0·9	-2·7	-4·6	-6·4	-8·9

Acetic acid, per cent., by weight	0	2	4	6	8	·0	12	14	16	18
Melting-point, °C (depression)	12·5	11·35	10·2	9·0	7·8	0·6	5·4	4·2	2·95	1·75

Allowance having been made for these impurities, any excess depression of the melting-point is due to water, each one per cent of which causes a depression of 3·9°C.

Detection of Paraldehyde.—The characteristic odour of paraldehyde, together with the production of acetaldehyde on warming an acidified solution, and the reduction by this solution of an ammoniacal solution of silver nitrate with the formation of a silver mirror, will suffice for the identification of paraldehyde. Paraldehyde will often come over as oily drops on distillation of an aqueous solution containing it; it may then be separated and its physical constants determined.

Determination of Paraldehyde.—The methods that have been proposed for the determination of paraldehyde are based on its depolymerisation into acetaldehyde, and a determination of this aldehyde by well-known reactions. When purified paraldehyde is heated at 100°C. in a pressure bottle with hydrogen peroxide and a known amount of sulphuric acid, and the acetic acid formed is titrated (account being taken of the added sulphuric acid), a result equal to about 94 per cent. of the theoretical amount is obtained. When hydroxylamine hydrochloride is substituted for the hydrogen peroxide, the result is equivalent to about 96 per cent. of the paraldehyde taken. Methods in which potassium dichromate in acid solution is used as the oxidising agent and in which after addition of potassium idodide the liberated iodine is titrated, are less satisfactory.

Tests available for the identification of small quantities of the War Gases. H. E. COX. (*Analyst* 1939 Vol. 64, Page 807).

Tests are described for the various war gases.

In order to identify these gases most rapidly certain group reactions are described.

A.—The following gases or vapours give rise to a halogen acid on contact with water, and so may be detected with an indicator, such as methyl red:—Chlorine, Phosgene, Diphosgene Benzyl or Xylyl. bromide (slowly), Diphenylchloroarsine,

Diphenylaminechloroarsine (slowly). Methyl and Ethyldichloroarsine, Chlorovinylarsine, Dichlorodiethyl sulphide. Methyl and ethyl chlorosulphonate. Methyl chloro-formate (with hot water).

B.—The following, which do not quickly form an acid with water, are rapidly decomposed by alcoholic potassium hydroxide, giving an alkali halide:—Ethyl bromoacetate, Ethyl iodoacetate, Bromobenzyl cyanide, Bromoacetone, Chloro and Bromoacetophenone, Phenylcarbylamine chloride, Chloropicrin (Reacts only slowly), Diphenylaminechloroarsine.

C.—The following give hydrogen cyanide on hydrolysis with water, and may be detected by the Prussian blue reaction:—Hydrogen cyanide (possibly mixed with stannic salt), Cyanogen chloride (slowly hydrolysed in water, quickly by alkali), Diphenylcyanoarsine. Diphenylaminecyanoarsine.

D.—The following will give an arsenic reaction when absorbed in alkaline permanganate solution:—Diphenylchloroarsine. Diphenylcyanoarsine, Diphenylamine chloroarsine, Diphenyl amine-cyanoarsine. Chlorovinylarsine. Ethyldichloroarsine.

E.—The following will give colours with conc. sulphuric acid:—Diphenylaminechloroarsine (red, cold), Bromobenzyl cyanide (red, warm).

REVIEW.

Announcing the introduction of Urea-Sulphazide-T to the Medical Profession and Chemists.

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