

Published Half-yearly

Vol. I

September, 1940

No. 4

THE PHARMACIST

(The Journal of The Pharmaceutical Society of India)

A Half-yearly Journal devoted to
the interests of Pharmacy in India.

Annual Subscription Rs. 1 including postage.
Foreign, 6/6 per copy, postage extra.

Single copy 8 annas, postage extra.
For Members and Associate Members, free.

Editor

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

*Liver & Haemoglobin
in a most palatable
form*



**HEMO
HEPALIX**

A POWERFUL
RESTORATIVE IN ANÆMIA
GENERAL DEBILITY & WEAKNESS
SPECIALLY INDICATED IN
ANÆMIAS OF PREGNANCY

Available at

WILFRED
QUALIFIED CHEMISTS

all chemists:-

PEREIRA LTD
MADRAS & BRANCHES



PEROXIDE
OF
HYDROGEN

'Peroxyl' Brand is Hydrogen Peroxide in its purest and most stable form, and is supplied only by MAY & BAKER LTD., Dagenham, London.

Its uses are manifold, and, wherever an antiseptic or deodorising agent is desired for use about the person, absolute reliance may be placed upon 'Peroxyl' Brand Peroxide of Hydrogen because of its purity, efficacy, safety and non-staining properties.



An IDEAL RECONSTRUCTIVE TONIC for the CONVALESCENT

Contains Peruvian Bark, Sodium and Potassium Hypophosphites, Nux Vomica, Malt Iron and Ammonium Citrate, Peptone and Portwine.

Improves Appetite and the Quality of the Blood and acts as an Iron Tonic for those Convalescing from Long-standing Illness.

NYAL COMPANY,
DETROIT, U.S.A.

Sole Distributors:
APPAH & CO.,
CHEMISTS & DRUGGISTS,
MADRAS.

PHELO BRAND

Calcium Preparations



FOR AIDING THE FORMATION
OF HEALTHY BONES & TEETH

CALCIUM GLUCONATE
COMBINED WITH POTASSIUM GUAIACOL
SULPHONATE PEPSIN AND OTHER
VALUABLE INGREDIENTS FOR COUGHS, COLDS
AND ALL AFFECTIONS OF THE CHEST
AND RESPIRATORY TRACT

AVAILABLE FROM

ALL CHEMISTS

WILFRED PEREIRA LTD.
QUALIFIED CHEMISTS

PEREIRA LTD.
MADRAS & BRANCHES

169128

600 008

7L

LZ3 m 2. N39

M39.1.4

VITAMEL

(Formerly known as "FERROVITA")
THE IDEAL RECONSTRUCTIVE TONIC

"VITAMEL" may be prescribed with confidence in Anorexia, Anaemia, Nutritional deficiency during pregnancy, and as a dietary adjunct for growing children.

"VITAMEL" will be found invaluable during and after convalescence, as it contains all the necessary factors to help to bring about a speedy recovery.

In cases of extreme exhaustion and weakness, the Glucose and Honey content provides a source of immediate energy and improvement in the patients' condition is quickly apparent.

FORMULA:

Each fluid ounce contains:—

Vitamin A	10,000	units.
" B ₁	150	"
" D	2,000	"
Calcium Glycerophosphate	3	grains.
Manganese "	1/10	"
Cupri Sulphate "	1/30	"
Ferri et Ammon Citrate Virid	12	"
Glucose and Honey	q.s.	

Dose:	Children, under 2 years	½ teaspoonful	twice daily
	" 5 "	1 "	thrice "
	5 to 12 "	2 "	" "
	Adults ...	1 tablespoonful	thrice daily.

VITAMEL is best taken after Meals

Wholesale prices on application to
SPENCER & CO., LTD.,
Manufacturing Chemists,
MADRAS.

When writing to advertisers, please mention this Journal

Avoid the Hazard of obscured vision in the operating room.

SURGEONS' NEW, IMPROVED DRYBROW SWEAT PAD

to help Surgeons and Nurses in the Operating Room to keep
a COOL Head and CLEAR EYESIGHT

ABSORBS 20 Times Its Own Weight in PERSPIRATION



Keeps Sweat Out of Eyes and Eyeglasses. Minimizes Danger of False Moves due to Obscured Vision...Makes Mopping of Forehead Unnecessary...Leaves Hands Free. For best results dip in cool water and squeeze before using.

A set of 3 pads can be used by a Surgeon for several years.

These are Washable, pliable, soft and size adjustable. Further particulars will be gladly supplied.

Sole Distributors:—

P. K. JAPPEE & COMPANY,
171, Nainiappa Naick Street, P. T., MADRAS.



A Safe and Simple Antacid.



Always see the
real 'BISMAG' sign
on the carton.

The medical practitioner in the East probably comes in contact with more cases of gastric disturbance arising from hyperacidity, than his colleagues in any other part of the world. 'Bisurated' Magnesia has won the wholehearted approval of the Medical Profession the world over because it represents the ideal neutralising agent in the prevention and correction of acidity. 'Bisurated' Magnesia is a safe, simple and pure antacid that never aggravates the morbid condition, and is indicated in all cases of digestive disorder arising from hyperacidity.

Dr. P. Avino, of Barcelona, says "I have used 'Bisurated' Magnesia in numerous cases of Dyspepsia (arising from excess stomach acidity) and have obtained the most brilliant results."

'BISURATED' MAGNESIA

THE PHARMACEUTICAL SOCIETY OF INDIA

(Established 1923)

(Registered under Society Act XXI of 1860)

Patron

Major-General N. M. WILSON, C.I.E., O.B.E., K.H.S., I.M.S.
Surgeon-General with the Government of Madras

President

Dr. S. RAJAGOPAL NAIDU
M.B.E., B.A., M.B., B.S., M.Sc. (Lond.), D.I.C., F.I.C.
Chemical Examiner to the Government of Madras

Vice-Presidents

Rao Bahadur Dr. A. LAKSHMANASWAMI MUDALIAR
V.H.A.S., B.A., M.D., F.C.O.G.
Principal, Medical College, Madras
Mr. WILFRED PEREIRA, M.P.S. (India)
Managing Director, Messrs. Wilfred Pereira, Limited, Madras

Consulting Pharmacologist

Capt. J. C. DAVID, M.B., B.S., Ph.D.
Professor of Pharmacology, Medical College, Madras

Secretary and Registrar

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

Assistant Secretary and Treasurer

Mr. R. RAGHUNATHAN, M.P.S. (India)

Members of Council

Mr. A. SELVANAYAGAM, M.P.S. (India)
Mr. K. VENKATAPATHI NAIDU, M.P.S. (India)
Mr. I. H. N. FIGRADO, M.P.S. (India)
Mr. J. S. GANDHEKAR, B.A., M.P.S. (India)
Mr. C. A. ARULSWAMY, Associate Member.

Editor

Mr. K. VENKATAPATHI NAIDU, M.P.S. (India)
Managing Proprietor, Messrs. Appah & Co., Madras



HEWLETT'S MIXTURE

WITH OR WITHOUT OPIUM
MIST. PEPSINAE CO. C. BISMUTHO (HEWLETT'S)
FOR
DYSPEPSIA AND DISEASES
OF THE STOMACH

OVER 60 YEARS REPUTATION

DOSE.—HALF TO ONE DRACHM DILUTED.
Price, in England, 4-oz. bottles 10d. oz.:
10, 22, 40 and 90-oz. 12/6 1b.

Also Supplied "Sine Opio".

Introduced and Prepared only by

G. J. HEWLETT & SON, LTD.
35/43, Charlotte Road, London E.C.2.

Agents who stock Hewlett's Preparations :—

BOMBAY :	CALCUTTA :	MADRAS :
Amersey Khimjee & Co.	Smith Stanistreet &	Appah & Co.
Ratilal Hemraj	Co., Ltd.	Dadha & Co.
	M. Bhattacharyya & Co.	Madras Drug Store
	B. K. Paul & Co., Ltd.	
	Ratilal Hemraj	

The chief aim of the Society is to advance the interests
of Pharmaceutical Chemists in India.

Membership is open to all persons with recognised
qualification in Pharmacy. Qualified compounders are eligible
for admission as Associate Members. Students undergoing
training in Pharmacy are eligible for admission as Student
Members.

For copy of the Rules and Regulations please apply to
the Secretary, Pharmaceutical Society of India, Wilfred Pereira
Building, Vepery, Madras, enclosing annas 4 in stamps.

CONTENTS

	PAGE
Pill Making A. N. LAZARUS and K. VENKATAPATHY NAIDU	... 127
Disinfectants A. SELVANAYAGAM	... 130
The Proprietary Drug Menace CAPT. S. SHONE, M.D., I.M.S.	... 137
The Role of Chemistry in the Discovery of Drugs A. N. RATHNAGIRISWARAN, M.A.	... 141
Capillar-Fluorescence-Analysis of Balsamum Peruvianum PROF. C. A. ROTHENHEIM (Bombay)	... 149
The Manufacture of Margarine I. H. N. FIGRADO	... 152
The Work of the St. John Ambulance Association and The Red Cross Society MAJOR-GENERAL N. M. WILSON, C.I.E., O.B.E., K.H.S., I.M.S.	155
Press Communique	... 159
Editorial	... 161
Extracts	... 164
British Pharmacopœia Commission	... 165

THE PHARMACIST

(The Journal of The Pharmaceutical Society of India)

A Half-yearly Journal devoted to the Interests of Pharmacy in India

Vol. I.]

July, 1940.

[No. 4

RATES OF ADVERTISEMENTS.

Front Cover Page	...	Rs. 50	per insertion.
Back " "	...	" 40	" "
Inside of Front or Back Cover Page	"	30	" "
Full Page Inside	...	" 20	" "
Half " "	...	" 12	" "
Quarter Page	...	" 7	" "

A rebate of 12½ per cent is allowed at the end of the year for those who give advertisements for two consecutive issues of the Journal.

PILL MAKING

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

AND

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

PILLS are small globular bodies containing active therapeutic substances which are intended to be swallowed and owe their activity to their disintegration either in the stomach or intestines according to requirements. Pills are dispensed either with or without coating according to these requirements. Pills are nowadays replaced largely by machine-made compressed tablets of standard formulæ. But, whenever any special prescription has to be dispensed the dispenser has to make the pills himself. The main reasons for the use of pills and tablets are: (1) they retain their activity for a long time owing to their dry state and (2) they are easily swallowed without unpleasant odour or taste being felt. To be easily swallowed the pills must be compact in size and may have to be coated in special cases. The pills have also the advantage of being easily carried about and taken whenever necessary. In some cases it is necessary that the therapeutic agent should be absorbed only after reaching the intestines and in such cases the pills are given a coating of salol or keratin so that the pills may not disintegrate in the stomach, but do so only after reaching the intestines.

In order to make pills satisfactorily, the ingredients should be brought together into nearly a homogeneous mass which should

be pliable and retain its shape when made into pills. The mass to possess the above properties should have the following characteristics: firmness, adhesiveness and plasticity.

1. *Firmness.* The liquid added to a pill should dissolve a small fraction of the solid ingredient and this solution should be just sufficient to enable a satisfactory mass to be made. If too much liquid is used the mass would become too thin and would not keep its shape. Experience and judgment are necessary in the choice of the liquid and the quantity used. The liquids generally used are water, syrup of acacia, mucilage of acacia, glycerin, syrup, syrup of glucose, honey, glycerin of starch, glycerin of tragacanth, alcohol, etc., according to circumstances.

Water is generally used for mucilagenous substances. Where there is little or no mucilagenous substance, liquid preparations of acacia, and tragacanth are generally used. Alcohol is used when resinous substances are present.

2. *Adhesiveness.* This is closely related to firmness. Adhesive substances may be present in the ingredients of a pill and if not present should be added by the dispenser in a sufficient quantity. Substances like gum, glucose, sugar, tragacanth, bread crumb, resin, cocoa-butter and petroleum are used for the purpose. Gums are used for dry and non-alcoholic substances and soap for oily and resinous substances. Some resinous extracts may be made soft and adhesive by simply heating them and then cooling.

3. *Plasticity.* This is achieved by thoroughly working or kneading the mass to make it more or less homogeneous so that all the fine particles are held together by the adhesive substances in the pills. Without adhesiveness and firmness, plasticity cannot be attained.

Choice of excipients. Excipients are substances added to the ingredients of a pill to achieve a mass with the above mentioned characteristics. Inert substances like starch, magnesium carbonate and kaolin may sometimes have to be added to obtain the necessary bulk and firmness and various mucilagenous and gummy substances already mentioned above have to be added to obtain the

necessary adhesiveness. In order to blend oils in the pill mass, powdered soap may be used with some inert substances such as lactose. Pills containing minute fractions of a grain of an active substance are made by one of the two ways. If the substance is soluble in water or alcohol, a sufficiently diluted solution is added to the other ingredients and well mixed to make the pill mass. If sparingly soluble or insoluble substances are used, the ingredient is sufficiently diluted by trituration with an inert substance like kaolin or lactose and then incorporated into the pill mass. In the case of oxidising substances like potassium permanganate the excipient used should be inert such as kaolin. For hygroscopic substances such as scale preparations, alcohol should be used to make the pill mass and the pills should be protected from the moisture of the air by coating with varnish. The dispenser should use his discretion and experience as to what excipient he has to use after studying carefully the ingredients of the prescription.

A satisfactory mass is obtained by observing the above conditions and blending the ingredients thoroughly in a special mortar with a long pestle so as to offer a good leverage for the manipulation of the mass. Next comes the dividing of the mass. A pill tile may be used for this operation. The pill mass is placed upon the tile and rolled into a cylinder preferably with a smooth bone spatula or on a flat board. When the pill pipe has been rolled to the proper length, it is placed over the scale on the pill tile and the place to cut each pill is marked with a spatula. The pieces of mass are now rolled into globular pills between the fingers, preferably gloved. Pill machines are preferred for making larger quantities of pills. The pill mass is rolled until it forms a uniform cylinder of the same height as the brass guides of the pill machine. It is then laid upon the grooves of the lower board of the machine. The upper board is applied so that the cutting surfaces correspond with those of the lower board and by a slight backward and forward motion with downward pressure, the mass is divided and rolled into perfect pills. To prevent the pill cylinder from sticking to the pill tile or board and to lessen the friction, an absorbent powder is sometimes dusted upon the surface. This may be powdered magnesium carbonate, lycopodium, rice flower or

powdered liquorice root. The dusting powder should never be used to the extent of showing it on a finished pill.

Coating. If the pills are intended to be absorbed in the stomach, they require no coating or may be coated with substances like sugar. Gold and silver coatings are now practically obsolete. If the pills are intended to be absorbed in the intestines, they may be given keratin or salol coating. A varnish coating may be given in order to protect the pills absorbing moisture from the air and becoming deliquescent.

Finishing the pills. To give a good finish, the pill finisher is used and the pills are rolled to give a round shape and finish. Pills are usually dispensed in flat circular or square boxes which should be made so shallow that the pills cannot lie on top of one another. The pills must be well dried before they are filled in the containers. Labels with proper directions for use written in simple language should be affixed on these boxes. This is again wrapped in clean paper, sealed and delivered to the patient.

DISINFECTANTS

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

Disinfectants are germicides, that is to say, they kill bacteria and other lower organisms, which injuriously affect the upper forms of life. After disinfection, usually there remains a residue of harmless, highly resistant organisms which often act beneficially by consuming injurious organic matter or organisms. In practice a complete destruction of all organisms would be difficult to attain economically.

Antiseptics are less powerful than disinfectants, in that they only retard or prevent the growth of injurious lower organisms in suitable media.

The germicidal power and the antiseptic power of a material are not always simply related. For example, guaiacol has only 0.9 the germicidal value of phenol, whereas it is 2½ times as effective as an antiseptic. It takes 2½ times as much phenol as guaiacol to stop an organism developing in a broth (antiseptic

DISINFECTANTS

action) whereas when it comes to killing an already existing organism 0.9 part of phenol has the same action as one part of guaiacol.

The bactericidal efficiency of disinfectants is assuming greater importance every year, for apart from their use as in hygiene and surgery, their use in the field of curative medicine is steadily increasing. Our present knowledge of these substances is very incomplete, yet an exact knowledge is very essential because of the important role they are called upon to play and the great dependence placed on them.

For testing the bactericidal action of a disinfectant the following factors have to be taken into account:

1. Concentration of the disinfectant.
2. The time during which the disinfectant is in contact with the test organism.
3. The temperature at which the test is conducted.
4. The organism chosen as the test organism.
5. The presence of other substances having a modifying action.

It follows from this that no one disinfectant can be satisfactory for every purpose and it is essential to use them by studying the type of work required from them.

There are two standard tests employed for comparing the germicidal action of a disinfectant, viz.:—The Rideal-Walker Test and the Chick-Martin Test.

Rideal-Walker Test. In this test the standard disinfectant is pure phenol (carbolic acid) C_6H_5OH and the power of a disinfectant is expressed numerically in multiples of the amount of pure phenol which would achieve the same germicidal result. This multiple is called the Rideal-Walker carbolic acid co-efficient or germicidal value of disinfectant. For example a disinfectant of 10 carbolic acid co-efficient means that one part of disinfectant would act with the same power as 10 parts of phenol.

Chick-Martin Test. In this method the bactericidal value is estimated in the presence of organic matter (dried fæces) against *Bacillus Typhosus* for 30 minutes and the result compared with pure phenol and expressed as a co-efficient.

Specification of disinfectants. Many disinfectants exhibit variable bactericidal values when tested against various organisms. A knowledge of this specific action is of great importance before a disinfectant can be chosen for action against causative organisms in diseases of bacterial origin.

Classification of disinfectants and antiseptics. A classification divides them into two groups.

- (1) Organic. (2) Inorganic.

Organic disinfectants are generally obtained by the distillation of coal tar and consist of dark thick fluids smelling of coal tar, and contain phenolic bodies or their sodium or potassium salts mixed with soaps, resins, etc.

The nomenclature used by manufacturers in describing these preparations include the following :—

1. *Tar Acids.* These are oxygenated hydrocarbons including phenols, creosols and higher hydroxy-benzene compounds.
2. *Phenoloids.* These consist of higher homologues, viz., xylenols and dimethyl hydroxy-benzenes. They are more bactericidal and less poisonous, and they make good emulsions with soap and water.
3. *Tar Oils.* Neutral bodies present in coal tar (insoluble in acids).
4. *Coke oven oils.* Containing varying percentages of phenoloids with tar oil.

The disinfecting power of the higher phenols increases in proportion to their position in the homologous series but their solubility decreases proportionately. They can only be used as emulsions.

The best disinfectants are generally made from tar acids and phenoloids mixed with soaps, resins, oils, etc. The disinfectants made with tar oils and coke oven oils are generally of poor disinfecting qualities, but with a strong smell of coal tar and ethereal oils. The disinfectants generally sold in the bazaar are of this quality, and when tested do not show a Rideal-Walker co-efficient of more than 4 or 5. They are very cheap and consequently in great demand from the public who have an idea that the stronger the smell the better the disinfectant. They never worry about the germicidal power of the disinfectant. Quality disinfectants cannot compete with these cheap disinfectants so long as the public cannot discriminate.

Water-soluble disinfectants are made by converting the phenols into their sodium or potassium salts. A typical formula consists of :—

Crude creosote	1 part
Potassium soap	1 part

heated together and glycerin added to increase the solubility in water. Sulphonated oils are now mixed with crude cresol and caustic soda or potash added in sufficient amount to obtain a water soluble neutral solution.

This type of disinfectant is not much on demand. What the public prefer is the disinfectant which yields an emulsion with water. These generally contain cresylic or other tar acids mixed with soaps, resins, oils, etc.

The following is a typical formula for this class of disinfectant.

Cresylic acid	49 parts.
Tar acids	36 "
Resin	26 "
Castor Oil	77 "
Caustic soda 30 % solution	14 "

The Caustic soda forms with the castor oil and resin a soap which keeps the phenols in solution and forms an emulsion when diluted with water.

The cresylic acids and similar homologues of phenol are much less poisonous to man than free phenol and at the same time have a higher germicidal value. Consequently most of the commercial coal tar disinfectants are now practically free from phenol. The Privy Council orders of 1900 and 1902 prohibit the uncontrolled sale of disinfectants containing more than 3 per cent. phenol or its homologues.

Commercial cresylic acid and similar tar acids are the basis of all good coal tar disinfectants. Cresylic acid, otherwise known as cresol, is a mixture of ortho, meta and para-cresols, three isomeric bodies which occur in tar oil. It comes in the market in two varieties, pale yellow and dark. It has a specific gravity of 1.044 and consists of about 35 per cent. ortho, 40 per cent. meta and 25 per cent. para-cresol. All disinfectants which form a milky emulsion with water generally contain a proportion of tar oils which are neutral bodies and are insoluble in a solution of sodium hydroxide.

Pure cresol or cresylic acid also enters into the composition of disinfectants of the type of lysol. The B. P. preparation is called *Liquor Cresolis Saponatus*. Any formula yielding a product complying with the B. P. characters and tests, is officially recognised.

Many formulæ have been published for this type of disinfectant, employing castor oil, cotton seed oil, linseed oil, etc. It can be prepared by the hot or cold process.

In the cold method, potash soap is made first with the addition of a proportion of alcohol and then the cresol is mixed by shaking without the aid of heat. The B. P. method of preparation from saponified linseed oil is satisfactory if the acid value of the oil is not less than 3. In order to obtain a lysol miscible with water, in all proportions, the cresol should be free from xylenols although in this case the Rideal-Walker co-efficient is lower. There are several oils which can be used equally well in the manufacture of lysol instead of linseed oil. Cocoanut oil makes a satisfactory product which shows a higher phenol co-efficient. The lysol type of disinfectant is largely used in hospitals, and

thousands of gallons are imported every month. The manufacture of this disinfectant is carried out by some firms in India on a small scale owing to the restrictions on the export of cresylic acid in England.

Cresol is obtained in small quantities in coke oven plants operating in the Northern India, but it is hardly enough for starting the manufacture of disinfectants in India, and until coal distilling plants on a large scale are established, it is not possible to manufacture the general type of coal tar disinfectants or the lysol type. There are no standards prescribed controlling the sale of disinfectants in India, but the Public Health Department prescribe a minimum Rideal-Walker co-efficient of 18 for a disinfectant to be on the list of recognized disinfectants.

It is possible however to start the manufacture in India of the modern type of disinfectants which are now replacing the lysol type. These are halogen derivatives of phenols, cresols, and xylenols. They act as effective bactericides at dilutions which are well removed from those which damage tissue. They are therefore excellent wound antiseptics. The action of a large number of chlorinated phenols have been investigated and the following found to be most suitable for general use because they have a high phenol co-efficient and are suitable for the preparation of concentrated antiseptic solutions.

1. Parachlor-meta-xyleneol.
2. Mono chlor-iso-thymol.

Preparations of this type consist of about 4 to 10 per cent. monochlorinated phenol, a similar proportion of volatile oil, a vegetable oil soap solution, and an aqueous alcohol vehicle. The first two constituents are mainly responsible for the germicidal activity. The volatile oil proportion of the germicide may consist of any combination of natural essential oils or synthetic terpenes giving a pleasant odour having a definite germicidal value and soluble in soap solution. Alkali produced from the latter make care necessary in using oils, containing much aldehydes or unsaturated hydrocarbons as resinification and darkening may occur. Terpeneol, oils of pine, verbena, eucalyptus and titree, are the most suitable essential oils.

There are a number of natural essential oils from Indian sources, like lemon grass and cajaput oils, which may be tried in place of verbena and titree oils. The soap in the preparation dissolves the oils and chlorinated phenol (the solution of which could only be otherwise effected by excess of alcohol) enables it to permeate deep-seated wounds and remove natural grease from the surface of the skin, and it is inhibitory against bacteria. A soap with a good solvent power is necessary. Green soft soap, linseed and cocoanut oil soaps, saponins and sulphonated oils do not usually give a consistently clear solution, and it is found that castor oil soaps are the best. The natural base for such a soap would be soda or potash, but ammonia giving ammonium ricinoleate enables the germicide to be truly described as non-caustic.

The Soap used should conform to the following specifications. It should be neutral to phenolphthalein as excessive alkalinity destroys the germicidal activity of chlorinated phenols and causes irritation when applied to skin wounds.

Antiseptics prepared with an ethanolamine castor oil soap when diluted with water yield opalescent solutions which are practically neutral and are therefore most suitable for general medical and surgical purposes but those prepared with a sodium or potassium castor oil soap yield on dilution clear solutions which are slightly alkaline and though not well suited for general antiseptic work are well suited for disinfection and sterilization of surgical instruments as the submerged instruments can be readily seen in the clear liquid.

The following formula would yield a non-poisonous antiseptic having a Rideal-Walker co-efficient of 3—4.

(1) Halogenated Phenolic compd.	3 min.
Titree oil	3 "
Oil of lemon grass	0.05 "
Alcohol	10 min.
Triethanolamine	5 "
Ricinoleic Acid	5 "
Water	add 100 "

(2) Halogenated Phenolic Compd.	3 min.
Terebene	2 "
Oil of Sassafras.	1 "
Methylated Spirit (not denatured)	10 "
Pot. Hydrobromide 10 % w/v	10 "
Ricinoleic Acid	6 "
Distilled water	add 100 "

Dettol, one of the most popular disinfectants, has been described as an halogen derivative of xyleneol, dissolved in a mixture of aromatic essential oils, with non-irritant, antiseptics for use in surgery, gynaecology obstetrics, and for all sterilization, Rideal-Walker co-efficient being 3.

THE PROPRIETARY DRUG MENACE

CAPT. S. SHONE, M.D., I.M.S.

We all know that a professional man begins to learn only when he has obtained his qualifications and can view his subject in some perspective. He then appreciates that mere text-book knowledge will not enable him to conduct his business and that he has the difficult task of translating theory into practice. With time, he elaborates a method of his own which is compounded of academic knowledge and experience. There is no short cut to the attainment of this state, but there are not lacking people who are ready to delude us into the belief that there is an easy way, which avoids spending much time and trouble in becoming proficient in our work. This is particularly so in the realm of therapeutics. To us doctors and pharmacists, the British Pharmacopoea represents the bible of our professions, and it may be maintained with confidence that no substance of proved value can for long be excluded from this compilation. Yet, in the hurry to find the short cut to a knowledge of therapeutics, a very large number practitioners appear to have forgotten the very existence of the book.

All of us are being inundated with literature and samples of every conceivable drug. We have dinned into our ears the virtues of this or that preparation and every known device of the expert

in psychological advertising is used upon us. There are, of course, many drug firms whose methods are strictly ethical and whose products we know can be relied upon, as they do not see the light of day until they have had an extensive trial. But there are other people who are not quite so scrupulous and who are prepared to let the doctor judge of the efficacy of a substance which is probably of no therapeutic activity. There is a considerable tendency, too, for firms to issue their own "potted" pharmacopœas, which not only give the names of their patent preparations, but their indications, under an alphabetical list of diseases. What is more tempting than to make a diagnosis, consult the book and prescribe the corresponding proprietary drug? If this is done with judgment and a due appreciation of the pharmacological action of the product, well and good, but one is often led to doubt whether the doctor really exercises any critical faculty in the matter. In many cases it is so much easier to prescribe a substance with an impressive name than to write out a formula which may be difficult to remember and is not quite so elegant.

There are several factors which have to be considered when we discuss the apparent eclipse of the Pharmacopœa and its substitution by the attractive brochures and pamphlets of the drug manufacturers. The faults lie primarily with the medical profession, but the pharmacist and the lay public cannot be regarded as entirely free from responsibility.

The medical student is frequently not impressed with the absolute necessity of acquiring his hospital Pharmacopœa, and both studying and annotating it during his long apprenticeship in the wards. He learns a few stock mixtures, but often knows them by name only and has no correct idea of their ingredients. When he goes out into general practice, the strangeness of his new surroundings and the fact that he can no longer send the patient to the hospital dispensary to get some *Mist. Expect.*, say, make him realise his deficiencies. Hence, he welcomes the kind intervention of the drug firms, who are prepared to show him an easy way to therapeutics. I am afraid that when it comes to resisting the wiles of the advertising agent, the doctor is just as amenable to suggestion as the layman. He welcomes the bombardment

of blotting paper and circular like a shower of confetti. Henceforth his prescriptions neglect the old-fashioned Pharmacopœa and his patients are impressed both by the high-sounding names of the medicines and by their costliness.

The annoying thing is, however, that these doctors become convinced of the infallibility of their pet preparations. The number of them who are prepared to swear that such and such a patent remedy is "absolutely marvellous" is incredible. They forget the difficulties of conducting strictly controlled experiments in therapeutics under the haphazard conditions of general practice, and are prepared to judge the effect of a drug merely from an impression, which is very often quite wrong. It is a regrettable state of affairs, therefore, that many doctors, after some years in practice, have degenerated into prescribers of patent medicines. They forget the existence of the Pharmacopœa and when, for instance, they are told that the pharmacist has no *Luminal* in stock, they cannot rouse themselves to the possibility of substituting phenobarbitone for it. This is a dangerous state to find the profession in, because of its implications. It means that the practitioner is prepared to be influenced by the publications of firms who are, after all, primarily interested in the sale of their products.

Now, proprietary preparations are costly. This must necessarily be so, on account of the large sums of money spent on popularising the article by advertisement. It is a curious psychological fact that the public are impressed by the very dearness of the remedy. They often begrudge the doctor his fee and they frequently bemoan the high price they have to pay for a small bottle of medicine. Nevertheless, the very extravagance has a certain virtue and they look upon the nostrum as if it were really a finely distilled essence of the elixir of life. The patent remedy habit rests, therefore, upon two foundations. There is, firstly, the encouragement of the doctor, which is often quite unpardonable and secondly, the fundamental ignorance of the public. There is no excuse for either of these conditions, and it is the business of the medical practitioner to enlighten lay people on the matter and to fulfil his true function as an educator in affairs connected with health.

How does the pharmacist figure in this patent remedy "ramp"? The ethical conduct of his profession should be one of the most important guiding factors in the life of the pharmaceutical chemist. In this respect, he shares with his close collaborator, the doctor, a responsibility which can never be shaken off during the whole of his professional career. Nevertheless, there is a regrettable tendency for the pharmacist to assume, upon occasion, the role of adviser in medical matters. I am fully conscious of the indebtedness of my own profession to yours, and I am aware of the many occasions upon which the reputation of a doctor has been safeguarded by the careful scrutiny of a doubtful prescription. But the chemist, serving, as he does, both doctor and patient, is often placed in an invidious position by the layman, who is quite ignorant of the ethical standards demanded of us. He may, if he is not careful, be pressed into recommending some drug because of the insistence of the patient, and this drug will often be a harmless preparation, elegantly compounded and extensively advertised. I am afraid that this sort of thing occurs very often and serves to perpetuate the patent remedy habit.

What measures can be recommended to counteract this neglect of the British Pharmacopæa and to check the flood of proprietary preparations, the number of which is now so great as to be a burden upon the memory and a drain upon the pockets of a susceptible public? I have mentioned the obvious duty of the doctor and the desirability of his exercising some degree of scientific scepticism in his choice of extra-pharmacoepal products. The next desideratum is the formation of a Committee, jointly made up of doctors and pharmacists, to consider the therapeutic value of proprietary drugs and the ethical standards of their manufacturers. All harmless preparations which are advertised in the Press should be heavily taxed: the lay public may then purchase these articles as expensive luxuries. Ethical products should only be advertised in professional journals, after they have received a certificate of therapeutic activity from the proposed Committee. All this seems such a commonsense procedure and appears now to be such a vital but long overdue part of public health legislation, that it is amazing that it has not been done long ago.

THE ROLE OF CHEMISTRY IN THE DISCOVERY OF DRUGS

A. N. RATHNAGIRISWARAN, M.A.

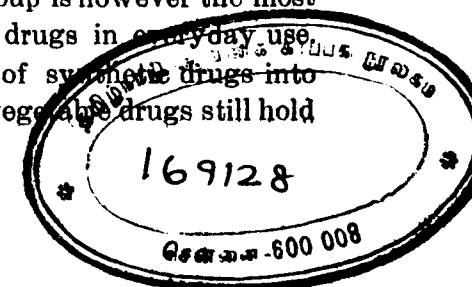
(Lecturer in Pharmaceutics, Madras Medical College)

The chief function of Pharmacy is to provide medicaments for the prevention, diagnosis, cure or alleviation of disease. There was a time when all that a Pharmacist was required to know was only a knowledge of the main constituents of the drugs, of animal, vegetable or mineral origin, that were in common use. But in recent years the subject of Pharmacy has so enlarged its boundaries that it has become indispensable for anyone practising the profession of Pharmacy to acquire an intimate knowledge of Chemistry, Physiology, Biochemistry, Bacteriology, Pharmacology and such allied sciences, so as to enable one to maintain the reputation of the profession and to discharge one's duties to the public. A study of the history of Pharmacy at once shows that its growth as a science has run parallel with the progress achieved in the branches of Medicine, and more particularly of Chemistry, which have been largely responsible for giving Pharmacy the status of an independent science.

The role of chemistry in pharmacy can be studied from various aspects. Of these, that which deals with the discovery of new drugs, is, however, the most fascinating and the most important. I, therefore, propose in the present paper to confine myself only to that aspect of chemistry which has a bearing on the discovery of drugs with special reference to those of vegetable origin, and to make a rapid survey of the application of chemistry to the supply of drugs from such a source. For the sake of brevity, Vitamins and Hormones are not included in this paper under the category of drugs, as each of them will require volumes for any adequate treatment.

Drugs may be classified into three groups, viz., vegetable, animal and mineral. Of these, the first group is however the most important and comprises a large number of drugs in everyday use. In spite of the entry of a countless number of synthetic drugs into the field of medicaments in modern times, vegetable drugs still hold

52
L 23 m 2, 1135
1135.116



an important place as indispensable therapeutic agents. It has been estimated by competent authorities that more than seventy-five per cent. of the materials prescribed daily by physicians are directly or indirectly derived from the plant kingdom. A large number of the reputed specific drugs like quinine, emetine, strychnine, digitoxin, ergotoxine, etc., are native products of the living plant, and in spite of the rapid strides that synthetic chemistry has made in recent years, it has still not been possible to synthesise identical or allied compounds with the same degree of therapeutic activity. Even in cases where synthetic analogues of the natural products have been discovered, it has not yet been possible for economic and other reasons to completely replace the former by the latter class of compounds. Reference may be made in this connection to the extensive experiments carried out under the auspices of the Health Organisation of the League of Nations on the antimalarial drugs with a view to assess the relative values and the functions of the principal remedies available. The outcome of the experiments was the fact that the newer synthetic antimalarials like plasmaquin and atabrin cannot yet oust the cinchona alkaloids in clinical practice and that there seems to be no possibility of this occurring in the near future.

It is useful to remember in this connection that the manufacture of synthetic drugs such as phenacetin, salicylic acid, aspirin and antifebrin was the natural outcome of the knowledge derived from the first attempts to penetrate into the secrets of Nature and to find out from her in what simple and rational way she accomplishes the synthesis of the simpler active constituents of medicinal plants. The synthesis of these medicaments led to the development of the synthetic drugs industry, and in the early decades of the present century it looked as if the preparation of medicines from natural products had fallen into disuse. But in the last few years a definite change in the angle of vision could be discerned in the field of pharmaceutical chemistry. With perfection in the methods of synthesis, biochemical research on drugs began to be prosecuted with increasing fervour because it was realised that plants and animals could supply us with valuable medicinal substances which human skill was not able to produce artificially. While formerly one was content to use the

natural products in crude form for treatment exact biochemical and physiological researches are now enabling us to make use of definite chemical individuals in a high state of purity in the place of the extracts. The isolation of the active substances in pure form, the determination of their molecular composition, their origin, method of elaboration, and function in the plant or animal concerned, and the investigation of their physiological actions are at the present time the chief objects of research on natural products.

The brilliant results achieved in this direction by Barger, Robinson and their co-workers in Great Britain, and by Spath and his pupils in Vienna on the role and constitution of a large number of plant alkaloids, the isolation of the cardiac glycosides in the natural state in which they preexist in the fresh plants by Stoll and his co-workers in Basle, and the elucidation of their structure and relationships by Jacobs in America and Tschesche in Germany, open up a vista of newer knowledge on plant products and illustrate the fact that chemical discoveries of theoretical interest may have important practical applications in pharmacy and medicine.

The application of chemistry to the discovery of drugs may be said to date back to the beginning of chemistry itself. In fact, chemistry in its earliest stages was evolved chiefly in attempts to prepare new drugs. Then it was mainly concerned with inorganic drugs. The close association between medicine and the systematic survey of plant life arising from the belief in the healing virtues of herbal preparations began from the 16th century onwards. Medicinal plants began to be cultivated in what was then called 'herbularies' or 'physic garden' which formed an essential adjunct to a monastery, before the beginning of the 19th century natural drugs were used in the crude state or as various preparations such as tinctures, decoctions, etc. Early in the 19th century definite organic compounds extracted from the natural drugs began to be used.

In 1804 the first alkaloid morphine was isolated from opium followed in 1809 by the equally important discovery of quinine in cinchona bark. The succeeding years witnessed the isolation of a

long list of plant alkaloids which gradually came into use in place of the crude drugs from which they were derived, with the advantage of more accurate dosage and more certain therapeutic effect. Morphine and quinine sulphate were first made in England on a commercial scale in 1821 and the salts of other alkaloids quickly came into use in medicine within a few years of their discovery. It was then thought that the alkaloids could and would completely replace the natural drugs, but it was later found that the action was not always by any means the same, for example, the action of morphine was found to be different in certain respects from that of opium with the result that today not only are many preparations of crude opium still in use but there are preparations, *e.g.*, omnopon consisting of the mixture of all the alkaloids of opium as they exist in the drug. There are indeed a few alkaloids, notably cocaine, pilocarpine and physostigmine, which may be said to have completely replaced the natural drugs, but almost all the other alkaloidal drugs are still in use in the crude form.

Attempts at modifying the structure of natural products by chemical means with a view to alter or enhance the therapeutic effects were first made on cotarnine as early as 1844, to be followed later by the production of apomorphine from morphine which is probably the first instance in which an organic compound the structure of which had been modified by chemical methods were used in medicine. Homatropine, Optochin and Vuzin are a few other well known drugs which resulted from the chemical attempts made to modify the action of naturally occurring alkaloids.

The discovery of synthetic drugs and their use in curative medicine may be said to have closely followed the development of the coal tar industry. The earliest synthetic drugs to be introduced were the antiseptics and the antipyretics which were derived from coal tar products. An unexampled stimulus to the production of synthetic drugs was given by Ehrlich's brilliant discovery of the arsenicals which resulted in the introduction of such valuable drugs as atoxyl, neoarsphenamine, sulpharsphenamine, tryparsamide, stovarsol, urea stibamine, and a host of other organo-metallic compounds which have now become well tried remedies. During the

years following the Great War of 1914 there was a comparative lull in the field of synthetic drugs, but with Domagk's marvellous discovery of Prontosil as a bactericide, we are again witnessing a period of intense and unrivalled activity in the domain of synthetic medicine.

The history of chemistry with reference to its applications in the discovery of drugs can be arranged in the following chronological order. The early period up to the close of the 18th century was one in which chemistry was applied to the preparation of inorganic drugs alone. The second period from 1800 to 1844 was occupied in the isolation of plant alkaloids. The next period from 1844 to 1914 was a period of synthetic drugs. Next comes the post-war period of biochemical and pharmacological research on drugs.

Chemistry plays a very important role in the supply of drugs. The isolation of the active principles of natural drugs, the elucidation of their constitution, and the synthesis of the same or allied compounds are problems of entirely chemical nature. The preparation of drugs by modifying the structure of naturally occurring compounds with a consequential change in their physiological action, the production of synthetic drugs, the analytical control of the supply of drugs, and lastly, the preparation of drugs in forms suitable for administration are again problems in which a knowledge of chemistry is indispensable.

The active constituents of natural drugs includes compounds of widely varying chemical character such as, alkaloids, glycosides, essential oils, resins, vitamins and hormones. In recent years there has been a revival in plant analysis in order to obtain an increased knowledge of plant constituents with a view to understand the mechanism of their formation *in vivo* and if possible to attempt to simulate by means of chemical methods their biogenesis *in vitro*. Such a revival has resulted in the discovery of new and potent alkaloids from drugs which have been in therapeutic use for a long time. The isolation of Ergometrine from aqueous extracts of ergot by Dudley and Moir is a triumph of recent improvements in the technique of alkaloidal isolation and is an illustration in point. Though, comparatively speaking, the

isolation of alkaloids from plant material is a simple process, the determination of their constitution is a much more difficult task and even now the structure of some of the widely used ones such as strychnine or emetine is still not definitely known. Many naturally occurring alkaloids, *e.g.*, atropine, cocaine and ephedrine have been synthesised, but the synthetic products have not yet been able to replace the natural alkaloids on account of the unfavourable cost of production of the former compared to the latter.

The investigation of the structure of natural products being an essential preliminary to their application in medicine, the problem of determining the constitutions of complex alkaloids is being tackled by organic chemists all over the world. Notable achievements in this direction that may be mentioned are the elucidation of the constitution of Vasicine, the alkaloid of *Adhatoda vasica*, and of physostigmine, a more complete knowledge regarding the constitution of the cinchona and opium alkaloids, and the discovery of the presence of the double-isoquinoline nucleus in alkaloids of *Tube Curare*. Some of the analogues of the natural products that were prepared in the course of these studies found interesting applications in medicine, *e.g.*, Miotine and Prostigmine in *Myasthenia Gravis*, Eucodol and Dilaudid as narcotics. Ethylapoquinine as a pneumococcide, and isoamyldihydrocupreine as a local anæsthetic.

The isolation and study of glycosides, on the other hand, are problems of a more formidable nature. Glycosides do not readily yield crystalline salts and compounds as the alkaloids do, and further they are usually present in insignificant amounts in the plants in which they occur. The occurrence of several glycosides of similar properties entails considerable difficulty in their separation, and the elucidation of their structure is no easy task either. In recent years, however, a rapid progress in our knowledge of the chemistry of glycosides, and especially of the glycosides having a specific action on the heart, has been possible due to the careful and brilliant researches of Jacobs, Stoll, Tschesche, Windaus and other eminent organic chemists. The major problems of the constitutions of the principal representatives of this group of glycosides

have been solved and much of the confusion that existed in regard to their structure has been cleared.

The cardiac glycosides comprise a group of naturally occurring substances placed together because of their common characteristic action on the heart. Pharmacological study of these substances ever since Withering published his epoch-making treatise on the therapeutic properties of the foxglove in the treatment of dropsy had kept far ahead of the accumulation of strictly chemical data available. This was due to a variety of factors. The plants in which these substances occur often contain several other active constituents which are responsible for the physiological action. In addition to possessing very similar physical properties they often occur in very minute amounts rendering their isolation as definite chemical entities an exceedingly difficult problem. Moreover, these substances are of a very complex chemical character and often quite labile which further contributes to the difficulty of their isolation in crystalline form. Instances are known where crystalline substances, notably the glycosides of *Digitalis lanata*, which had been reported as chemical individuals were later on shown to be mixtures of closely allied compounds. The isolation of chemically pure glycosides is greatly handicapped by the presence of relatively large quantities of saponins and other inert substances which are extracted along with the cardiac principles and alter the solubility properties of the active substance, a circumstance which contributes in no small measure to the difficulty of their isolation.

The preparation of the genuine glycosides, as they preexist in the plant, from the leaves of *Digitalis lanata* by Stoll and Kreis by applying their perfected technique of extraction is a notable example of chemical discoveries of a fundamental nature having important practical applications in medicine. Digilanid, the total glycosides of *Digitalis lanata* containing collectively the components A and B which are eliminated rather easily and the more powerful and more permanently active Digilanid C, is now the drug of choice in cardiac therapy and is the only preparation containing the chemically pure, genuine digitals glycosides of constant composition. The digilanid mixture which has been

tested clinically and introduced into medicine is standardised to contain about 46 per cent. of digilanid A, 17 per cent. of digilanid B and 37 per cent. of digilanid C. An accurate method for the estimation of the components has been perfected which guarantees the uniform composition of the preparation. Its therapeutic dose for human beings when administered orally amounts to a daily average of 0.75 mgm. In severe cases this may be increased to 1.5 mgm. divided into 3 doses. For parenteral administration 0.8 mgm. or 2 doses of 0.4 mgm. may be used.

The clinical results confirm the assumption that the total glycoside preparation adequately replaces the crude extracts of the leaves which were being used hitherto, offering at the same time the advantage of an accurate dosage of a pure substance. The indications for and therapeutic action of digilanid do not differ from those of digitalis and are especially associated with cases of mitral disease and auricular fibrillation.

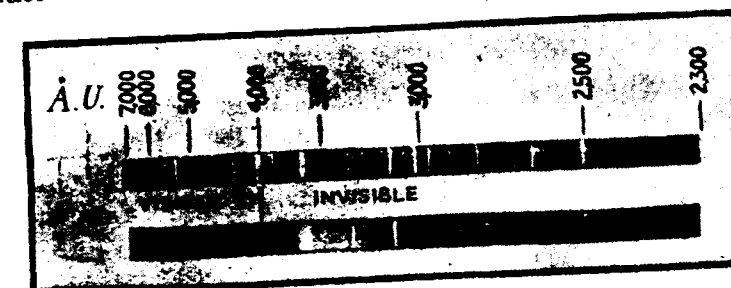
The trend of modern therapeutics is therefore, towards the use of single drugs administered in chemically pure condition. This new bias has been the natural result of the successes achieved by chemical research on natural products within the last two decades. The crude plant or animal products which were employed at one time for the treatment of disease have now been largely replaced by the active constituents that have been isolated from such drugs as well as by other drugs obtained by synthetic methods. This orientation in therapeutic medicine has been made possible by the close association between chemistry and medicine and the indispensable and important role that chemistry has played in the discovery of new drugs either from natural sources or by synthetic means. The improvements in the technique of pharmacological investigation have also contributed their share to effect a 'rationalism' in therapeutic medicine. The perfection of the experimental technique of biological assays which has made possible the accurate standardisation of drugs that are not amenable to a chemical assay has also constituted an important advance in the direction of therapeutic precision. With such rapid advances in the methods and technique of chemical and pharmacological investigation the

foundation of a rational system of treatment of disease has been truly and firmly laid, and the day may not be far off when every disease will have a specific drug for its treatment.

CAPILLAR-FLUORESCENCE-ANALYSIS OF BALSAMUM PERUVIANUM.

PROF. C. A. ROTHENHEIM, BOMBAY.

The use of the ultra-violet-lamp for analysis of pharmaceutical products becomes more common from year to year. Many substances, solids as well as liquids, glow up under the filtered rays of the mercuri-arc, and show an especial and particular distinguishable colour. This glow disappears as soon as the lamp is switched off. For the use in the fluorescence-analysis the visible light is filtered off, and only the invisible light rays are used. In most of the cases the filterglass used in fluorescence-analysis contains a mixture of nickel-oxide and copper-oxide in different percentages. The picture below shows a spectrogram of a mercuri-arc unfiltered and a spectrogram of the filtered mercuri-vapour-rays, usually used for the fluorescence-analysis.



It can be observed that for the fluorescence-analysis for rapid test only the invisible light between 4000 and 2300 Å. U. is used. Å. U. means Angstroem Unit. Anders Jonas Angstroem was a Swedish astronomer and physicist, who lived from 1814-47. His studies had been devoted to the heat, magnetism and spectroscopy. The unit for measuring the wavelength of light was named in his honour. An Å. U. corresponds to 3.937×10^9 in, or $1 + 10^8$ cm. or 1/1000 micron, one microne μ = to 1000th of a millimeter.

In the modern pharmaceutical technique capillar-analysis is used together with fluorescence testing. The ordinary way is to hang a strip of non-fluorescent filter-paper in a solution, to enable this liquid which has to be tested, to rise. After having dried those strips they are examined under the quartz lamp. This simple method has several disadvantages, the main being, that, according to the rapid evaporation, the liquid cannot proceed quick enough higher up in the strip of filter-paper. To avoid those disadvantages, we have developed a method, which allows the undisturbed rise of any liquid into the filter-strips, and which enables dispersed materials to fix themselves into the filter-paper. Furthermore with our method it is possible to analyse alcoholic and ethereal liquids.

One glass tube, 60 cm. long and 30 mm. diameter, is immersed in a cylindrical vessel of glass or porcelain with the volume about 20 ccm. The opening of this vessel must only be as wide as to allow the glass pipe to become fixed in easily. In this container we put 3 to 5 ccm. of the liquid to be analysed and finally we adjust in the glass pipe one filter-paper strip about 2 cm. broad and approximately 55 cm. long. This filter-paper strip has to be folded in the middle to give more stiffness to it. The upper end of the glass pipe is to be closed by a cork with one very small hole. The paper strips suck the liquid up as soon as the air in the pipe is saturated with the liquid. According to our experience, working now over twelve years, it is best to let the paper strips remain in the glass pipe for five hours. After this time all different sorts of liquids which we have used, have risen up high enough for analytical purposes. After having removed the paper strips from the glass pipes, they get first dried in the open air and finally over chalk or silica gel. Always for all the tests the same kind of filter-paper has to be used, and for each trial under the analysis quartz lamp one unused filter-paper strip must be examined in comparison.

Balsamum Peruvianum (Balsam of Peru) balsam of peru, is a viscid balsam, exuded from the trunk of *Myrciobium peruvianum* (Royle), after the bark has been beaten and scorched. It contains not less than 53 per cent. of balsamic esters, which have a saponification

value of not less than 235. The Pharmacopeia shows a test for identity, purity and the assay. Test for identity: specific gravity (15.5° 15.5°), 1.140 to 1.170. Test for purity: shake one gramme with the solution of three grammes of chloral hydrate in two milliliters of water; a clear solution is produced (absence of fatty oils), shake two grammes thoroughly with ten milliliters of light petroleum (boiling point 50 to 60), filter, and evaporate four milliliter of the filtrate on a water bath; the residue has no odour of benzaldehyde or of turpentine (absence of benzaldehyde and of turpentine). Assay: gives an elaborate method for the determination of the saponification value by extraction and titration.

The balsamic esters of balsamum peruvianum are the benzy-lesters of cinnamic and benzoic acid $C_6H_5 \cdot COO (C_6H_5 \cdot CH_2)$ viz. $C_6H_5 \cdot CH=CH \cdot COO (C_6H_5 \cdot CH_2)$, forming the so-called cinnamein, furtheron the cinnamic and benzoic esters of peruresinotannal, $CBH_{20} O_5$, cinnamic acid $C_6H_5 \cdot CH=CH \cdot COOH$, peruvicol, $C_{13}H_{21} OH$, and vanillin, $C_6H_5 \cdot CHO, OCH_3, OH, (1, 3, 4,)$.

To shorten the method to perform an assay on balsamum peruvianum I tried to develop an analysis with longstretched capillar-pictures and the quartz lamp. Approximately twelve years ago, I published first about this item, but meanwhile its usefulness was proved by several authors, and I believe it is worthwhile to mention it newly, because it really shortens the test on balsamum peruvianum, and facilitates the proof whether the drug is pure or adulterated. To compare the balm I made a test with various kinds of it and also with balsamum cannadense balsamum copaibæ, balsamum guranæ, styrax, balsam tolutan, benzoe, colophonium, terebinthina, cinnamic acid, cinnamein, benzyl benzoas, cinnamic ethyl ester, peruvicol, oils of amygdalæ, arachis, persicæ, rapæ, ricini, olivæ, terebinthinæ, I have diluted the materials to be tested with ether, alcohol, acetone, petrol, benzene, chloroform, methyl alcohol and water. The mixtures had been made, taking one part of the material to be tested and nine parts diluting liquids. These mixtures remained for twelve hours in the containers, and were shaken from time to time. The capillar-picture was obtained according to the method mentioned above, and yielded the following results. Balsamum peruvianum which

complies with the requirements of the Pharmacopœia, shows in its watery extraction an exceptional typical blue colour, which is not found with adulterated balms, or other tested materials. This blue colour in the filtered ultraviolet light is so typical that everybody will recognise it immediately. I came to know that even if the capillarisation is done in the ordinary way, without working with my method, this typical colour is obtained. Summing up we come to the conclusion that it is possible while using filtered ultraviolet light and capillar-pictures, we have a simple and efficient method for a rapid test of pure or adulterated balsamum peruvianum.

(The references to literature being so many, I am not quoting any in this article, owing to the lack of space, but if anyone requires them, I will willingly produce them).

THE MANUFACTURE OF MARGARINE

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

Margarine (Butter substitute) was first manufactured during the Franco-German War of 1870, owing to the acute food shortage, experienced by the French. The methods then in use were rather crude compared to the methods now employed, for the modern manufacturer has at his disposal not only a much greater variety of oils and fats but also much more scientific means of attaining a valuable edible product.

What Margarine is? Margarine is an emulsion of animal and vegetable oils with milk, stabilised by the addition of special chemicals.

There are two classes of margarines:—

(1) Oleomargarines, in which the quantity of animal fats and oils predominate over the vegetable oils.

(2) Vegetable margarines in which the quantity of vegetable oils predominate,

Oils and Fats used. A combination of oils and fats are used in order to obtain a product having the desired melting point and other characteristics and also the choice of ingredients depends on the economic factor which is of primary importance. Among animal fats, the most common in use are lard, premier-jus (the oil obtained by the melting of the fat of ox-heart and kidney) Oleo oil, etc., while of vegetable oils, Arachis (Peanut), Cocoanut, Cottonseed, Palm, Soya, Beans, etc. In recent years, the development of the hydrogenation of vegetable oils, has rendered possible their solidification. This process consists of the addition of atoms of hydrogen to the unsaturated portions of the oils, converting them to products of higher melting point. Thus Olein, which is liquid at ordinary temperatures and contains three unsaturated linkages, is converted to solid unsaturated stearin. Thus by the regulation and proper control of the hydrogenation, the manufacturer can within limits, obtain a fat of any desired melting point and a fat less liable to deterioration. The method used consists in passing Hydrogen through the oil (at high temperatures and pressure) in the presence of a catalyst, generally Nickel.

Purification of Fats and Oils. The raw materials, the oils and fats in solid and liquid form, after being freed from extraneous matter are treated with Caustic Soda solution to remove free fatty acids and most of their colour. The caustic soda solution (the quantity depending on the acidity of the oil and the colour) is mixed together in tanks, fitted with stirrers and steam coils at a temperature of 30° to 50° C. After standing the "soap stock" which separates out at the bottom is removed.

The oil is now washed to remove excess Soda and the temperature is raised to slightly over 100°C and bleached with fuller's earth or activated charcoal. The fuller's earth is then removed by filtration, through filter-presses and the oil is transferred to autoclaves and deodorised by means of steam distillation, under high vacuum. This process not only removes odour but also the last traces of water and unsaponifiable matter.

Mixing of Oils. After refining, the fats and oils are charged into large melting tanks, double jacketed for heating with steam or for cooling and provided with stirring gear, for mixing, so as to

obtain a homogeneous mixture. The mixed oil is then pumped to a series of jacketed pans for the next process of emulsification with milk.

If the oils and fats are found, on examination to be deficient in vitamins A & D, these are added in the form of vitamin concentrates usually obtained by extraction from cod or Halibut liver oils. The modern manufacturer strives to manufacture a margarine equal in vitamin A & D content to the best summer butter.

Emulsification of Oils and Milk. Milk is added for two reasons, first to give the desired flavour of butter, secondly as an emulsifying agent. The flavouring properties are brought about by first pasteurising the milk and then treating it with lactic acid bacteria, such as *B. lactic acid* Leichmann *Streptococcus lacticus* and *B. bulgaricus*.

The acidified milk after being charged into mixing tanks jacketed for heating and cooling is agitated and the oils are added slowly in a stream or as a spray. The temperature in the tank is kept up from 5°C to 35°C, depending on the melting point of the mixed oils. During the mixing process yellow colouring matter and emulsifying agents are added. As milk does not form a stable emulsion with fats and oils, the following emulsifying agents are usually added, such as glucose, lecithin, albumen, etc.

Solidifying the Emulsion. The emulsified milk and oils are now forced down an inclined chute into ice-cold water, which stabilises the emulsion by forming it into tiny granules. The margarine is now stored in special rooms for maturing and ripening. After maturing, the margarine is kneaded in wooden machines to bring down the water content to about 12 per cent, which is the usual water content of good butter. If salt is needed in it this is added during the kneading process.

THE WORK OF THE ST. JOHN AMBULANCE ASSOCIATION AND THE RED CROSS SOCIETY

MAJOR-GENERAL N. M. WILSON, C.I.E., O.B.E., K.H.S., I.M.S.

Surgeon-General with the Government of Madras

(BY COURTESY OF THE "INDIAN REVIEW")

As every one knows, these two associations are both voluntary and charitable organisations which exist for the service of suffering humanity. Both have a long and honourable history of fine achievement. Both owe their birth to the sense of human sympathy strongly aroused by the contemplation of suffering caused to human beings by the horrors of war, and of disease, accidents, privation and hardship in times of peace. The two organisations are complementary to each other, and six months before the outbreak of the present war, plans were made for mobilising all the resources of both these Societies in India, should necessity arise.

Thus, at the outbreak of war, a Joint War Committee of both the Societies was formed at Delhi and a Commissioner was appointed to co-ordinate the work of the Branches of these Associations in every State and Province. His duty is also to maintain contact with the Army Headquarters with a view to ascertaining the needs of the Hospitals caring for men of the Services, whether serving in India or abroad, and also to obtain and apportion supplies of materials and arrange for their transport to the various fields of action.

Now in India, in times of peace, the funds of these Associations are devoted to all kinds of welfare and relief work and to the training of personnel in First-Aid, Home Nursing and kindred subjects, and so important is this work, that it was decided that at all costs it must be maintained as far as possible, though the first charge upon the capital fund of the Indian Red Cross Society is the expenditure on relief work necessary in war. Fortunately the various appeals for funds in the different Provinces have met with a generous response.

In the Province of Madras a total of 4½ lakhs has been so far received. Nearly 1 lakh of this was earmarked by the subscribers

for various war charities, to which the money was promptly forwarded; 1 lakh more was cabled to the British Red Cross as a gift from the Madras Province towards repairing the losses incurred in France; and about Rs. 20,000 has been spent on materials for the working parties of the Province. The overhead expenses of the Madras Depot are extremely small, the workers being all voluntary and unpaid, and the clerical staff, with the exception of one clerk and one packer, being all paid from the peace-time funds of the Red Cross Society.

This does not represent the total expenditure from Madras on War Charities, but only on those which are the direct responsibility of the Red Cross, i.e., the provision of comforts and hospital supplies for the sick and wounded, Indian or European, at home or abroad, and on relief to the refugees, whose claims grow ever more pressing, and who have no one else to help them in their dire need. The International Red Cross in Geneva is appealing to every Red Cross Society in the world to come to its aid in relieving the sufferings of millions of people who have been driven from their homes and are entirely without the barest necessities of life. Nor does it include money and gifts in kind which have been sent independently by many in this Presidency to Red Cross Headquarters in Delhi and to His Excellency the Viceroy's War Purposes Fund and also to one of the many Funds in England, which have up to the present been bearing the brunt of relief work. And now for some account of what work is being done in India and of how public money for War Charities is being spent.

Work of the St. John Ambulance Association. The St. John Ambulance Association is responsible for enrolling voluntary workers, training them in First-Aid and women in Home Nursing. Men are then enrolled in Ambulance Divisions, women in Nursing Divisions and children in Cadet Divisions, also Medical Students, forming a Division. The Brigade thus constitutes what might be described as an executive body of troops which are available to carry out the general purposes of the Red Cross Society in providing relief for sick and wounded. These Divisions will be responsible for assisting trained personnel in case of need in India, and for replacing trained nurses called up from hospitals all over India who

may be required on any front to care for the sick and wounded of the fighting forces, and the need for more and more trained volunteers is imperative, mainly for work within India. Madras has done well in this respect. Since the outbreak of war, 2500 men and approximately 400 women, Indian and European, have received proficiency certificates, and should Madras herself be attacked, these workers will serve at the posts already allotted to them at Casualty stations, which have also been equipped from the Funds. Others will be required in all the hospitals. St. John Ambulance Volunteers have also been trained and enrolled as ambulance drivers, storekeepers, transport corps workers, and many are doing miscellaneous jobs according to the requirements of the army to supplement its essential needs.

Red Cross Organisation at Headquarters. As has been previously stated, there is a Red Cross Commissioner in Delhi who is in touch with all the States and Branches and also with Red Cross International Headquarters at Geneva, and in England, and with the Army authorities in India. Pamphlets on "How to help" and "A simple guide to Ladies Work Parties" have been issued, a definite quota of work allotted to each Province, both of hospital dressings and clothing, and of warm knitted garments for sick men and for healthy troops (though materials for the latter are not paid from Red Cross Funds, but from a separate Fund known as the "Amenities for Troops" Fund).

There are Red Cross Store Depots at the Ports, where hospital stores and garments, etc., made by Work Parties all over India, collected and forwarded by the Provincial and State Committees are stored and despatched to the fronts, on demand. Singapore, Egypt and the North-West Frontier are the places to which large consignments have already been sent. These Store Depots are in charge of voluntary workers who are successfully sorting and packing enormous quantities of supplies. Demands from Military Hospitals in India have also been met from these reserves and many consignments of Red Cross Comforts specially earmarked for the purpose have also been sent to London for the various British forces fighting in Europe.

Egypt has hitherto been the special care of the Bombay Provincial Branch and Malaya of the Bengal Provincial Branch, but we are warned that at any moment all possible help from India may be required on other fronts, possibly even at home.

Headquarters has also been responsible with the assistance of the Indian Stores Department, for placing a contract for 18,000 lbs. of knitting wool at special rates with the Raymond Mills of Bombay. This has to be inspected and certified before being issued to the Provincial and State Branches for being made up. It is calculated that so far 1/10th of the wool made into garments has been for Red Cross purposes (*i.e.*, hospital garments for sick and wounded men of the fighting forces) and 9/10th into warm garments for healthy troops, including our Indian troops serving in the colder climate of Europe, and for men of the Mercantile Marine, whose work is of such vital importance to our daily life.

The Indian Red Cross Society receives and answers enquiries from Geneva about enemy prisoners in India and it is hoped shortly to provide for sending postal messages from India to enemy and enemy occupied territory. The scheme is at present under the consideration of the Government of India. Literature is called for in the languages of India, for supplying to Indian troops. Such books and illustrated magazines should be in good condition, of recent date and such as are likely to appeal to soldiers in hospital.

Ladies Sewing Parties. Hundreds of Indian and European women and girls throughout India are at work making clothing and dressings for hospitals and warm clothing for active troops, and the supply of work sent in is increasing every month. There is work for all—too much cannot be sent, provided it is made according to specifications supplied from Headquarters. Madras is well organised in this respect.

Large quantities of cloth and wool made in India have been purchased from the proceeds of the War Charities Fund, and are stocked at Red Cross Headquarters in Madras, from where materials are sent free of cost, together with patterns and instructions, to the organisers of Sewing Groups. When they are

returned, made up, all supplies are checked, listed and packed in suitable boxes.

The quota called for by Headquarters is despatched to Bombay. Madras has also forwarded a consignment of Hospital Supplies direct to the British Red Cross, and one of warm clothing to the Indian Comforts Fund in London. It is also suggested that we might, if shipping is available, send a consignment direct to the Red Cross Commissioner in Egypt. Firms and shipping companies are co-operating in facilitating transport and keeping down expenses, and the Railways most generously carry all parcels free of charge.

To those who feel that it is incumbent upon Governments to provide all that is necessary for sick and wounded, it may be made clear that the Red Cross is not responsible for providing basic equipment of Hospitals, and that only if the need is one of immediate urgency or caused by overwhelming numbers, will such Red Cross supplies be used. Many of the gifts are in the nature of "comforts" intended to give to our soldiers, whether sickly or well, those amenities which in civil life might be provided by their relatives and friends. But it must be remembered that in this war crisis come unexpectedly and with overwhelming force, and every effort that can be made by civilians to supplement the military provision of ordinary equipment such as bandages and dressings will be required. By the time the crisis has arrived, it will be too late to begin cutting and sewing; let us do it now, so as to be ready to send help wherever it is wanted.

PRESS COMMUNIQUE.

Indian Chemical Manufacturers' Association.

"The drug and pharmaceutical industry in India has developed considerably recently and in order to enable it to make further headway, simultaneous growth of heavy and fine chemical industries and industries connected with coal carbonisation and production of solvents, etc., is essential. If the required basic materials and chemicals are readily available, it is possible to produce in India all the drug requirements of the Country". This is the conclusion of the 'Medicinal Preparations' Sub-Committee of the Indian

Chemical Manufacturers' Association, Calcutta in their report recently submitted to the Government of India. It is stated that India possesses a wonderful range of vegetable materia medica and nearly three-fourths of the drugs mentioned in the British Pharmacopoeia grow in this country in a state of nature and the remaining one-fourth can be easily cultivated in some part of the country or other. In the Appendices to the Report, the Sub-Committee have included two lists (1) Drugs belonging to the British Pharmacopoeia which grow in India and (2) those included in the British Pharmaceutical Codex and the Extra Pharmacopoeia which either grow spontaneously or can be easily grown. It is the opinion of the Sub-Committee that if due attention is paid to the proper cultivation and utilisation of vegetable drugs, India would not only be completely self-supporting in this respect but would also be able to develop an export trade in crude vegetable drugs. The Sub-Committee refer to the position about the production of oils, including essential oils, fixed oils and liquid paraffin; Alkaloids including caffeine and its derivatives, emetine, morphine and codeine and their derivatives, strychnine, ephedrine, quinine, etc.; Glucosides including digitalis; Inorganic and organic drugs, inorganic and organic metallic compounds; Synthetic chemotherapeutic products, organo-therapeutic products; coal-tar products; Biological products including sera, vaccines, bacteriophage, etc., Vitamin preparations, patent foods, etc.; Surgical dressings, disinfecting fluids and other miscellaneous requirements. The Sub-Committee have also appended lists of essential drugs and medicinal chemicals available in India, of drugs and medicinal chemicals of secondary importance available in India, of basic chemicals necessary for the manufacture of drugs and possibilities of their manufacture in India and Tables showing imports of drugs, patent and proprietary medicines and chemicals along with their industrial uses. The Sub-Committee invite the attention of the Government to the necessity of close co-operation between the drug manufacturing concerns and hospitals. At present the manufacturers in India find it difficult to make a clinical trial of their products in any hospital under the Government and Semi-Government bodies and it urges the State to render necessary help in this respect.

THE PHARMACIST

(The Journal of The Pharmaceutical Society of India)

A Half-yearly Journal devoted to the Interests of Pharmacy in India

Vol. I.]

July, 1940.

[No. 4

Editorial

THE WAR EFFORT;—Pharmacists have unique opportunities of coming in contact with all sections of the population rich and poor and should do everything in their power to induce the population to contribute to the war effort on which depends the prosperity of our profession and our country. The Pharmaceutical Society of India has in its own humble way contributed to this cause by investing its available funds with the Government of India in the Defence Loan without interest. The Society expects every practising member of the profession to do his utmost to contribute to the War Fund opened by H. E. The Governor of Madras in every way possible. It also calls on all the dealers carrying on the Pharmaceutical Trade to do their utmost in supporting this cause by contributing either in cash or in kind.

Library and Laboratory Fund:—One of the aims of the Society is to have a building of its own commemorating the memory of its Foundation President Lt.-Col. Clive Newcomb, C.I.E., I.M.S. The building is intended to house a laboratory and library to stimulate post-graduate study and research among the members of the profession. A start was made to collect funds on the 14th March, 1940 by having a benefit performance at the Minerva Talkies, Davidson St., Madras. The Society takes this opportunity of thanking the Directors of the Minerva Talkies for their generous help. The Society thanks the public for their co-operation, keenness and enthusiasm in encouraging the cause of Pharmacy.

The Drug Legislation:—A copy of the memorandum submitted by the Pharmaceutical Society of India to the Central Government is given below :

"1. There is no provision for representation of the profession of Pharmacy in the proposed Drugs Technical Advisory Board. Considering the fact that Qualified Pharmacists are members of a skilled profession with first hand knowledge of drugs and actually handling drugs in their every day life, Pharmacists would be in a position to give practical advice to Government as apart from purely theoretical advice. The present constitution of the board provides for efficient theoretical advice and a board like the one at present constituted would not be complete without adequate representation from the Profession of Pharmacy. It would therefore be advisable that there should be on the board at least four actively practising Pharmacists, two of whom at least should be nominated by the Pharmaceutical Society of India, a society of seventeen years standing in this country and the only organisation which is purely an association of Qualified Practising Pharmacists. Persons selected as representatives from the Profession of Pharmacy should be those who have qualified as Pharmacists after passing the prescribed examination and have had at least five years experience.

"The Pharmaceutical Society of India, therefore, urges the Central Government to include in the membership of the Drugs Technical Advisory Board four Qualified Actively Practising Pharmacists of at least five years standing in this country, two of whom should be nominated by the Pharmaceutical Society of India.

"2. The Society is of opinion that the provision in the first schedule for patent and proprietary medicines are too drastic and follow the American model rather than the British model. The British model is more suited to our present day conditions and it is that those who are unwilling to divulge the formula of their preparations should be allowed to sell their products provided that they pay a suitable specified stamp duty on such preparations as in Great Britain.

"3. There should be provision in the present legislation itself for the formation of Provincial Pharmacy Councils to regulate the enforcement of Provisions in Chapter IV of the Bill.

"It is also advisable that an important legislation of this nature should not be rushed through the Central Legislature and sufficient time should be given for the profession and the trade to express their views on the various clauses of the Bill.

"The Central Laboratory should be located in a really central place like Bombay within easy access to all parts of India. Bombay has further the advantage of being the main port for India and a great business centre, to which all the railways from all the rest of India converge."

We take this opportunity to suggest that in the appointment of Inspectors under the Drugs Act, the claims of Qualified Pharmacist (possessing the diploma of chemists and druggists) of Madras Government should not be overlooked. For the appointment of Inspectors for Drug Factories the B.Sc. (Pharm) Graduates may be appointed and for the inspection of dispensaries, pharmacies and wholesale and retail concerns, Practising Pharmacists possessing the Diploma in Pharmacy would be more adequate as inspectors. It is hoped that the Government of Madras would bring into operation the Pharmacy Act which has been in contemplation for some time. The Pharmacy Act should be brought into operation simultaneously with the DRUG ACT as without the regulation of the Profession of Pharmacy, a regulation only of the sale of drug would not be in the full interest of the Public.

THE JOURNAL.

Owing to the stress of present war conditions, we have been compelled to convert the quarterly issue of our Journal into a half-yearly issue until the present conditions are over. The present issue of the Journal, which is the fourth volume in the series, is sent to every member in lieu of the April issue which was not issued and subscriptions for future issues of the Journal, which will be in March and September should be sent to the Editor before the 1st December 1940. The annual subscription will remain the same as before, Re. 1 per annum.

BLEACH OINTMENTS

D. D. MOIR, M.S.C., F.I.C.

*Extract from "The Analyst" Volume 65, No. 768, Page 154,
March, 1940.*

In view of the importance of bleaching powder preparations in the first-aid treatment of mustard gas casualties, the following notes and observations on the strength and keeping properties of bleach ointment may be of interest.

Bleach ointment consists of equal parts of bleaching powder and white petroleum jelly. Bleach ointment, when freshly prepared, should contain about 15 per cent. of available chlorine. A yellow petroleum should not be used, since there may be interaction between the bleaching powder and the jelly, which can become very vigorous and has been known to cause a fire in large bulk. Even with white petroleum jelly this possibility is not entirely excluded.

The fact that bleach ointment is liable to deteriorate has been known for some time. Chambers and Savage, who prepared bleach ointment according to the earlier A.R.P. formula of two-thirds bleaching powder and one-third petroleum jelly, observed a loss in available chlorine of about 50 per cent. in 15 months. Of this loss, a small proportion was found as combined chlorine in the petroleum base, but by far the greater part had been converted into inorganic chloride.

Determination of Available Chlorine.—After several preliminary trials the following method of determining available chlorine was found to be most satisfactory and was used throughout these experiments:—About 1 g. of ointment is weighed directly into a weighed stoppered flask of about 200 ml. capacity. Twenty ml. of carbon tetrachloride are added, and the flask is rotated gently, with slight warming if necessary, until the whole of the paraffin is dissolved; 100 ml. of water are added and the flask is shaken vigorously. About 2 g. of solid potassium iodide are added, followed by 5 ml. of 33 per cent. v/v acetic acid. After a further shaking, the liberated iodine is titrated with N/10 sodium thiosulphate solution.

The petroleum base is determined by extraction with petroleum spirit in a Soxhlet thimble lined with filter paper; thus determined it would include any small quantity of chlorine which has entered into combination with a jelly.

Deficiency in available chlorine in a bleach ointment may be due to one or more of several causes. The wrong proportion of bleaching powder may have been used, or the bleaching powder may have been deficient in strength. Deterioration may have occurred either through interaction between the bleaching powder and unsaturated compounds in the petroleum base or by loss in strength of the bleaching powder itself. Any combination of these causes is possible, and it is not easy to distinguish between them.

BRITISH PHARMACOPŒIA COMMISSION

Report of the Committee on General Chemistry

**Report No. 14, Published by authority of the General Medical Council, 44, Hallam St., London, W. 1., December, 1939.
Price 1s. 6d.**

This report has been published in order to provide the opportunity for medical practitioners, pharmacists, analysts, manufacturers and others who may be interested, to criticise it and to suggest amendments before the preparation of the new Pharmacopœia reaches its final stages.

SECTION I.

The Sub-Committee on Alkaloidal Salts have reviewed the monographs submitted to them, in so far as the descriptions, characters and tests for identity and for purity are concerned. They recommend certain changes (Mainly concerned with the melting-points) in nine monographs.

SECTION II.

The Sub-Committee on General Organic Chemicals recommend changes or additional requirements in 19 monographs.

Aether:—The Sub-Committee recommend that the monograph of Anæsthetic Ether in the current Pharmacopœia should be

continued, and the quality now described as "Aether" should be named "Aether Solvens, Solvent Ether".

Glycerinum.—The refractive index should read "1.4696 to 1.4726" instead of "1.470 to 1.472". A new test for reducing substances is proposed.

Urea.—The synonym "Carbamide" should be inserted. The m. p. (130°—132°) should be given as a Test for Purity.

SECTION III.

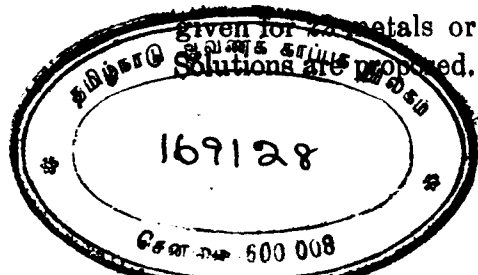
The Sub-Committee on Inorganic Chemicals recommend changes or additional requirements in 42 monographs and in Appendix 1.

Appendix VI.—For the quantitative determination of Lead the Sub-Committee recommend the adoption of the Ether Extraction method, and the necessary additions to the table on pp. 553 to 558 of the B. P., 1932, are given. These include the following limits for Lead in p. p. m. **Acidum Mandelicum**, 5; **Calci Mandelas**, 5; **Ferri Carbonas Sacchratus**, 50; **Ferri et Ammoni Citras**, 50; **Ferri et Quinine Citras**, 50; **Ferri Sub Chloridum Citratum**, 75; **Ferri Sulphus**, 30; **Ferri Sulphus Exsiccatus**, 50; **Liq. Ferri Perchloridi**, 15; **Magnesii Sulphus Exsiccatus**, 10; **Pot. Chloridum**, 5; **Sodii Metabisulphis**, 20; **Sodii Phosphas Exsiccatus**, 10; **Sodii Sulphus Exsiccatus**, 10.

Appendix VII.—Quantitative Test for Arsenic—Additions are required in relation to certain substances which are to be added to the Pharmacopœia. Amounts to be taken for the test are prescribed, and the following limits (p. p. m.) for Arsenic are recommended:—**Acidum Mandelicum**, 2; **Bismuthi Subgallas**, 2; **Calcii Leevulas**, 2; **Calcii Mandelas**, 2; **Magnesi Sulphus Exsiccatus**, 5; **Pot. Chloridum**, 1; **Sodii Metabisulphis**, 5; **Sodii Phosphas Exsiccatus**, 10; **Sodii Sulphus Exsiccatus**, 4.

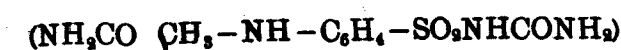
Appendix VIII, C.—Limit Test for Iron:—A Colorimetric method based on the use of Ammonium Thiocyanate is described. The comparison is made in Nessler cylinders.

Appendix V.—Qualitative Reactions and Tests for Substances mentioned in the Pharmacopœia tests, regarded as specific, are given for metals or Acid Radicals. Eight additional Reagent Solutions are proposed.



36
L23 m2, n3
1725.114

UREA-SULPHAZIDE-T



Found very effective in cases of

Gonorrhoea

and

Pneumonia.

Sole Agents for Madras Presidency:—

Manufactured by

Messrs. ADAM & CO., UNION DRUG CO., LTD.,

MADRAS.

CALCUTTA.

When writing to advertisers, please mention this Journal.

TO LET

In all cases

of malaria, influenza and
bronchitis

WINCARNIS is a pleasant-tasting, effective tonic composed only of purest health-giving ingredients. It contains no drugs, and may be prescribed with the utmost confidence for all convalescents or patients suffering from debilitating illnesses. It is especially valuable in cases exhibiting a tendency to anaemia, as it rapidly strengthens the bloodstream. Wincarnis is basically a blend of matured and selected red wines, combined with exact quantities of finest strengthening elements and vitamin malt extract (4,850 International Units Vitamin A per ounce, 700 Units Vitamin D). One or two glasses a day is the usual prescription, and Doctors recommend it because it not only stimulates appetite for food, but facilitates digestion of it. It is extremely efficacious in inducing sound, healthy sleep, and its general tonic effect restores vitality and resistance. For all cases where vitality is low—influenza, bronchitis, tonsillitis, anaemia—

Prescribe

WINCARNIS

The Tonic Wine

● OVER 25,000 RECOMMENDATIONS FROM MEDICAL MEN

Coleman & Co. Ltd., Wincarnis Works, Norwich, England

141/W/67

When writing to advertisers, please mention this Journal.