

The  
**Madras Medical Journal.**

The Journal of the Madras Medical Association.

PUBLISHED QUARTERLY.

|           |               |        |
|-----------|---------------|--------|
| Vol. XIX. | January 1939. | No. 1. |
|-----------|---------------|--------|

**Bactero-Therapeutics—Recent Progress.**

BY DR. N. SESHADRINATHAN, M.B.B.S., D.T.M.,

*The King Institute, Guindy.*

Bactero-therapeutics aims at increasing the resistance of the host in bacterial diseases by either passive or active immunisation. In acute conditions active immunisation is not usually possible, as the tissues are considerably fatigued and are unable to react immunologically. Passive immunisation alone can be resorted to in acute conditions.

*Viruses.*—Rapid advances have been made in the study of virus diseases recently. Several diseases whose etiology has remained obscure have been proved to be due to viruses.

Living but modified virus is used for prophylaxis against virus diseases. Curative vaccine therapy has not been so far possible.

Really killed virus vaccines have been incapable of producing immunity response. The modification of the virus is effected by passage through animals, as in smallpox, by the use of chemicals or antiseptics, as in carbolised rabies vaccine, or by the cultivation in specially prepared chick embryo as in yellow fever.

The practicability of producing vaccine lymph in the laboratory instead of from the pustules on the calf has been amply demonstrated. It is likely that very soon vaccine lymph thus produced free from extraneous organisms may be available for general use.

In rabies no recent progress has been made. Semple's carbolised vaccine remains the method of choice for prophylactic vaccination. Anti-rabic serum has

not been successful in the treatment of rabies.

Protection against influenza is being attempted by injections of suspensions of influenza virus containing elementary bodies heated to 57°C. Anti-body production has been noted in the rabbits and even in human beings. Definite conclusions as to the efficacy of this therapy cannot be drawn until many hundreds of cases have been treated.

Acute anterior poliomyelitis is perhaps more prevalent in this country than is believed to be. Prophylactic vaccine therapy with attenuated virus has not so far been successful. The application of astringent solutions, such as 0.5 per cent alum and 0.5 per cent picric acid in physiological salt solution to the nasal mucous membrane is said to give protection during epidemics.

For other virus diseases prophylactic vaccine therapy has not been useful. Prophylaxis with convalescent serum is definitely of value in measles. Convalescent serum and normal human placental serum are now available in the market. It should be given within 3 to 5 days of exposure.

Convalescent serum should be obtained from blood taken not before and not later than 7 to 10 days after the temperature has become normal. The usual precautions should be taken against transmission of syphilis, tuberculosis and similar diseases. The dose is about 10 c.c. given intramuscularly. Normal adult serum

### *The Madras Medical Journal*

has been similarly used; but the dose is about 20 c.c.

Whole adult blood from the parent in doses of 25 to 50 c.c. given intramuscularly is a very handy prophylactic measure when convalescent or placental sera are not available.

#### *Therapeutic Sera in general.*

The use of therapeutic sera is now generally simplified. Concentrated sera of high potency are available in the market. The volume to be injected consistent with efficacy is now reduced considerably. But it is doubtful if serum reactions are correspondingly reduced. It is even recommended that unconcentrated sera are to be preferred for intravenous use. The use of anti-pneumococcal serum has not become popular in our country chiefly on account of the prohibitive cost of the serum. From a study of the preparation of antivenomous, anti-scorpion serum and antimeningococcal serum it is now clear that local venom and so also possibly toxins or bacterial strains obtained locally are to be preferred in the preparation of serum. This makes out a strong case for the manufacture of therapeutic sera in our country for local use.

The use of anti-streptococcal serum for erysipelas or puerperal sepsis is rapidly getting out of vogue after the advent of Prontosil and the various similar preparations.

It is now definitely admitted that with very large doses of

### *Bactero-Therapeutics—Recent Progress*

antitoxin, mortality in tetanus can be reduced considerably. The doses in recovered cases have ranged from 240,000 to 340,000 international units. The serum is given intravenously.

Anti-pneumococcal serum prepared formerly was associated with severe reactions. In Felton's serum the reaction producing substances have been removed without reducing the potency. The serum is given in doses of 10,000 to 20,000 units during the first 24 hours and continued in smaller doses until clinical improvement is evident. Anti-pneumococcal serum prepared from the rabbit has been found to be superior to that prepared from the horse owing to the special antigenic composition of the pneumococcus. This serum has not yet come into general use. For type-III pneumococcus we have a very efficient chemotherapeutic remedy in a sulphanilamide compound M. & B. 693. Another remedy is under trial in experimental mice. It is an enzyme extracted from a bacterium. Injection of this enzyme into mice infected with pneumococcus type-III has caused the capsule of the coccus to be destroyed and rendered it vulnerable to phagocytosis.

Improvement has been effected in the prophylaxis against diphtheria. The addition of alum (2 per cent) toxoid increases its efficacy. It has been found that a single dose of alum precipitated toxoid confers immunity in over 90 per cent of the cases. The immunity produced may persist

for years. For immediate prophylaxis anti-diphtheritic serum has to be given (1,000 units).

Nasal immunization for diphtheria is under trial. The method consists in instilling 10 drops of the standard toxoid in 3 weekly doses. In attempting active immunisation against tetanus the obstacle was the intense toxicity of the toxin. This has now been overcome by the action of formaldehyde on the toxin. Two injections of the toxoid 1 c.c. at an interval of 6 weeks produce sufficient anti-toxin titre to be effective against an infection. This method is being tried in the field. Perhaps the injections will have to be repeated periodically to ensure the maintenance of effective level of anti-toxin titre in the blood. Here again immediate prophylaxis is dependent on an injection of anti-tetanus serum.

The serum treatment of typhoid fever and plague is still under trial. But favourable reports are forthcoming on the use of anti-typhoid serum in the treatment of typhoid fever. The serum is prepared from a virulent strain of *B. typhosus*.

The infecting strains of meningococcus varies in different countries. The serum, therefore, must be prepared from local strains. The effect on the course of the disease is doubtful. Prontosil therapy together with intrathecal administration of anti-meningococcus serum has been reported to be very successful. The doses of prontosil are 0.8 per cent solution about 10 to 30 c.c. intrathecally, 70 to 150 c.c. intramuscu-

larly, and 2 to 3 gms. per day given as six doses up to a total of 20 to 70 gms. by mouth.

**Bacterial Vaccine Therapy.**—Bacterial vaccine therapy is still as nebulous as before. The initial boom manifested on the introduction of vaccine therapy has faded away and the pendulum has swung back. As an accessory to other lines of treatment it has real value. Properly applied, definite and quick response is obtained in many conditions.

**Prophylactic and Curative Vaccines.**—Prophylactic vaccines against cholera and typhoid fevers are resorted to with success on a large scale as public health measures. Besredka's oral vaccination based on his local immunisation therapy has not replaced inoculation although it is proved to be equally efficient. It is realised that the selection of the proper strains of organism and the method of preparing the vaccine have much to do in obtaining maximum protective value from the vaccine.

Anti-dysentery inoculation has not been popular on account of the high toxicity of the endotoxins. Formalisation of the vaccine has reduced toxicity without detriment to antigenic activity. This vaccine is still on trial and if successful, should prove of great value in asylums, jails, and other institutions.

No remarkable change has been effected in the use of plague vaccine. Two more methods of preparing the vaccine have been

described, one is by growing the cultures at 37.0°C.; the other is by treating the cultures with bacteriophage. The advantages over the usual method are not yet clear.

Curative vaccine therapy has made very little real advance recently. Different methods of preparing the vaccines have been introduced, such as detoxicated, defatted vaccines, lipo-vaccines (suspended in oily medium) bacterial extracts, and filtrates, autolysates, antiviruses, etc. Advantages are claimed by the authors for their own modifications. The doses have also varied widely with individual fancy. Standardisation of dosage does not appear to have been successful on account of the difficulty of measuring the extent of cure or benefit derived.

It has been shown by animal experiments that immune bodies can develop within two or three days after vaccine injection.

Certain vaccines such as streptococcal vaccine can be given intravenously and produce better results than when given subcutaneously. Typhoid and B. Coli vaccines produce severe reactions when given intravenously, even in smaller doses. Advantage is taken of this for the production of protein shock as a therapeutic measure in some diseases.

To stimulate specific immune bodies, non-specific vaccines or any foreign proteins, such as milk proteins, can be given. This form

—the basis of non-specific protein therapy. Recent literature as shown that acute rheumatism, rheumatoid arthritis and chorea all have their basic etiology in a streptococcal infection of the throat and tonsils. Streptococcal vaccine either autogenous or stock is indicated in the treatment of such diseases. The vaccine can safely be given intravenously. Slight reactions sometimes occur but they do not interfere with immune body production.

Since the advent of chemotherapy of bacterial infections with Prontosil preparations it may be feared that vaccine therapy may recede to the back-ground. It is not likely to be so; for the efficient action of prontosil products, an initial anti-body response has to be started with one or two doses of the specific vaccine.

Toxoid prepared from staphylococcal toxic filtrates provokes a more satisfactory immunity in rabbits than the bacterial vaccine. It should be presumed that toxoid can be profitably used in the treatment of staphylococcal infections in man.

Opinions with regard to the use of prophylactic and curative pertussis vaccine are conflicting. The reason is that the freshly

isolated strains which belong to Phases I and II gradually deteriorate into those of Phases III and IV. The vaccines commonly used consist of the degenerated stock strains which are ineffective. Freshly isolated strains should be used for the vaccine preparation. Recent work on the toxin of the pertussis bacillus has shown that the characteristic whoops are due to a sensitisation with the toxin. It has been shown that rapid amelioration of symptoms can be obtained by desensitisation with a solution of the toxin prepared *in vitro*. Commercial organisations will not be slow in putting a product on the market.

The use of what is called the B. G. G.-Vaccine for preventing tuberculosis is still on trial. In spite of the long period of time which has elapsed since its introduction the method has not become popular on account of the potential of the avirulent bacillus taking on virulence spontaneously. The use of tuberculin continues to be of value in localised lesions such as bone or gland tuberculosis and to inflammatory lesions of the eye.

[No claim to originality has been made in this paper, since it is only a collection of the latest ideas on bacterio-therapy from recent literature]

## Digitalis and Quinidine in the Treatment of Fibrillation and Flutter.

BY M. D. ANANTHACHARI, M.B.B.S.,  
General Hospital, Madras.

### Introduction

Since the time of William Withering digitalis has been known to be efficacious in the treatment of cardiac oedema of the congestive type. Like all new drugs, it had its early stage of boom and indiscriminate use; later its shortcomings and dangers were realised and now it has earned a permanent place in the pharmacopoeia. There it remained unchallenged, until recently quinidine was discovered to be useful in that type of heart failure where digitalis enjoyed unique success, namely, auricular fibrillation. The new drug quinidine was hailed as a specific for auricular fibrillation superior even to digitalis, till after extensive but indiscriminate and misdirected use, it too had its therapeutic scope and efficacy exactly defined. As a result of experience with these drugs in treatment, it is now realised that both have their proper place in the treatment of auricular fibrillation. Their action in fibrillation is such that a correct choice in a particular instance will depend upon the proper evaluation of the many factors which enter into the etiology and pathogenesis of auricular fibrillation. It is the

purpose of this paper to discuss these factors.

### Digitalis and quinidine: how each acts on the heart mechanics

Digitalis produces its action on the heart in two different ways. It has its effect on the nervous and muscular mechanisms which initiate and maintain the heart beat, represented by the vagus and the sensitive bundle of His. In addition, digitalis has a direct action on the heart muscle, apart from that on the conducting tissues.

Its predominant action is that through the vagus; to a less extent by its effect on the bundle of His; only very slightly does it act on the heart muscle itself when not in toxic doses. Its action on each of the three types of cardiac muscle, the auricle, the conducting tissue and the ventricle is different. Expressed in tabular form, digitalis affects the heart by:

(1) Stimulation of the vagus resulting in

(a) slowing of the pacemaker at the sino-auricular node;

### Digitalis and Quinidine

(b) SHORTENING of the refractory period of the AURICLE;

(c) depression of the conductivity of the conducting tissues (bundle of His).

(Note.—Very little action on the ventricles.)

(2) Direct depressant action on the conducting tissues.

(3) Direct action on the muscle fibres causing,

(a) increased strength of the systole, in small doses, according to some;

(b) PROLONGATION of the refractory period of the auricles; and

(c) irritability of the ventricular muscle with a tendency for ectopic beats (when given in large and toxic doses).

The effect on the refractory period of the auricles through the vagus and by direct action are antagonistic while, whether through the vagus or by direct effect, the bundle of His is depressed with a slowing of the ventricular action. Digitalis however acts predominantly through the vagus.

Quinidine exercises the following actions on the heart:—

(1) Partially paralyses the vagus (with exactly the opposite results of digitalis).

(2) There is a depression of the conductivity of all tissues of the heart: auricle, bundle and ventricle.

(3) Depresses the sino-auricular node.

(4) Lengthens the refractory period of the auricles.

(5) Slows the rate of auricular contraction, probably through the action on the sino-auricular node.

### Circus Movement

The one reason for digitalis earning the pride of place in therapeutics is its efficacy in heart failure associated with auricular fibrillation. For similar action has quinidine come into prominence. It is therefore necessary to have a clear conception of auricular fibrillation and flutter in the pathogenesis of heart failure with all its clinical manifestations, in evaluating their relative merits.

The conception of 'circus movement' has greatly assisted in the understanding of the two conditions of disturbed cardiac rhythm, auricular fibrillation and auricular flutter. The term 'circus movement' is used to describe the wave of impulse which travels continuously round and round in one direction. In the two conditions, fibrillation and flutter, the auricle instead of contracting on its contents as normally, fails to contract at all. Instead there is noticed an irregular fibrillary twitching movement of the muscle fibres with no co-ordinated contraction of all the fibres at the same time. The auricle quivers instead of contracting. The fibrillary twitches either pursue an irregular zigzag

course in the auricular wall or go round and round the tissue joining the mouths of the venæ cavæ. To understand how this phenomenon is produced in the auricular muscle an idea of what happens to the contractile auricular muscle under experimental conditions, is necessary. Two of the properties of cardiac muscle, refractivity and conductivity are involved in this experiment. Refractivity is that condition of the cardiac muscle when an impulse fails to provoke a contraction. It is 'relatively refractory' immediately after a contraction when minimal stimuli fail to evoke a contraction but when strong stimuli are effective. When the muscle completely recovers it is excitable. Conductivity is an inherent property of the heart muscle especially developed in the bundle of His and the Purkinje fibres whereby, like what happens in nerve tissue, an impulse is propagated undiminished from tissue to tissue. It is a very stable property and when it is depressed the fibres are probably on the verge of death.

The auricles when stimulated at rates between 250 and 300 per minute pass into a "partially refractory state". Some fibres are responsive and others are not at any given moment. At greater rates of stimulation, e.g., 450 per minute, the refractory period is increased and is longer than the interval between any two stimuli with the result that 2:1 response of the auricles results and the auricle contracts only to alternate stimuli. For conduction of

an impulse it is necessary that the excitation process must meet responsive tissue in front of it.

If a ring of muscle be stimulated at a point, impulses travel in both directions simultaneously and meeting one another are abolished as they become faced with unresponsive tissue in front of them when they meet. If the rate of stimulus production is increased, just before the critical rate when there is 2:1 response, a 'partial refractory' state develops, when certain parts have gained responsiveness and others are refractory. In such a state, the impulse at a point on the ring will find its way blocked in one direction but not in another. The result is that the impulse travels in one direction only and by the time it reaches the point where the tissue was refractory, it finds the same responsive, its refractory period having passed off. Thus the impulse tends to go round and round the ring. When this state of affairs develops and when the impulse which has set the wave of contraction going in only one direction is not followed by another, a circus movement is established.

Let us consider the effect of changes in the conductivity and refractivity on the established circus. If the rate at which the impulse is conducted is reduced, i.e., when the wave of contraction travels slowly, there is more time for the unresponsive refractory tissue to recover and the wave is likely to meet continuously responsive tissue before it. On the contrary if the rate of

conduction is increased, the wave travels faster, there is less time for the muscle to recover; the wave meets refractory tissue and is abolished.

If the refractory period, with a given rate of conduction, is increased, the effect will be to abolish the impulse while on the contrary if the refractory period is diminished, the muscle is ready to contract earlier and the impulse is propagated and maintained. Thus the circus is maintained by:—

(a) diminished conductivity (slow rate).

(b) diminished refractory period (short period).

(c) longer path.

And it is abolished by:—

(a) quicker conduction.

(b) longer refractory period.

(c) shorter path.

When circus is established in the auricles, the heart fails to act as an effective pump and the circulation of the blood is disturbed. So long as the bundle of His is healthy and the rate of impulses from the auricles is within its capacity for conduction, it transmits the impulses and the ventricle contracts for each auricular twitch reaching it in the early stages. The ventricle begins to contract at a rate which soon exhausts it for two reasons. On account of its shortened diastole, the ventricular filling is poor and for the same reason the supply of blood to the ventricular muscle through the coronary

arteries is diminished. In consequence the circulation fails.

The establishment of the circus movement either in the form of auricular fibrillation or flutter soon results in congestive heart failure with engorged veins, peripheral œdema, ascites and enlarged liver. This is exactly the stage in which the digitalis effects its miraculous cure.

#### Treatment

How can this state of the heart be set right? In answering this question lies the choice between the two drugs, digitalis and quinidine.

The first consideration will be to restore the chaos in the auricle to order. This is what quinidine treatment aims at. It attempts to diminish the rate of circus in the auricle to something when the circus will be abolished. As has already been stated, it is only at high rates of stimulation between 250 and 300 that the necessary state of partial refractoriness is developed. When the rate falls below this level it is impossible for circus to occur.

This eminently desirable state of affairs may not be capable of achievement in which case one fails to cure fibrillation. But it is still possible to make the heart act as an efficient pump, capable of maintaining the circulation satisfactorily, ignoring the circus in the auricles. This is what is attempted by treatment with digitalis. Instead of setting right the condition of the auricles, treatment with digitalis attempts

at setting the circulation satisfactory.

Herein is the difference in the scope of treatment between quinidine and digitalis. What cannot be cured by quinidine has to be set right by digitalis. Thus the cure of auricular fibrillation and flutter in the sense that the circus will be abolished is possible with quinidine treatment. The number of instances of cardiac pathology where the restoration of the cardiac rhythm to normality is possible is limited indeed, and success with quinidine treatment is limited to these cases only. In all other instances, as circus cannot be abolished, the incorrigible auricles are ignored totally and the ventricles are tuned up to satisfactory circulation.

**Quinidine Treatment.**—The relevant actions of quinidine on heart muscle are depression of the conductivity of all the tissues and the increased refractory period of the auricles. It has little or negligible action on the vagus. By its depressing action on conductivity circus is maintained, and by increasing the refractory period it tends to abolish the circus. On which of the two actions predominates, success or failure depends. It is not surprising therefore that there is only 50 per cent cure with quinidine treatment.

Let us consider what happens in a case of flutter or fibrillation when the quinidine is acting favourably. At the outset the auricles are probably fibrillating

between 350 to 400 times per minute. The A. V. node is transmitting the maximum of such impulses that is within its capacity to conduct, *i.e.*, about 270 impulses per minute. The ventricles are therefore contracting at the very high rate of about 150 to 200 per minute, with a partial block in the bundle of His. As the refractory period increases, the auricular rate is gradually tending to diminish. It gets less and less till it is just within the capacity of the A. V. node and the bundle to transmit. That is, there is a tendency for the auricular rate to fall and for the ventricular rate to rise. It is so, particularly in those cases where the bundle of His is healthy. A stage will be reached when the bundle will pick up every twitch of the auricle. This stage is critical. After this both the auricular and ventricular rates fall simultaneously till normal rate is established and fibrillation stops. Before this happens it is just possible that there may be a standstill of the whole heart before the sino-auricular node takes up its function as pacemaker.

The danger of quinidine treatment lies in this critical stage, when the auricular rate is reduced sufficiently to be within the capacity of the conducting tissues to transmit. At this stage with a rising ventricular rate the clinical condition of the patient will be aggravated and fatal heart failure may result.

In those cases where the quinidine fails to have effect on the

### Digitalis and Quinidine

refractory period no cure can be expected.

For cure with quinidine certain conditions are necessary. If the etiological factor has damaged the heart muscle to such an extent that the normal conditions cannot be restored, quinidine will fail. If the condition of fibrillation has long been in existence before treatment is started, it is not likely that normal rhythm will be established. For success in treatment a very careful selection of cases will have to be made. Points for consideration are: (1) The duration of the condition before treatment; if less than a month, 50 per cent of cases succeed; if less than two months, 25 per cent, and if more than six months, no cases retain normal rhythm after treatment. (2) Etiology.—of favourable etiology, in order are goitre, rheumatic fever without valvular disease, hypertension and mitral stenosis without heart failure. (3) Size of the heart—enlarged hearts are not favourable.

Very suitable cases where quinidine should invariably be tried are those where there is no heart failure, where the heart is only slightly dilated and where fibrillation has been for less than a month. Unsuitable ones are those where rest has had no effect on the condition and where the fibrillation has been long standing. These standards must be strictly observed in cases of fibrillation from mitral stenosis: least attention need be paid if fibrillation is due to goitre (Campbell and Gordon, 1936).

**Dosage and manner of administration.**—Two methods are advocated:

(1) Test for sensitivity for quinidine with 5 grs. in a cachet or acid mixture. Count the apex rate (not the pulse) one hour later. If it is over 150 per minute or when there are no complaints of headache or nausea, give 30 grs. in six doses of 5 grs. each on the following day at two hourly intervals. Count the apex rate hourly and see if the rhythm returns to normal or if it is above 150. If the normal rhythm is established stop the quinidine that day; if not, continue the same dose of 30 grs. per day for the second and third days. If still refractory substitute digitalis till apex rate comes down to 80 per minute. Then stop digitalis and repeat quinidine for another three days. If after the third course of quinidine treatment fibrillation persists, attempts to cure fibrillation may be given up.

The patient should stay in bed during treatment and for a week after restoration of normal rhythm, and should then get up gradually for lengthening periods for fear of embolism. During this time it is advisable to give 10 to 15 grs. of quinidine daily as a maintenance dose. It should be continued until the patient is living his normal life.

(2) For this method less toxic effects are claimed. Give 5 grs. of quinidine on the first day, 10 grs. on the second day and so increase the daily dosage until a maximum of 30 grs. has been reached. This is continued for two

to three days unless the rhythm has become normal.

Some prefer to bring the patient under the effects of digitalis before starting quinidine and find that less of it is then required. A preliminary course of digitalis is advisable if the ventricular rate is high. This would appear essential to overcome that critical period already mentioned, where the auricular rate is falling and the ventricular rate is rising. The earlier treatment with digitalis establishes a certain amount of bundle block and the critical period is tided over.

The dangers in quinidine treatment are (1) aggravation of the existing heart failure with increasing ventricular rate and fatal results; (2) embolism from clots in the fibrillating auricle which has been made to contract; and (3) sensitivity to quinidine.

**Digitalis Treatment.**—Digitalis treatment does not attempt at restoring the normal rhythm though this may sometimes happen. It aims at making the circulation efficient. As the action of digitalis is normally through the vagus, it will be seen that with the shortening of the refractory period of the auricle there will be a tendency for the perpetuation of the circus movement. But the main effect sought by dosing with digitalis is to produce a block in the conducting tissues so that not all the auricular twitches are transmitted. In result, instead of a rapid irregular, ineffectual and exhausting ventricular tachycardia there

will be a fairly regular, effective, slow and purposeful ventricular activity. Many of the weak impulses from the auricles are cut off by the block induced; the heart's action becomes slower; there is ample diastolic time for better filling of the ventricle and better nourishment of the heart muscle. With increased efficacy as a pump the signs of heart failure disappear although the auricles continue to fibrillate.

The clinical improvement therefore is mainly due to slowing of the apex rate though the irregularity is not abolished. In cases of flutter, digitalis converts it into fibrillation and maintains it though clinical improvement of the circulation is achieved by slowing of the heart rate. The main effect of digitalis lies in slowing of the ventricular rate. Obviously in cases of heart failure with slow rhythm digitalis can do little good. Any improvement in such cases will probably be by its direct action on the muscle fibres with increased strength of the systole.

Digitalis treatment is therefore for all cases of heart failure with rapid ventricular rate, whether it be due to auricular fibrillation, flutter, paroxysmal tachycardia, or even febrile and toxic tachycardia. Inasmuch as it ignores the etiological factors, its use becomes widened in contradistinction to the narrowed field of utility of quinidine. The indication for digitalis is the diagnosis of congestive heart failure, whatever its cause.

It is not necessary to give details of various preparations of digitalis nor the manner of administration. Dangers in digitalis treatment are few unless the dose is poisonous. Contraindications are cases of ventricular irritability either toxic or coronary in origin and heart block.

In cases of auricular fibrillation digitalis may have to be continued for ever. If the fibrillation of the auricles has not been abolished, the check on the bundle has to be maintained continuously with adequate doses of digitalis.

What has been outlined happens in the majority of cases. In a few instances, however, digitalis may act predominantly on the auricular muscle (directly instead of through the vagus) with prolongation of the refrac-

tory period, in which case circus movement will be arrested and heart restored to normal rhythm just like quinidine.

### Conclusion

Quinidine and digitalis have both their proper places in the therapy of auricular fibrillation and flutter. Permanent cure is more likely possible with quinidine but selection of cases will have to be stringent and quinidine therefore is of limited use. On the contrary digitalis rarely cures fibrillation but is definitely of use in treatment of heart failure. Quinidine is curative and digitalis palliative so far as auricular fibrillation is concerned.

### REFERENCES.

- East & Bain. "Recent advances in Cardiology," 1936.  
Campbell M. & Gordon, E. W. (1936). Quart. Jour. Med., April, 205.  
Sampson Wright. "Physiological principles in treatment," 6th Edn. 1937.

## A Review of Acute Abdominal Emergencies in the Government Victoria Caste and Gosha Hospital during the years 1936-38.

EBENEZER MADURAM, M.B.B.S., F.R.C.S.E., M.R.C.O.G.

The Government Victoria Caste and Gosha Hospital holds a unique position among the Government Medical Institutions in the City of Madras in that it serves within its portals women suffering from medical and surgical diseases in addition to the large number of obstetrical and gynaecological patients. The following is an analytical review of cases of acute abdominal emergency that came into this Hospital during the past three years, where the diagnosis was clearly established after laparotomy, to show the variety of cases handled and to see what inferences can be drawn from them.

The greater number of these were operated on within 24 hours of admission and in the rest a delay of two or three days was found necessary to make sure of an abdominal crisis necessitating laparotomy. The total number of cases so operated on was 145, a few more might have been added to this number, but they were either moribund on admission, or they refused operation and left the hospital "against medical advice". As the diagnosis cannot be given with any degree of certainty in these cases, they are

not included in this series. Of the total of 145 cases, 39 were caesarean sections and I do not propose to include them also in this discussion.

The present series includes only the 106 cases of gynaecological and surgical emergency. Of these 36 were performed for accidents in the generative organs while 70 were of a surgical nature. The first point to note then is that although in a hospital of this sort the leisurely planned operations in the gynaecological field are far in excess of those of general surgery, yet in the matter of abdominal emergency the surgical crises constitute nearly two-thirds of the total number.

Going into details of the analysis the gynaecological emergencies are distributed as follows:—

|                                                          |    |
|----------------------------------------------------------|----|
| Ruptured uterus                                          | 14 |
| Ectopic gestation                                        | 12 |
| Twisted Ovarian Tumour                                   | 5  |
| Acute Salpingo Oophoritis                                | 1  |
| Acute Salpingo Oophoritis }<br>with acute appendicitis } | 4  |
|                                                          | —  |
|                                                          | 36 |
|                                                          | —  |

### Acute Abdominal Emergencies

15

At a superficial glance it seems obvious that next to caesarean section, *ruptured uterus* forms the largest group of abdominal accidents that fall to the lot of the obstetrician and gynaecologist to deal with. One may feel inclined to think that 14 cases of ruptured uterus in three years is too large a number for even an institution that has handled a total number of more than 10,000 labour cases in the three years. But it is really due to better recognition of these cases and dealing with them, many of the cases that formerly used to be treated as peritonitis and peritonism on the second and third day after a difficult labour with distension, etc., are now being recognised as ruptured uteri. The dramatic rupture after prolonged and obstructed labour with the foetus and placenta delivered into the peritoneal cavity are easy enough to recognise. Here apart from the ease with which the foetus can be palpated under the abdominal wall and an absence of the foetal heart and general signs of collapse, the other signs are a disappearance of the presenting part from within the cervical canal, and the palpation of a firm contracted mass just above the symphysis pubis which stands separate from the foetus. If one is quite sure that labour has terminated into the peritoneal cavity, an injection of 5 c.c. of pituitrin or pitocin not only helps to keep the uterus well contracted and so arrests bleeding until the patient and the operation theatre can be got ready for the operation, but also clinches the diagnosis in that the

mass mentioned above alternately contracts and relaxes showing it to be the empty uterus. The ones that are really difficult to diagnose are those where the rupture is extraperitoneal in the lower segment rubbing into the broad ligament, the so-called "silent rupture". So a careful examination should be made as a routine in all cases of prolonged labour ending in a difficult forceps delivery or version, particularly if there has been any difficulty in the delivery of the placenta.

Many of our cases had been ruptured outside and recognised within a few hours of admission. In three cases only the rupture took place in hospital where the patients had been brought in with a tonically contracted uterus and labour had to be terminated by internal podalic version or by application of forceps. Of the fourteen cases nine were treated by suture of the rent and drainage of the peritoneal cavity. There were five deaths in this group making a mortality rate of 55.6 per cent in these cases because of the difficulty of introducing a drainage tube into Douglas' pouch round the uterus which is almost near the umbilicus. We invariably close the middle line incision and put in two drainage tubes through two lateral incisions along the outer border of the recti muscles just above the inguinal ligaments. The remaining five cases were treated by Hysterectomy, total or partial, according to expediency, and of these two died. That makes a mortality rate of 40

per cent. The mortality rate is high in both so that there does not seem to be much to choose between the two alternative lines of treatment. The high mortality rate is not surprising considering the fact that the patients are already exhausted by prolonged labour and they have all been handled either by untrained hands in the house or by manipulative or instrumental delivery in the hospital.

The next largest group of gynaecological emergencies comprises *Ectopic gestations*. During the three years under review all the ectopic gestations were in the Fallopian tubes. Of the twelve cases operated upon seven were in the right tube, four in the left, and one had bilateral ectopic gestation; three were tubal abortions and the rest tubal rupture. Excepting one whose case sheet cannot be traced and whose date of discharge has not been entered in the operation register, the remaining eleven left Hospital alive. That is a point worth noting, for one is usually led to consider an accident to a tubal pregnancy, a very serious emergency. It certainly is. Any one who is familiar with the blanched condition of these patients and seen the abdominal cavity flooded with liquid blood or dark clots cannot fail to be impressed with their serious condition and yet you remove the offending tube, do a peritoneal toilette and replace the fluid lost and these patients come round remarkably well. It is probably because there is no element of toxæmia added to the accident. It seems

very evident then that a ruptured uterus during labour is a far more grave accident in that the mortality rate is very high even after operation.

*Twisted Ovarian Tumours*. Only five of these have been operated on during the past three years, of which four were cysts and one a solid tumour. It is quite possible that some who were advised operation refused and quit the Hospital. Again all the five operated on have been cured. *Acute salpingo Oophoritis and Pyosalpinx* cases have been practically eliminated by us from the field of emergency operations, for apart from the fear of infecting the general peritoneal cavity with either gonococci or streptococci and losing the patient from general peritonitis, and causing damage to adherent intestines which are soft, vascular and extremely friable, even the ones who survive have tedious and stormy convalescence with infection of abdominal wound and sinuses. We find we get very good results on conservative lines of treatment. Even when patients come with pelvic masses reaching up to the umbilicus, the masses go down rapidly with radiant heat, milk or aolan injections, hot douches and ichthyol glycerin plugs, etc. The only surgical treatment given to these is incision and drainage of abscesses when they came very near the surface in the posterior fornix or abdominal wall.

For streptococcal infections we have the aid of chemotherapy now in addition to the lines of treatment mentioned above.

*Surgical Emergencies.*  
Purely Surgical Emergencies are classified as follows:—

|                                        |    |
|----------------------------------------|----|
| I. Accidents arising from the appendix | 26 |
| II. Intestinal obstructions...         | 30 |
| III. Other miscellaneous group         | 14 |
|                                        | 17 |

As the appendix is by far the commonest of any one offending organ I shall deal with it first. The cases dealt with here comprise only those fulminating and very acute cases which were operated on within a few hours of admission; they are distributed as follows:—

|                                                         | Number operated upon. | Deaths. | Mortality rate. |
|---------------------------------------------------------|-----------------------|---------|-----------------|
| (i) Fulminating appendicitis with general peritonitis   | 11                    | 4       | 36%             |
| (ii) Acute appendicitis but without general peritonitis | 8                     | ...     | ...             |
| (iii) Empyema of appendix                               | 3                     | ...     | ...             |
| (iv) Appendicular abscess needing immediate drainage    | 4                     | 2       | 50%             |
| Total                                                   | 26                    | 6       | 23%             |

No deaths have occurred in groups (ii) and (iii), proving the well-known fact that fatal results are only likely to occur when there is infection of the general peritoneal cavity or when there is an abscess formed. I have noticed that often the fulminating types of appendicitis occur in an epidemic form. During the Christmas season of 1936 and early January of following year there were four such cases within a month. In all the three cases of Empyema of the appendix the organ was found free from any adhesions. What might have happened if they had perforated might easily be left to the imagination.

Since the opening of H. R. H. The Prince of Wales' Hospital for Children two years ago, only

two cases of appendicitis have been operated on and both were perforated ones with general peritonitis and free pus in the peritoneal cavity. One of them died the day after the operation, the other is very well and often attends the out-patient department for minor ailments. I have never seen pus squirting under pressure from the abdominal cavity of any adult patient as I have seen in these two children, eight and ten years of age.

Now we come to the most varied but most urgent of all surgical emergencies—that of intestinal obstruction. Eighteen of these occurred in adults and 12 infants have had colostomy for *imperforate anus or rectum*. The need for an immediate operation is even greater than

in adults for the delay of even a few hours is detrimental to the recovery of the infant, especially when they are brought in more than 24 hours after birth. We encounter every variety of congenital malformation described in text-books. In many cases the rectum is low down and readily found or there is only a septum between the anus and rectum which needs perforation and dilatation. In every case a thorough exploration is done in the lower region, and in every case a separate tray of instruments is kept ready for colostomy in case the exploration proves futile. Babies who have had colostomy fare very badly on the whole. Two case sheets cannot be traced and out of the remaining ten, six died. They die either of shock within 24 hours of the operation, or peritonitis in two or three days, or wound infection and necrosis of abdominal wall during the second week. Even the few who leave the Hospital alive at the end of a month with the colostomy opening functioning satisfactorily, invariably return in a few weeks or months either in a marasmic condition or of lung complications and die eventually. We have at the present moment in the H. R. H. The Prince of Wales' Hospital for Children one such child born on 22nd April 1938 and who had colostomy performed the same day still living and in a thriving condition, because she has never left the Hospital and every complication she develops is promptly attended to.

The 18 cases of *intestinal obstruction in adults*, cover almost

every type described in text-books. They are classified as follows:—

|                                         |     |    |
|-----------------------------------------|-----|----|
| Internal strangulation by bands         | ... | 5  |
| Intussusception                         | ... | 3  |
| Volvulus                                | ... | 2  |
| External Strangulation in a hernial sac | ... | 6  |
| Obstruction by tubercular stricture     | ... | 2  |
|                                         |     | 18 |

When one considers the usual high mortality that attends these cases, it is a matter for congratulating ourselves that only two out of the 18 cases died. Two of these had resection of gangrenous loops of bowel and anastomosis, and I am glad to say both were cured. The two who met with a fatal end are—a case of volvulus of small intestines who must have developed gangrene or peritonitis even after the untwisting, and a case of obstruction due to an advanced tubercular caecum whose condition only allowed of drainage of proximal loop with Paul's tube.

*Internal Strangulation by bands* was a common accident in our series, three of whom had bands constricting ileum and two had bands arising from gall bladder area and kinking the hepatic flexure and transverse colon. *Intussusception*, though said to be rare in adults, was met with in three adults one of whom was as old as fifty years and had symptoms typical of bacillary dysentery until the lump was

palpable. She was operated on three years ago and is very fit. In two years of the opening of the Children's Hospital I remember only one child of two years diagnosed as intussusception, but the mother fled with the child as soon as an operation was suggested. All the three cases in adults were of the ileo-caecal variety and all left the hospital alive. They were all subacute in type, with no gangrene and easy of reduction. In none of them was a tumour noticeable.

Of the two cases of *volvulus* one was in sigmoid colon and the other in the small intestines. The latter died as mentioned above. In this connection I cannot help quoting a patient very well known to all the senior staff of our Hospital, who was operated on for volvulus of the sigmoid colon four times on four consecutive years, each time in the summer months between June and August. Each time the sigmoid loop used to distend with gas to the size and colour of a large ovarian cyst, but rise up like a balloon under the left cupola of the diaphragm. Every time she was advised to have a radical operation in the interval but we never saw her again until the next acute attack. Finally in the summer of 1934 when she came in for the fourth time I took the risk and resected the large baggy loop of sigmoid and did an end-to-end anastomosis after untwisting. She had an uneventful convalescence and left the hospital alive and we have not seen her since.

*Strangulation in an external hernial sac* was found in two cases of inguinal hernia, three cases of ventral hernia and one in an umbilical hernia. The strangulation in umbilical and ventral hernia is interesting in that they are not commonly said to occur, owing to the wide patency of the rings. Strangulation in these hernias does occur by bands and adhesions which are extremely common in them, and in the ventral hernia known as epigastric hernia of the linea alba strangulation is very common due to the dense fibrous margins of the gap in the linea alba.

*Obstruction by tubercular stricture* was found in one case at the caecum and in the other also it was close to the ileo-caecal junction.

The miscellaneous group of abdominal emergencies is classified as follows:—

|                                                                |     |    |
|----------------------------------------------------------------|-----|----|
| (i) Peritonitis of unknown origin                              | ... | 8  |
| (ii) Perforation of ventral hernia with prolapse of intestines | ... | 3  |
| (iii) Foreign body in the peritoneal cavity                    | ... | 1  |
| (iv) Suppurating hydatid cyst of liver                         | ... | 1  |
| (v) Perforated gastric ulcer                                   | ... | 1  |
|                                                                |     | 14 |

There have been eight cases of peritonitis of unknown origin. In

many of them the condition was so bad that a proper exploration could not be carried out, so that a quick laparotomy and drainage were all that could be justifiably done under the circumstances. Of the eight, three died. Some were suspected to be caused by criminal abortions, but when we are certain of the cause we leave them alone, for surgical interference invariably kills them. Treated on conservative lines they do better.

Of the other miscellaneous types of surgical emergencies I need mention only one type which usually does not find its way into text-books and that is *ulceration and perforation of the sac of a ventral hernia with prolapse of gut*. We have had three such cases in the three years under review, so it has to be recognised as a clinical entity. This accident

occurs in post-operative ventral hernia in woman, the coverings of which undergo extreme thinning out in succeeding pregnancies. The skin hangs in thin, alternated loose folds, and by friction undergoes ulceration and perforation. Intestines or omentum may protrude. Treated promptly they do well and herniostomy is done at the same time. The case of perforated gastric ulcer was sealed off, by adhesion with the abdominal wall. She had the ulcer invaginated and gastro-enterostomy was performed and she did well.

My thanks are due to Dr. Lazarus for giving the permission to publish records of her cases as well as mine, to Dr. (Mrs.) Chellamma Nilakantan and Dr. Rajeswari for their help in tracing case sheets and in tabulating the cases into groups.

# MORE BIRTH ANNOUNCEMENTS HEADQUARTERS, CLARKSON GENERAL HOSPITAL OMAHA, NEBRASKA

December 16, 1935

## SPECIAL BULLETIN :

No. 2

1. All channels were cleared for a brief interval at 11-25 p.m. to-day to permit the arrival of Recruit Gary Lee Aagesen.

2. At the above time our Chief of Staff, fired and fell back exhausted. However, her gallant aide-de-camp, Dr. Charles Moon and Capt. W. J. Aagesen, carried on from this point in true military fashion. The scars of battle were rapidly repaired and the noisy recruit reported for duty, weighing 6 lbs. and 3 ozs.

3. After a ten day conditioning period the new arrival will be turned over to his

Chief of Staff and her aide-de-camp for further guidance and training at Fort Aagesen.

4. The general policy of the Corps Area in regards to the curtailment of new recruits in the future will go into effect immediately according to an announcement from the Chief of Staff, G. H. Q.

(Signed) General Stork, I. Bringem,  
Commanding.

-J. A. M. A.

## Neurological Cases—An Analysis of 440 Cases.

G. V. SATYANARAYANA MURTI, M.D.,

Medical Registrar, King George Hospital, Vizagapatam.

The study of neurology is still in its infancy in India. This lack of interest is most probably to be attributed to the unfortunate belief prevalent among the laity as well as the profession that the amount of labour expended in the diagnosis of the nervous cases is not commensurate with the benefits derived by the patients from treatment. This belief is of course baseless. One has to quote the brilliant results achieved by Surgery in the field of tumours of the brain and spinal cord to refute such an unwarranted belief. There is another group of neurological cases which are very amenable to treatment—the neurosyphilitics. Here early diagnosis and proper treatment will forestall many an incurable later condition. The recent advances in chemotherapy have made the prognosis of meningitis more hopeful. A good number of neurological cases owe their origin to heredity. A careful study of these diseases will throw a flood of light on the prevention of such diseases by prohibiting marriage and undertaking suitable legislation. Neurological cases are sufficiently frequent in our clinics to merit close study but there are only a few articles on neurological subjects in Indian medical literature. What is urgently required is their statis-

tical study. At present no statistics are available even as to the prevalence of the common neurological cases. Statistics will focus the attention of workers on the predominant type of neurological cases and their study, prevention and cure. This article is an attempt to present an analysis of 440 neurological cases, studied in the in-patient department of the King George Hospital, Vizagapatam, during the years 1935, 1936, 1937. The total number of admissions were 5,537, and of these 440 were neurological. This gives a percentage of nearly eight of the total admissions. It must be mentioned that these statistics do not give a correct idea of the incidence of neurological cases. Many cases are refused admission for want of accommodation or for the reason that the disease has so far advanced that no useful treatment can be given.

### 1. Inflammations:

|                           |        |
|---------------------------|--------|
| Meninges:                 |        |
| Tuberculous               | ... 2  |
| Pneumococcal              | ... 3  |
| Others                    | ... 3  |
| Brain:                    |        |
| Encephalitis              | ... 5  |
| Post encephalitic sequelæ | ... 13 |
| Diss. sclerosis           | ... 0  |

|                                    |                                                                                                                                                                                                                                                                                                                                                  |     |  |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--|
| Extrapyramidal:                    |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Chorea                             | ...                                                                                                                                                                                                                                                                                                                                              | 5   |  |
| Spinal cord:                       |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Ant. poliomyelitis                 | ...                                                                                                                                                                                                                                                                                                                                              | 2   |  |
| Myelitis                           | ...                                                                                                                                                                                                                                                                                                                                              | 0   |  |
| Periph. Nerves:                    |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Neuritis                           | ...                                                                                                                                                                                                                                                                                                                                              | 204 |  |
| 2. Syphilis of the Nervous System: |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Cerebral:                          |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Meningitis                         | ...                                                                                                                                                                                                                                                                                                                                              | 3   |  |
| Endarteritis                       | ...                                                                                                                                                                                                                                                                                                                                              | 19  |  |
| Cranial Nerves                     | ...                                                                                                                                                                                                                                                                                                                                              | 10  |  |
| Spinal:                            |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Acute Meningo-myelitis             | ...                                                                                                                                                                                                                                                                                                                                              | 8   |  |
| Chr. Meningo-myelitis              | ...                                                                                                                                                                                                                                                                                                                                              | 24  |  |
| Cerebro-spinal                     | ...                                                                                                                                                                                                                                                                                                                                              | 8   |  |
| Tabes dorsalis                     | ...                                                                                                                                                                                                                                                                                                                                              | 2   |  |
| G.P.I.                             | ...                                                                                                                                                                                                                                                                                                                                              | 0   |  |
| 3. Vascular Disease:               |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Thrombosis                         | ...                                                                                                                                                                                                                                                                                                                                              | 18  |  |
| Hæmorrhage                         | ...                                                                                                                                                                                                                                                                                                                                              | 6   |  |
| Embolism                           | ...                                                                                                                                                                                                                                                                                                                                              | 0   |  |
| Aneurysm                           | ...                                                                                                                                                                                                                                                                                                                                              | 0   |  |
| Anterio-sclerosis                  | ...                                                                                                                                                                                                                                                                                                                                              | 0   |  |
| 4. Degenerations:                  |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Progressive muscular atrophy:      |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Atrophic type                      | ...                                                                                                                                                                                                                                                                                                                                              | 14  |  |
| Bulbar type                        | ...                                                                                                                                                                                                                                                                                                                                              | 6   |  |
| Cerebral Diplegia                  | ...                                                                                                                                                                                                                                                                                                                                              | 5   |  |
| Cerebellar ataxias                 | ...                                                                                                                                                                                                                                                                                                                                              | 2   |  |
| Sub-acute combined degeneration    | ...                                                                                                                                                                                                                                                                                                                                              | 2   |  |
| Paralysis agitans                  | ...                                                                                                                                                                                                                                                                                                                                              | 2   |  |
| 5. Tumours:                        |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Brain:                             | ...                                                                                                                                                                                                                                                                                                                                              | 3   |  |
| Spinal cord                        | ...                                                                                                                                                                                                                                                                                                                                              | 2   |  |
| 6. Of unknown ætiology:            |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Epilepsy                           | ...                                                                                                                                                                                                                                                                                                                                              | 26  |  |
| 7. Psychoneurosis                  | ...                                                                                                                                                                                                                                                                                                                                              | 37  |  |
| 8. (Myopathies)                    | ...                                                                                                                                                                                                                                                                                                                                              | 9   |  |
| Comment.                           |                                                                                                                                                                                                                                                                                                                                                  |     |  |
| Tuberculous Meningitis.            | —Both the cases were in adults and occurred as the terminal event of focal infection in the lungs.                                                                                                                                                                                                                                               |     |  |
| Pneumococcal Meningitis.           | —There were three cases. Two of them were in children aged two and six years with definite signs in the lungs. In both the cases the C. S. F. was turbid with a cell count of 600 and 660 cells per c.mm. with a predominance of polymorphonuclear leucocytes. No bacteriological confirmation is available.                                     |     |  |
| One case was in an adult male      | aged 35 years with temperature ranging to 103° F. Respiratory rate and the lungs said to be normal. The C. S. F. however was positive for culture of pneumococci.                                                                                                                                                                                |     |  |
| Other Meningitis.                  | —Besides the above there were three cases which were clinically meningitis: two in children who have recovered and were in all probability acute aseptic meningitis; and one in an adult female who died. The C. S. F. showed no indication regarding their nature and no biochemical or bacteriological data available for further elaboration. |     |  |
| Encephalitis.                      | —The five cases shown in the above figures all terminated fatally and no post-mortem was available. Two were attributed to arsenical medication                                                                                                                                                                                                  |     |  |

for spirochætal infection and one was a case of hypertensive encephalopathy. These three cases cannot be strictly put under infections the remaining two cases however are interesting. One was an adult European male aged thirty years, admitted with fits of 24 hours' duration and temperature. He died within three days. The other was a child of ten years, admitted in an apyrexial condition for inability to talk, walk and help itself to feeds, of a month's duration. While in the hospital the temperature shot up to 104° F. and the child died. This has to be deemed as a sub-acute encephalitis with a hyperpyrexial termination.

Compared with the number of cases of post-encephalitic sequelæ seen in the out-patient and in the wards, the number of acute encephalitis lethargica cases is disproportionately small. This may be due to either the prevalence of a larval form leading to the sequelæ without much constitutional disturbance or the acute cases being mistaken for some other disease, such as cerebral malaria, encephalitis complicating typhoid.

*Sequelæ of Encephalitis.*—These are chiefly varying degrees of parkinsonism. Of these thirteen cases, no less than twelve gave a definite history of pyrexia often high, immediately preceding the symptoms. Eleven of them were between the ages twenty-five to thirty-five years, while one was forty years, and the other fifty years. These distressing sequelæ

are really more common than these figures warrant, and the physician's inability to mitigate this suffering prevents him from admitting these cases.

*Disseminated Sclerosis.*—There were no cases in this series and the writer has yet to meet with a genuine case.

*Chorea.*—There were five cases of chorea, one in an adult male aged 38 years and the other four in children, 3 boys and 1 girl, aged 9, 10, 11 and 12 years. Three of these cases including the adult gave definite rheumatic history with involvement of the heart while two of the children gave no history of fever and had healthy hearts and tonsils. It is interesting to note that three of the five cases were hemi-chorea with the abnormal movements confined to one side.

*Anterior Poliomyelitis.*—Infantile paralysis following acute anterior poliomyelitis is very common in Vizagapatam district. But very few cases of the acute form of the disease are seen in the wards. As in the case of E. lethargica, these cases are also evidently mistaken for some other acute pyrexial diseases.

Of the two cases one was a chronic case with residual palsy admitted for the treatment of malaria. The other was an acute case in a child aged four years admitted on 21st March 1935 with fever of seven days' duration and paralysis of the left upper and lower limbs. She was discharged on 13th April 1935

with complete recovery and on residual palsy.

**Acute Myelitis.**—In this series there were no cases of acute myelitis due to causes other than syphilis.

**Peripheral Neuritis.**—Cases of peripheral neuritis form nearly 47 per cent of the neurological cases. They are unusually frequent in this district. The causes of peripheral neuritis are various. Of the females, the bulk of the cases are post-puerperial, a form peculiar to this part of the Presidency, and already reported. Of the males, cases of Beri-Beri,  $B_1$  avitaminosis, post-febrile polyneuritis are the commonest varieties. In both sexes mercurial and occasionally arsenical polyneuritis occur.

**Syphilis of the Nervous System.**—There were 74 cases under this head. No attempt is made to elaborate on them as it would exceed the limits of this article. Reference, however, is made to the article of Dr. P. Kutumbiah on 'Neuro-syphilis' in the July 1938 issue of this Journal though it relates to a different series.

**Cerebral Thrombosis.**—Of the eighteen cases of cerebral thrombosis seven were in hypertensive individuals, while five were in senile individuals of the age group, fifty years and above, with low blood pressure and arterial degeneration.

There was a group of six cases—all in young and middle aged

adults of the age group, twenty-five to forty years, in which the cause is obscure. Syphilitic endarteritis had been decisively ruled out due to lack of history of luetic infection and negative serological tests.

**Cerebral Hemorrhage.**—There were six cases all of which terminated fatally. Three were in hypertensives with previous history of attacks of cerebral thrombosis. There were two cases in old men aged fifty years and one in a middle aged healthy constable of forty years; and in these the cause was very obscure. The onset and termination were rapid and fatal and massive thrombosis cannot be ruled out.

There were no cases of *embolism, aneurysm or cerebral arterio-sclerosis.*

**Progressive Muscular Atrophy.**—There were 14 cases of the atrophic type. Of these 10 were in the age group, 30 to 40 years. One was 10 years old and is the son of one of the patients in the previous group and his defect could be noticed only on close scrutiny. This is said to be a disease of early middle life, but this instance may illustrate the fact that the disease may commence in rare cases quite early in life, and by its very slow and insidious progress may come to the patient's attention only in the middle age. There is one case aged 60 years while two are 25 years. One of the last is serologically strong positive for syphilis and should be ruled out from this group.

There is a group of six cases with involvement of muscles supplied from the brain stem—the Bulbar type. They have occurred in the age group, 28 to 48 years, five being in males and one female. The predominant symptom was inability to speak and difficulty in swallowing. Two are purely Bulbar while four are mixed Bulbar and Spinal types.

**Cerebral Diplegia.**—Cases of mental deficiency of varying grades with spasticity of the extremities are often seen in the out-patient. In some cases more than one child in the family is affected. There were five cases. Of these two had symptoms developing since birth; and one was a child aged 5 years in whom the symptoms developed two years after birth. The fourth was a boy of 13 years and in him the scissor gait developed at the 10th year, and this may be a case of spastic paraplegia described under the hereditary group which may occur with or without hereditary history. None of the cases showed any signs of optic atrophy.

There was the interesting case of a child aged 9 years with athetosis since birth. This may be deemed as a case of cerebral diplegia with extrapyramidal involvement.

**Cerebellar Ataxias.**—There were two cases. One was a male aged 15 years with cavus deformity of the foot and in whom the ataxic symptoms started at 1½ years of age. The other was a male aged 25 years with symptoms starting

in the 24th year. None of the cases showed any defect in vision and there was no hereditary history.

**Sub-acute Combined Degeneration.**—In one case only there was the associated pernicious blood picture and he did well with liver therapy.

**Paralysis Agitans.**—One was aged 50 and the other was 60 years of age. In both the picture was typical and there was no history of pyrexia.

**Tumours.**—There were three cases, two being pituitary and one a tumour of the parietal region diagnosed on clinical and radiological data. There were two cases of spinal tumour in this series. One was operated on successfully by Dr. M. G. Kini and reported by him. The other case was one of a tumour of the cauda equina. He was admitted with advanced cystitis and died of this complication.

**Epilepsy and Psychoneurosis.**—No attempt has been made for a detailed study of this group.

**(Myopathies).**—The causation of this group of diseases is still uncertain but they are included in the diseases of the nervous system for convenience. Cases of pseudomuscular hypertrophy are exceedingly common in this district. The other types of myopathy are rare. It is generally conceded that pseudomuscular hypertrophy in females is rare. We had in this series four cases. Rarely cases of pseudomuscular hyper-

trophy survive the age of puberty. It is interesting to note that there were three cases over sixteen years of age in this series.

My thanks are due to Dr. P. Kutumbiah, the Acting Professor

of Medicine for his encouragement and valuable guidance and to Drs. G. R. Dinker Rau and P. Kutumbiah, Physicians, from whose case records I have compiled the material.

### SPECIAL ARTICLES.

## i. The Origin and Evolution of Madras General Hospital.

By D. V. S. REDDY, M.B.B.S.,

Vizagapatam.

(Continued from the previous issues.)

The next important advance in the management of the Hospital occurred in 1741, when strict supervision by the officers of the Guard was ordered. A consultation dated Monday, June 1st, 1741, states that after considering the honourable Masters regulations for the Military, the following conclusions were recorded:—

“The Officer of the Guard visits the Hospital once a day, to see that no abuses happen there. The Surgeons have hitherto reported to the President the number of men entered in and discharged from the Hospital and how many remained there every month, but from henceforth they shall also give a list of their names.” (P.C. 1741, P. 83).

Under the duties of Military Officers and soldiers, as daily

practised in this Garrison of Fort St. George, 1741, the following are noted:

#### Captain's Duty.

The Captain of the guards to visit the Hospital once in twenty-four hours, during the time of his being on guard, and upon the decease of any of the military, to acquaint the Governor therewith; likewise upon the desertion of any of the military, the Governor to be informed immediately (P. 85).

#### Sergeant's Duty.

If any one gone into the Hospital, he is to report them to the Captain of the Main Guard (P. 86).

#### The Sergeant and Corporal.

The Barracks and Hospital doors to be shut at 10 at night

and opened at gun-fire in the morning (P. 86).

In the year 1744, during the war with France, the Hospital was overcrowded. In one of the despatches dated 24-9-1744, it is recorded “For some months past, there have not been less than 40 to 50 of the military on the sick role” (P. 182). At the same time, some temporary and special concessions were allowed and this was communicated to the honourable Masters in a despatch dated 15th February, 1745.

“Having a considerable number of the Military in our Hospital this year and the servants allowed to the Commissioned Officers reducing, besides the number of Mounting Men, we agreed to allow the Lieutenants in lieu of all servants and other advantages, five (5) Pagodas each a month and to advance the pay of the Ensign to thirteen 13 Pagodas a month but this only to be continued to them so long as we think proper.” (Despatches to England, 1743-46, Page 46). Next year, conditions returned to normal as shown by the following extract:—“Agreed also that, as the number of Europeans in the Hospital is now pretty well reduced, the additional allowance of five Pagodas a month made to the Lieutenants in Consultation of the 24th September last be discontinued, as also the 4 Pagodas a month to the Ensigns and that the allowance to the Lieutenants and Ensigns be the same as before we thought it necessary to make those additions (D. & C. 1745, Page 48).

#### A Naval Hospital.

But, in this year, 1745, a new proposal was made:

“It being also considered that it will be much more convenient to have some place ready for the reception of the sick men that may come ashore from His Majesty's ships than to mix them with those of the Garrison, besides that the accommodations of our Hospital are too confined even for our own people. It is agreed and ordered that the Paymaster accompanied by the Surgeons do survey the Granary on the Island and report to the Board whether it may not be made to serve that purpose; ordered also that the Paymaster get provided a quantity of Hospital cloathing with cots and other things necessary for the sick men” (D. & C. 1745, Page 2).

“The Paymaster acquaints the Board that pursuant to order of last Consultation he has been with the Surgeons to survey the Granary on the Island, which they find may be made fit for the reception of the men of war's sick people by opening a few windows for the benefit of air, and some other small alterations which he computes will not cost above two hundred pagodas, ordered that he set about them forthwith” (D. & C. 1745, Page 3).

#### Surgeons, Surgeons' Mates, Etc.

A letter dated 4-2-1742 gives an interesting account of the changes in the staff at various stations.

"One of our Surgeons, Mr. Robert Douglas taken his passage to England on the "Wager" having behaved very much to our satisfaction during his stay here.

"We shall call Mr. Andrew Munro up hither to supply his vacancy, and send Mr. William Belcher to Fort St. David. But having sent Mr. Turing who was one of the Surgeon's mates here, to be Surgeon at Vizagapatam and Mr. William Douglas, the other mate here, designing to quit his employ, as did Mr. Macknight at Fort St David in August last, we shall not have one mate either here or at Fort St. David and our seasons are sometimes so sickly that great attendance is required in the Hospitals as well as among the inhabitants. We shall, if it be possible, get some assistance out of next year's shipping, but the pay and allowance are very small, and it was perhaps only the hope of succeeding on a vacancy which induced Mr. William Douglas and Mr. Macknight to act as a mate so long as they have done and we are therefore to desire your honour's care and consideration of us in this respect." (Despatches to England, 1741-42, pages 45-47).

The Dairy and Consultation show that Andrew Munro arrived from Fort St. David on 14-3-1742. From September 1742 records mention Barlow and Munro as the Surgeons of Fort St. George, drawing a pay of £ 36 per annum (or 40 Pagodas a month).

The next change in the staff of the Hospital is mentioned below:—

"The very bad state of health Mr. Macknight our present Surgeon's Mate has long laboured under having determined him to go for Europe in January next, if he gets over his present indisposition which is much to be doubted, and there being in the place two persons of that profession who are willing to engage in the service, namely William Lyon and John Sheafe; it is agreed to entertain them from the 1st of next month, Lyon as first, Sheafe as second Mate of the Hospital. Agreed also that pursuant to the liberty granted us in the 6th paragraph of our Honorary Masters commands of the 11th March last, and in consideration of the nature of that service their pay be increased from ten Pagodas to fifteen a month each and that Mr. Sheafe who has assisted in the Hospital from the 10th of this month be paid at that rate" (Consultation dated 22nd September 1743, D. & C. 1743, P. 161). In the particulars of extra-expenditure for the month of October 1743, there is an item: "Advance pay for two surgeons' mates ordered in Consultation 22-9-1743, to Lyon and John Sheafe."

The liberty granted by the Company in the reference quoted in this:—"As you say the Surgeon's mates pay is too small, we would have such an addition made thereto, as you shall judge reasonable" (Despatches from

England 1740-43, page 106, letter dated 11-3-1743).

In 1745, mention is made of the entertainment of a new Surgeon's Mate "Stephen Lightfoot, a Surgeon (formerly of Ship Benjamin) having assisted for some time in the Hospital and being willing to enter as a Mate, it is agreed to entertain him as such, at the usual allowance of 15 Pagodas a month." (D. & C. page 173). He was actually entertained on 12-10-1745. In an entry dated 1750, it is stated. "Dr. Stephen Lightfoot died sometime past in Bengal."

Two entries of some interest occur in the proceedings of this period. One refers to the repairs to the Doctor's residence and the other to travelling allowance given to doctor.

1743:—"Mr. Barlow's lodgings, stopping cracks in the terrasses. Pagodas 1-6-0."

In July 1745, under Fort. St. David account, is noted: "Doctor Barlow's travelling charges 10 pagodas."

Then there is a big gap in the records, probably due to the confusion, and anxiety due to the loss of the settlement and also due to loss of some Records.

Entries relating to Hospital and Surgeons are once again frequently made from November 1749, as shown by the following statement of General account, payment of Covenanted servants

in Company's service at Fort St. George, 31st December 1749 (D. & C. 1750, page 31).

Andrew Munro, Surgeon

Pay: Pags. 36 per mensem.

Diet money: Pags. 8 per mensem.

Pallankeen charges: Pags. 4 per mensem.

Servants wages: Pags. 1-20-0

Candle, oil, etc.: Pags. 1-20 per mensem.

James Wilson, Surgeon's Mate.

Pay: Pags. 15 per mensem.

In addition, as Steward of Hospital:—Pags. 10 per mensem.

At a Consultation dated 29th July 1750, Andrew Munro's letter requesting to be allowed house rent and another assistant was read. Here is the letter:—

"To the Worshipful Richard Prince Esq.,

Deputy Governor of Fort St. George, etc. Council.

Sir and Sirs,

I must beg leave to lay before you, the state of the Hospital in order to show the necessity I am under of hiring a house, or proper lodgings. Upon Admiral Boscawen's taking possession of this place, in August last, the Hospital was, and is so much crowded ever since, that there has not been

*proper room for the sick, so that the usual apartments for the Mates, have been taken up by them. One of the Surgeon's lodgings the Officers have possessed ever since; the other apartment I mean the late Mr. Barlow's being immur'd and streightn'd by the French, in fortifying the place: so that there is hardly room for the two Assistants: therefore I must request the favour that some allowance may be made me for house rent which I now pay the Hon'ble Company themselves.*

*I must also beg leave to represent, that I have been all along in great want of an Assistant: having had but one Mate all this time; I need not say, there usually were two allowed; as well as two Surgeons, when there were fewer men in this Garrison, than there are at present; therefore I hope my request will not be thought unreasonable and now begging pardon for giving all this trouble, I conclude with all the respect and consideration imaginable.*

Worshipfull Sir and Sirs,  
ANDREW MUNRO.

FORT ST. GEORGE,  
29th June 1750.

The Deputy Governor and Council decided to recommend his request to the Presidency (i.e., Fort St. David) as there had been formerly two Mates allowed in this place, when the Garrison was smaller than in 1750. The request appears to have been sanctioned.

In the account of payments in December 1750 in addition to the Surgeon and one Mate, there is shown another Mate, Joseph Hinchly, Surgeon's Mate of the Hospital at Pags. 15 per month.

#### Doctor Munro.

A few more details about Dr. Munro are available. In the year 1749, some time before November, he was reinstated at Madras as Surgeon. Records also mention about the same time, one Mary Munro as a resident of Fort St. George. At the beginning of 1750, the Paymaster reported that the house belonging to Mr. Baillieu in Choultry Gate Street, was to be rented by Mr. Andrew Munro at ten pags. per month, commencing from 1st January 1750. A Consulation dated 7-5-1750 mentions that the Secretary made a payment into Company's cash for rent of confiscated houses.

"House in Choultry Gate Street, tenanted by Dr. Andrew Munro from 1-1-1750 to 1st April 1750: 3 months at 10 pagodas per month = 30 pags." Again, in the account for July a sum of 30 pagodas is paid and in October another 30 pagodas for the months July, August and September 1750. The Company also sanctioned a house rent of 8 pagodas per month for Dr. Munro and a sum of 88 pagodas for the previous eleven months was paid in July. Later, house-rent for the next three months at pagodas 8 per month, was paid to Dr. Munro in November 1750.

In an auction in December 1749, Munro also purchased one horse for pags. 40.

#### James Wilson.

His name occurs for the first time, in a letter dated 2nd November 1749, (Fort St. David Despatches to England).

"Our Surgeon's Mate that was stationed at Deve Cotta to attend on that Garrison being so ill as obliged him to return here, and having no other of that profession to supply his place, we therefore entertained Mr. James Wilson as Surgeon, who come out by the Severn with your Honour's recommendation for the first vacancy, and sent him thither (page 143)."

The next reference to him occurs in a despatch to England dated 12th February 1750: "Mr. William Belsches, your Surgeon at this place (Fort St. David) having requested leave to resign his employ with desire of going to Europe in September we have accordingly permitted him and appointed in his room Mr. James Wilson who came out with your Honour's recommendation to succeed to the first vacancy." Wilson is stated to have been at Fort St. David in October 1750.

He seems to have been in Madras as Surgeon's Mate in December, 1749 and again in December 1750. He appears to have been of a religious turn of mind. "James Wilson, Surgeon's Mate offers himself for reading prayers and other church duties here for which he requests we

will allow him usual gratuity, agreed to refer the same to the Presidency" (D. & C. 1750, page 191). The same is referred to, in despatch to England from Fort St. David, dated 7th February 1751: "The Reverend Mr. Swynfen died at Madras the 17th November and Mr. James Wilson for the present officiates there with the allowance, as is customary at subordinate settlements (D. & C. page 210).

About 1755, Wilson was at Trichy. He was ill in March of the next year. "It has unluckily fell out that during the absence of Mr. Stewart, the Surgeon's Mate, Doctor Wilson was taken ill, upon which I took the liberty of sending orders to Mr. Stewart, immediately on the arrival of the party at Devacottah, to return to this garrison with all expedition, as at present the sick are without attendance, Mr. Wilson is, however, out of danger and recovers very fast."

He was therefore recommended leave and change of place from Fort. St. David to Fort St. George.

#### Indents and Supply of Medicines.

A very important despatch from England dated 28-1-1740 states: "We have taken care to supply you fully with the medicines indented for, without curtailing any article but here we must take notice that duplicates of your indents were not sent by the Marlborough, which ought not to be omitted in any such material affairs" (Despatches from England 1740-43 P. 13).

After this direction, the following indents were sent:—

List of papers *via* ship (Wager) on 4-2-1742.

Indent for medicines for 17 (Lacuna).

List of papers *via* King William on February 1742.

Indent for medicines for 1743.

List of papers *via* Benjamin on 9-10-1742.

Duplicate indent for medicines for the Hospital in the Company's account for 1744.

Meanwhile, two important matters came up for consideration. In a Consultation dated 19th January 1741, the following report on the quality of drugs supplied by different Agencies is recorded:—

"Letter from the surgeons read as entered hereafter accompanying the indents to England for 1742, which are now signed and reporting the medicines put up by Messers Silvanus and Timothy Bevan to be much inferior in quality to those provided by the Apothecaries Company and Mr. Alexander Johnston and that in general those sent from the Hall have proved the best." (P. C. 1741, page 18). The actual letter of the surgeons, Nathaniel Barlow and Robert Douglas is omitted for want of space.

#### Medicines for Private Patients.

The other passage, a despatch from England, relates to the

Hospital Medicines and their use by the Surgeons for their private patients (Letter dated 20th Jan 1742, Desp. 1740-3, p. 51-52). "We having reason to believe great part of the medicines annually sent out by us, are made use of by the surgeons in their private practice, either in the cure of Venereal distempers or among the natives or other inhabitants, for which they are well paid, as also that they are used in fitting up boxes or chests for the country ships, it is therefore highly reasonable the surgeons as they are great gainers thereby, should provide medicines and instruments for these purposes at their own cost.

We have this year ordered all the medicines indented for to be sent of which we have destined part for our own use and the rest in a separate invoice for account of the surgeons which we insist on their paying for at the rate of ten per cent advance if they think fit to take them.

And for the time to come, we direct that our surgeons send an indent of medicines for our use in English, and also in the same packet another indent likewise in English, for the medicines, instruments, etc., that they may require for their private practice, directing such indent either to our Apothecaries or such others as they may think proper and they shall be sent to them in the same manner that our own are sent, and we will pay for them and receive the money at your place from the surgeons who indent for them, or from those who succeed

them in the case of absence, to whom they must be delivered at the before mentioned advance.

You must duly acquaint our surgeons herewith, and also that we expect they take more care of the capital instruments and utensils, so as not to make such frequent and great demands for things of that nature, which may last much longer than they do if properly taken care of, and not embezzled, which we apprehend has too often been the case.

Upon the whole, we will not provide medicines, etc., for any, but such persons as are actually in our service, whom the surgeons must attend upon and administer our medicines to, without fee or reward, except in Venereal cases where the surgeons are to use their own medicines and be paid for the cure.

The surgeons at the Subordinate Factorys who do not receive the medicines directly from hence must have a reasonable share of those sent for the surgeon's account, on their paying for them as before-mentioned."

In consonance with the above orders, communicated to the respective surgeons, separate indents were either sent or cost was paid to the Company, for the drugs used in private practice. Ship Benjamin sailing on 9-10-1742 carried, as already stated, duplicate Indent for medicines for the Hospital in the Company's account for 1744. The same ship, also carried "duplicate Surgeons' particular indent for medicines

for 1744, to be put up by John Loyd, Apothacary in Aldergate Street." (Despatches to England, 1741-42, page 68).

#### Attested Lists of Deaths with Distempers.

Before giving the lists of papers sent to England, as a routine by various ships during this period, it is necessary to refer to another order of the Company to the surgeons, to understand the necessity and the meaning of certain papers forwarded to England along with indents, etc., by surgeons at various stations. "The surgeons must transmit an attested list of the deaths adding the distemper of each person, agreeable to the practice in Bengal. (Despatch from England dated 20-1-1742; Despatches 1740-43, page 51). It would be highly instructive to peruse these lists giving causes of death but unfortunately documents are not easily traced. The first list, of persons who died under the care of Surgeons at Fort St. George and their distempers was carried to England by Ship Benjamin sailing in the early part of October 1742.

List of Fort St. George Packet to England, *via* Prince of Wales (6-9-1744):

1. Indent for medicines for the use of Hospital in 1746.

2. List of persons who have died under the care of surgeons at Fort, with their distempers since January 1st, 1744.

List of Fort St. George Packet to England, *via* Durrington (16-2-1745).

1. Duplicate indent for medicines for Hospital.

2. List of persons who died under care of surgeons with their distempers for 1744.

List of Fort St. George Packet to England, *via* Beaufort (16-2-1745).

1. Triplicate indents for medicines for 1746 for the use of Hospital.

2. Lists of persons who died under the care of the Surgeons with their distempers for 1744.

List of Fort St. George Packet to England, *via* Benjamin (24-9-1745).

1. Indent for medicines for 1747.

2. List of persons who died, with distempers, from January 1st, 1744-45.

List of Fort St. George Packet to England, *via* Dolphin (6-10-1745).

1. Duplicate indent for medicines for 1747.

2. List of persons who died with their distempers from 1st January 1745.

List of Fort St. George Packet to England, *via* Lincoln (1-2-1746).

1. Triplicate indent for medicines for 1747.

\* \* \*

**Then there is a big gap in the Records.**

\* \* \*

The next indent for Madras traceable in the records was carried by ship *Elizabeth* leaving Fort St. David, then the headquarters of East India Company on the Coramandal Coast, along with the papers from the Presidency. This ship sailing on 12-2-1750, carried the Surgeons' indents for medicines for 1751 and Surgeons' lists of deaths for 1749. Thenceforth, the Fort St. George papers are seen to be forwarded to Fort St. David, to be sent home regularly along with the despatches, letters and books from the Presidency. Ships *Severn* and *Norfolk*, sailing in February 1751, carried the Surgeons' indents for medicines and the lists of persons who died under the care of the Surgeons at Fort St. George.

The supplies of medicines, drugs and chirurgery ware, were sent out from England, in chests, cases, hogs-heads, barrels, casks, etc., and the keys for the chests were kept separately in a box. The invoice of the medicines was separately sent but the value was included in the general invoice. The following extracts serve to show the form, cost and quantities of supplies received:—

Scarborough's invoice to Fort St. George (April 1731).

Medicines: 2 chests 1 case and 3 hogsheads, £203-7-11.

The same ship brought in the Company's packet, "key to the medicine chest to Fort St. George and the key for the same to Fort St. David in a box apart," and the invoice of the said medicines.

Walpole's invoice for Fort St. George dated 21-1-1742:

Medicines: 2 chests, 2 casks and 1 hogshead, £ 114-14-7.

Lynn's Invoice dated 29-1-1742:

Medicines: 3 chests, 2 casks, 1 hogshead, and 1 case, £ 228-4-3.

The Company's packet by Lynn contained:

Key of one chest of medicines for Fort St. George and two chests for Fort St. David, by the Lynn both in the box apart.

Invoice of the said medicines, the value being included in general invoice.

The next year, though the invoice of the ship included the item Medicines, the ship did not actually carry them. They appear to have been sent by the next ship, as shown by the following entry:—

Invoice of Winchester dated 7-3-1743:

Medicines: 1 chest, 1 hogshead, £ 52-8-7.

A note is added at the end that the medicines could not be taken on board the ship.

Invoice of Heathcoate dated 17th March 1743 is not available, but the packet contained: (1) Key of 1 chest of medicines for Fort St. George and, 1 chest for Fort St. David. These in the box apart. (2) Invoice of said medicines.

#### Hospital Equipment.

The hospital equipment does not figure very prominently in the records of this period. A list of necessities wanting in the hospital were submitted on 29th March 1741:—

|              |     |          |
|--------------|-----|----------|
| Shirts       | ... | 200      |
| Drawers      | ... | 200      |
| Caps         | ... | 200      |
| Pillow cases | ... | 200      |
| Pillows      | ... | 80       |
| Quilts       | ... | 100      |
| Gowns        | ... | 100      |
| Cotlashing   | ... | 40 pair. |
| Cotts        | ... | 20       |

The accounts read on April 30, 1741, stated under charges hospital, Pags. 390-19-44, and later the explanation for the extraordinary expense of the month is noted as due to cloths and sundry necessities, supplied this month amounting to Pags. 346-31-44.

There is an extraordinary expenditure of over 300 pags. in April 1743, where about 250 pags. is shown as being incurred for the clothing for the sick.

On 20-12-1743, Barlow sent in a list of necessities for the hospital :—

*List of necessities for the hospital.*

|              |               |
|--------------|---------------|
| Shirts       | ... 200       |
| Drawers      | ... 200       |
| Benyan coats | ... 100       |
| Caps         | ... 200       |
| Quilts       | ... 100       |
| Stools       | ... 8         |
| Pillows      | ... 80        |
| Pillow-cases | ... 200       |
| Cott lashing | ... 30 pieces |

In the review of accounts for 1743, it is stated that the additional expense of Pags. 451-6-15 was "occasioned by the supplies of clothing for the sick, not being brought to account last year, which together with that for this year increases this head."

On 15-11-1744, Barlow and Munro conjointly presented a list of necessities wanting in the hospital :—

|              |               |
|--------------|---------------|
| Shirts       | ... 250       |
| Drawers      | ... 100       |
| Gowns        | ... 150       |
| Caps         | ... 100       |
| Quilts       | ... 200       |
| Pillows      | ... 100       |
| Pillow-cases | ... 50        |
| Cotts        | ... 12        |
| Cott lashing | ... 20 pieces |
| Stools       | ... 7         |

In the account for April 1745, read in May, the expenditure is shown as Pags. 388-12-50, out of which Pags. 334-10-10 is said to have been incurred for clothes, etc., for the sick as per account.

**Accounts of the Hospital.**

The expenditure of the hospital was gradually increasing. The average of monthly expenditure at normal times ranged between 60 and 80 pagodas. But the expenses rose to 300 or 400 pagodas, during those months when clothes and other necessities were supplied to the hospital. After the rendition and rehabilitation of Madras and the re-employment of the full medical staff in the Hospital at Madras about 1750, the charges under the head, Hospital, were noted as follows :—

Charges for December, 1749, Read in January, 1750, Pagodas 607-35-0.

Charges for January, 1750, Read in February 1750, Pagodas 190-2-48.

Charges for February, 1750, Read in March, Pagodas 100-24-70.

Expenditure for December was probably high on account of the reorganisation and fresh supplies for the hospital, which was closed for over three years.

The annual expenditure during this decade is given as follows :—

|      |                      |
|------|----------------------|
| 1739 | ... Pags. 1,114-29-0 |
| 1740 | ... 1,284-25-58      |

The reason given for this additional expenditure being that more medicines costing Pagodas 115-30-50 and clothes costing 54-2-8 total 169 32-58 was incurred for the sick people.

|      |                 |
|------|-----------------|
| 1741 | ... 1,375 17-14 |
| 1742 | ... 1,225-31-74 |
| 1743 | ... 1,677-2-9   |

Cause of extra expense already explained.

|      |                |
|------|----------------|
| 1744 | ... 1,286-18-4 |
| 1745 | ... 1,603 0-72 |

(Account for January 1745 alone was 496-19-12). In the explanation of annual accounts, under the head charges Hospital, the excess of Pagodas 316-18-68 over the expenditure of the previous year, is accounted thus :

By larger quantity of clothing wanted, Pags. 133-0-0.

Also allowances of firewood and attendant, Pags. 46-18-0.

And Medicines delivered more than year before : Pags. 137-0 0.

Total extra : Pags. 316-18-68.

During the early part of the year, 1746, when the English Settlements on the Coromandal were hastily preparing for the threatened attack by the French,

by frequently moving a number of warships from Fort St. George to Fort St. David, the Surgeons had to advance the expenses for the treatment of soldiers and later get the amounts reimbursed from the Company. A Consultation dated 17th March 1746, reads "The President acquaints the Eoard that on the Surgeons here and at St. David remonstrating to the Commodore, the hardship they suffer by being a long time in advance of their own money for disbursements on the sick and wounded people of the Squadron under their care, the Commodore at his last going from hence had desired of the President that they might be paid their arrears quarterly and that in consequence Mr. Barlow, agent for the sick and wounded of the Squadron at this place, had applied to him for payment of the arrears due to him on that account... amounting to Pags. 717-24-00, which is now paid and charged to the Squadron." These patients were accommodated, not in the Hospital but in the granary on the Island, altered and equipped for their reception, as a Naval Hospital.

## ii. A Brief Account of the History of Pathology—

### THE IMPORTANCE OF THE STUDY OF "THE HISTORY OF MEDICINE"\*

BY T. S. TIRUMURTI, B.A., M.B. & C.M., D.T.M. & H., F.N.I.,  
Principal, Stanley Medical College, Madras.

"We cannot know Modern Medicine, unless we study it as a whole, in the past as well as in the present."

(Clifford Allbutt.)

No apology is required for my choosing for the Presidential Address this year the above subject—'A brief account of the History of Pathology,' when we all know that, in none of the Medical Colleges or Schools in our Country, a Chair for "the History of Medicine" has been created or the subject of "the History of Medicine" included in the curriculum of studies of the Medical student or admitted for post-graduate study or research.

The branches of Medicine have become more and more divided and sub-divided and each, in turn, so much highly specialised that the student of medicine requires a watch tower, from which he could survey Medicine as a whole from its dim, indeterminable origins in the past to its bright glorious scientific achievements of the present day. Only a study of "the History of Medicine" can be the golden key, which will open to the student the door of the great 'Edifice of Medicine,' wherein he can obtain an insight

into the highest human endeavour to fight and subdue or prevent disease. "The History of Medicine" is a fascinating story of the most laborious and painstaking of all human enterprises.

Fortunately, a study of the "History of Medicine" is no longer merely a diversion for the ordinary historian, the philologist or the student of the classics, as it was until the close of the last century. In 1902 was founded the first German Society for the study of the "History of Medicine." In 1905 the Institute for Medical History was established at Leipzig. Materials for study were collected from libraries, old manuscripts, ancient classics, biographical sketches, bibliographical references, etc. More and more materials were gathered. The Medical Profession, since then, have begun to realise the cultural value of the scientific study and interpretation of the 'Evolution of Modern Medicine' from the earliest times. Apart from its general cultural

value to all persons, to the practising clinician a historic perspective of the subject is useful towards his attempts to solve many problems of disease and its processes.

The world-famous Professors of Medicine and Surgery have been also great students of "the History of Medicine," and in their writings and teachings have systematically adopted the 'Historic Approach' to the elucidation of the subject. The last three decades of our century have produced a number of distinguished Medical Historians, but not one of them belongs to India.

The essence of the scientific method should guide the medical historiographer. The 'History of Medicine' is not a mere category of dates and names. It attempts to describe in a scientific manner from the earliest recorded times to the present day, how man reacted to his environments and their unfavourable conditions, how he got over them and in what way his wounds were healed and sufferings relieved and diseases cured or prevented. A mere listing of the herbs or drugs, used in healing the sick, or of instruments, employed in Surgery, is of no great value. It will be a catalogue, not history.

The philosophy, underlying medical thought in the successive epochs of man's history, should be properly understood and explained. That the antiquity of disease is co-eval with the antiquity of man has been shown by the examination of human bones,

unearthed from the bowels of the earth in archaeological explorations and geological excavations, and in the bodies of Egyptian mummies, preserved from remote times. A special subject like Paleo-Pathology has been ushered by the careful study of the above materials.

Separate Chairs for "the History of Medicine" have been instituted in all progressive countries, in the Universities and Colleges. In many Universities it is a compulsory subject for a Doctorate in Medicine. In other places there are Institutes for the study of "the History of Medicine." The International Society for the study of "the History of Medicine" has its head-quarters in Paris. The Charaka Club flourishes in America and not where Charaka was born! In America and in the Continent, there are many Societies for the study of "the History of Medicine." Medical History Libraries and Medical Historical Museums have come into existence in other countries. Their educative value is immense. The best known Medical Historical Museum is the Burrough's Wellcome Medical Historical Museum in London.

In India there has been an utter neglect of the study of this important subject. Materials for such study are vast and varied. "The History of Indian Medicine," including the Indigenous Systems of Medicine, is yet to be written. The Asiatic Society of Bengal has not devoted sufficient attention to Medical Historiography. Only three fasciculi of Susruta were

\* Presidential Address to the Medical and Veterinary Section, Indian Science Congress, held at Lahore, January 2, 1939.

published by it, but many of the old books of Medicine in this country, written in Sanskrit and other languages, are still sealed books to us. Only the Calcutta University published in 1921 the Tanjore Manuscript of Bhela Samhita. The other Indian Universities has not endowed or encouraged medical historical research. The responsibility for research rests with both the Profession and the Universities. Rare texts await print; hidden books have to be searched out, old manuscripts require to be copied: palm leaf bundles of ancient writings need attention from crumbling into powder and from attack by white ants and moulds. The theories and descriptions of diseases in the Vedas, folk medicine in Jatakas, ancient Classics, Medicine of Aboriginal Tribes, Nature and Naga Worship, Yoga Shastras, Tantras, Puranas, Kavyas, legends, writings of other ancient historians about India, etc., will afford fruitful material for study.

The special study of, or research into "the History of Medicine" is not undertaken, because there is no employment open for such specialists in the Colleges; and it is foolishly thought that such study is derogatory to the reputation of the doctor or is an impediment to the progressive Science of Medicine. Nothing can be farther from the truth.

I fervently hope that, at least in the future, the Medical Student will be trained to look at his subject from a 'Historic Perspective' and that the Universities

and the Medical Profession will bestow some attention to the encouragement of this branch of Medical Science, because, in my opinion, "the History of Medicine" is largely "the History of Pathology," the Story of man's conception of 'the Nature of Disease and Disease Processes' and his great endeavours for the cure of disease, alleviation of suffering and prevention of disease.

"Nothing gives a better perspective of the subject than an appreciation of the steps, by which it has reached its present state."

A knowledge of "the History of Medicine" is necessary also for the Medical teacher, who wishes to distinguish himself as a really capable teacher or desires to stimulate in his students an interest for research. He should supplement the detailed presentation of his subject, "by its historic milestones and landmarks, its triumphs and failures, its pathways and pitfalls."

"History maketh a young man to be old without either wrinkles or grey hairs, privileging him with the experience of age, without either the infirmities or the inconveniences thereof. Yea, it not only maketh things past present, but enableth one to make a rational conjecture of things to come." (Fuller).

*The Test of Civilization.*—The test of Civilization is the degree of advancement of the Medical Science of the people. The benefits

conferred by the Physical Sciences—the train, the telephone, the telegraph, the automobile, the radio, the air-plane, etc., are appreciated by the people as these benefits are positive contributions to their convenience, comfort or pleasure. But the contributions of Medical Science are not remembered by the general public as the benefits, which have accrued from it, are negative in their quality. The 20th century man does not appreciate them fully. His appreciation is occasionally expressed in his ardent desire to guard himself from epidemic or communicable diseases. But there are still those who offer active opposition to the progress of modern medicine. Cult healers, faith-curers, anti-vivisectionists, etc., will decry scientific medicine. Owing to the vast amount of illiteracy and the poverty of the people in this country, primitive ideas continue to be deep rooted in the minds of the people. Even knowing persons have no objection to enjoy all the material comforts, which Physical Sciences have provided in modern civilisation but they will still cling to ancient methods and philosophies of medicine, unable to adapt themselves to changing ideas and altered methods of the modern Science and Art of Medicine.

*The Philosophy of Medicine.*—The conception of the Etiology, Pathology and Pathogenesis of Disease may be called "the Philosophy of Medicine." There are two philosophies in medicine: one is the Primitive Philosophy, which is based on superstition,

and the other is the Modern Philosophy, built on the bed-rock of Reason and Experiment. According to the Primitive Philosophy of Medicine, disease is caused by supernatural agencies, whereas the rational philosophy of medicine teaches that disease arises from natural causes and that it is only by a knowledge of such causes that disease can be prevented. Primitive peoples continue to believe in their primitive medicine. To them disease is a mystery. But the civilized peoples seek to unravel by patient research this tangled skein of the thread of mystery. Even modern man's instincts and impulses, and beliefs and mental reactions, are seen on analysis to be the same as those of the primitive man, many thousand years ago. Hunger and love were the two great powers to our ancestors, as they are to us even to-day. Though still a savage in instinct and impulses, the man of the 20th Century is modern in his dress and diet, housing and furnishing, manners and speech. Though under the treatment of the best physician of the Modern Science of Medicine, he cannot abandon his intuitive ingrained belief in the physician, practising the Primitive Medicine of his forefathers. Few educated people have been educated to think or reason logically in matters of health, especially, when they are themselves ill. Faith and Sentiment are more over-powering than cold Reason. We are loath to give up the philosophies of our ancestors, and therefore willingly seek the aid of the practitioners of Primitive Medicine, consult

Astrologers, offer prayers and oblations or pay for the removal of the influence of the Evil Eye or for driving the Evil Spirit. How often our outer veneer of conventions hides a primitive savage mind and heart within! Only when Civilisation advances, does Rational Medicine replace Primitive Medicine.

*Origin of the Healing Art.*—Ever since the existence of man, diseases have afflicted him and he has attempted to combat them. The primitive man sought medical aid only for external injuries, wounds inflicted mostly by the weapons and the blows of his enemies and the bites of wild animals, burns and bruises, fractures and contusions. It is from the instinct of self-preservation that the noble art of healing has sprung. Primitive man knew how to dress a wound, check bleeding or put up a fractured limb in splints. Archæological research has revealed that he was fairly conversant with surgical instruments of various sorts. But about internal diseases he knew very little in the pre-historic days. We have to draw only on our imagination about the mind and philosophy of the pre-historic man.

*Primitive Medicine and Supernatural Concept of Disease.*—Disease has existed from pre-historic times and many geological ages. History tells us that queer and elaborate ideas, regarding the nature of disease, were entertained by man from very early times. Disease was a mystery and supernatural agencies

were called to account for the origin of disease. The religious belief, in such supernatural agencies as malicious Gods or malevolent demons or evil enemies, made these primitive people to resort to their priests or witch doctors, to the use of charms or totems, or to the performance of ceremonies or sacrifices, with the object of appeasing the wrath of these supernatural agencies.

As the primitive man could offer no rational explanation to the cause of disease, he conceived that supernatural agencies, such as, Evil Spirits, Gods or Demons, evil-minded Witches, or adepts of the Dark or Occult Arts, brought about disease. The treatment was, therefore, directed against these agencies.

Such belief in supernatural agencies may be seen even now in the belief a large number of our people in Astrology and in Omens. It is considered possible to cause disease by casting the Evil Eye. Belief in Miracles, in Christian Science and in olden days in the 'King's Touch' and in the blessings of the elderly and religious people—all these are evidences of the undoubted psychological influence of the mind over the diseased body. Even to this day, such beliefs are held by the aboriginal tribes and the illiterate and uneducated peoples. Even in many of the civilised and educated men of the 20th century, such beliefs can be exposed by psycho-analysis.

Therefore, treatment of diseases gradually became the

specialised occupation with religious cults, and, in course of time, specially qualified persons to practise the Art of Medicine arose among them. Such were the early professional mendicants, quacks and charlatans, who offered to cure disease by Magic, Charms, Amulets and Incantations. To the same category belonged the 'Medicine Men' of the Red Indians, the Wise Women of the ancient Germans and the 'Priest-doctors' of Babylon, Egypt and other countries.

Luther himself believed that some internal diseases were caused by Demons. Every disease was ascribed to some demoniacal power or evil spirit. The anger of the offended Deity had to be appeased or counteracted. Supernatural causes of disease were believed to be capable of being attacked only by supernatural means and occult practices. From the Folk Medicine of primitive times, the history of medicine has to be traced. From Folk-medicine, Modern Medicine has developed.

During Homeric times, Medicine does not appear to have been dominated by Religion. Asclepius (or Æsculapius) plays the role of a King and not a God. But later Asclepius was deified and a temple was built to the "God of Healing." Subsequently, the temple structure and the image remained, but the Spirit of the Science of Healing, Enquiry and Research, had departed.

In the very early times, therefore, apart from the supernatural concept of disease and the collection of clinical descriptions of various diseased conditions, no systematic attempts appear to have been made for the study of Pathology, as we now understand it. Leaving the primitive superstitions and fanciful theories of disease, we next come to the 'humoral conception of disease' in the golden age of Greece. The Humoral Theory appears to have been prevalent in the old Greek Empire, the Roman Empire and even during the Medieval period. It persisted practically till the establishment of the 'Cellular Theory' of the nineteenth century. The Humoral Theory, though of great antiquity, should be regarded as the most important of the early pathological concepts of disease.

*The Sources of the Medical Art.*—During historical beginnings, primitive man was accumulating facts, derived from observation and experience. In his search for food, he selected edible plants and animals and discarded the rest. He gained experience of poisonous plants and of those, which had carminative, purgative, expectorant, diuretic or other therapeutic properties. He experimented with them and made also many accidental discoveries. The drugs were put to test by repeated administration in selected patients. The sources of the Medical Art were, therefore, accidental discoveries and repeated experiences. Also observations of 'Nature,' such as, the behaviour

of diseased domesticated animals were carefully recorded. But, in spite of correct interpretation of observed facts, he was superstitious and believed in Magic and Miracles.

In early Medieval times, the medical art had made considerable progress, but during the Dark Ages it sank into superstitious speculations. Reason and Enquiry were abandoned.

When Monasteries sprang up, they became the custodians of culture. With the Renaissance of Arts came the Revival of Medical Science. The destiny of the Medical Science was determined by the standards of civilization and its progress or decay coincided with the advance or regress of civilization.

Surgery occupied a humble position, similar to the handicrafts and the practice of surgery was regarded as a humble occupation. The name "Surgery", mutilated from "Chirurgia", is derived from the two Greek words: cheir, hand; and ergein to work. With the establishment of Universities, where Natural Sciences, and Medicine were taught along with the Humanistic Sciences, Scientific Medicine branched off from Folk Medicine and even opposed the latter, exposing all its superstitions and unfounded beliefs. Surgery developed along with Internal Medicine, until the two merged together to form the modern Scientific Medicine. Scientific Medicine is barely 400 years old and to-day Surgery claims first rank.

### Ancient Hindu Medical Sciences.

**Chemistry.**—It developed from two sources, Industry and Medicine. As early as the Gupta times, India had attained to high industrial development. India was famous for the tempering of steel and King Porus is said to have asked for 30 lbs. of steel in preference to gold or silver, for being taken as a present to Alexander, the Great. The chemical industries of dyeing, tanning, soap-making, etc., had then reached a high degree of perfection. Even in the 6th century, the Hindus had known the various chemical processes of distillation, sublimation, calcination, etc. From India the Science of Chemistry spread to the Persians and from them to the Arabs, who later were instrumental in spreading that knowledge into Europe.

**Anatomy and Physiology.**—Even as early as the 6th century B. C., Hindu Physicians had made great advance in these sciences. The processes of digestion were well-understood. Atreya anticipated Weismann by 2400 years. Atreya (500 B. C.) held that the parental seed is independent of the parental body and contains in itself, in miniature, the whole parental organism. The development of the foetus was described with much accuracy. It was noted that the sex of the foetus remained undetermined for some time. It was also held that the sex of the embryo could be influenced by food and drugs.

**Ayurveda.**—The earliest records of Hindu Medicine are in the Atharva Veda. In this work a list of diseases is found with description of symptoms and magical formulæ. Medicine arose as an adjunct to Magic. That Medicine and Magic have had a common ancestry is the popular belief but it is not true. The History of Medicine reveals that Medicine, though it may have had its early origins in Magic, was always the Enemy of Magic. The oldest system of Hindu Medicine is the Ayurveda (the science of longevity), which is a part of the Atharva Veda. The Rig Veda contains over a thousand herbs, used for the treatment of diseases. Even in Vedic times, Physicians and Surgeons were differentiated from the magic doctors. Great Physicians are said to have lived in houses, surrounded by gardens or herbaria, in which they cultivated medicinal plants.

**High Standard of Hindu Medicine in Ancient Times.**—The great teachers of Hindu Medicine were Susruta, who lived in the 5th century B.C., and Charaka in the 2nd century A.D. Susruta was the Professor of Medicine in the then existing famous Benares University. He is stated, according to mythology, to have learnt from Dhanvantri, the Physician of the Gods. His works were in Sanskrit. Charaka composed an Encyclopædia of Medicine, known as "Charaka Samhita", which is still extant. Later, came Vagbhata (625 A.D.) and Bhavamisra (1550 A.D.) The latter produced a voluminous work on Anatomy, Physiology

and Medicine. He is said to have described the circulation of the blood a hundred year before Harvey.

That the medical and surgical arts had reached a higher standard earlier in India than in other countries will be evident from a perusal of the ancient works of Susruta and Charaka. Despite brahminical prohibitions, Susruta advocated the dissection of dead bodies as indispensable for the training of a surgeon. Vaccination, unknown to Europe before the 18th century, was known in India as early as 550 A.D. The Science of Hypnotism and Hypnotic Therapy appears to have originated among the Hindus. This knowledge spread to Egypt and Greece later.

**Pathology in Charaka and Susruta.**—In both Charaka and Susruta Samhita a separate division, consisting of several chapters, has been reserved for the subject of Pathology. The Section on Pathology is known as 'Nithana Sthanam.' Charaka deals with this subject in eight chapters. In the Susruta Samhita, which consists of six divisions, the second one, consisting of 16 chapters, is devoted to the Pathology of Surgical Diseases. The ages of Charaka and Susruta have been variously estimated. It has been stated that they lived during the 2nd and 5th century A. D. respectively. Other historians have fixed the time of Susruta as 500 B. C. In the modern researches into the antiquity and theory of Ayurveda, is new interest in the Indigenous Systems of

Medicine has been aroused, not only among Indians but among Western Scholars. It has been stated by some medical historians that, owing to the essential affinity, between Ayurveda and the old Greek Medicine of Hippocrates, and owing to the deep gulf in historical knowledge between the age of Hippocrates and the age that witnessed the evolution of Ayurveda, it is difficult to fix how much Ayurveda borrowed its essential features from the Greek medicine.

*Indebtedness of Greece to India.*—It is, however, generally held that the Hindu Ayurveda was of earlier antiquity and influenced the Greek concept of disease. Hippocrates is stated to have lived between 460-370 B. C. and to have propounded the Humoral Theory, but Ayurveda, as the name suggests, may be as old as the Vedas themselves, and the Vedas have been admitted by European scholars to be the oldest books in the world. It is stated that there are significant passages, which unmistakably point to a well established system of medical treatment to have been in vogue at the Vedic period. Opinion is, therefore, everwhelmingly in favour of the theory that the Medicine of the Greeks was largely borrowed from India. It can be definitely stated that the fundamentals of Ayurveda, especially, the concept of 'the Thridosha' was not borrowed from the Greeks or from any other nation. Many facts have been adduced by scholars that ancient Greece, directly or indirectly,

owed her Medicine and especially the famous 'Humoral Pathology' to the ancient Hindus. Historical researches have shown that the ancient Hindus were a great maritime, highly enterprising and colonial race. Indians had colonised in Greece. The colonists carried the seeds of the Hindu culture, including Hindu Medicine, and sowed them on the virile Greek soil.

It has been stated on high authority that modern Europe owes its system of Medicine directly to the Arabs and through them indirectly to India. It is probable that Medical Science developed for some time by contemporary contact and mutual influence in India, Egypt and Babylon. A general survey of Indian Medicine from the Vedic and Buddhist periods, followed by centuries of slow progress, and later of stagnation, will give the medical student the true historic perspective, which is essential for the culture of a successful physician. It is with a view to stress the importance of a study of "the History of Indian Medicine," that I have somewhat digressed from the main subject of my address.

*Sources of Ayurveda—Science, Philosophy and Religion of the Hindus.*—The sources of Ayurveda are scattered among such works of Philosophy as Nyaya and Samkya Dharsanas, and such works of Religion, as Vedas, Puranas and Itihasas. To the majority of us, of the present day,

such a mix-up of Science with Philosophy and Religion must seem unscientific. But, it should be remembered that in Ayurveda, as in Hindu thought generally, all branches of study, Science, Philosophy and Religion are ever associated with one another. If the scope of Science is to ascertain the truth in every possible branch of knowledge, no sphere of enquiry is beyond the legitimate field of Science. The ancient Hindu thinkers have evidently been of the same opinion as the scientist, Karl Pearson, that to draw a distinction between Science and Philosophy is obscurantism. To the ancient Hindu, all branches of knowledge formed one connected whole. The association of Philosophy, Religion and Science is on axiomatic proposition in Hindu thought. To him, Philosophy was not a pure speculative theoretical study dissociated from the problems of life. It was considered to be of practical value in regulating his daily life.

"The Theory of Thri Dhatu and Thridoshas" forms the foundation of Aurvedic Physiology and Pathology.

"The Theory of Thridhatu" forms the foundation of Ayurvedic Physiology. It is unfortunate that this theory should be confused with "the Hippocratic Humoral Theory."\* I am informed by authoritative opinion that the three Dhatu—Vata, Pitta, Kapha are, most emphatically, not the three "Humors"—wind, bile and phlegm. The Hippocratic humoral theory con-

sisted of four humors. It had nothing to do with the Thridhatu conception of Ayurvedic Medicine. According to the Ayurvedic conception, health and ill health are the functions of 'Dhatu Equilibrium'. When normally disposed, the 'Dhatu' are in their pure state, fit to be built up into the body; when abnormally disposed, they are in their 'Mala' or impure state, only fit to be rejected and thrown out of the body. When the "Dhatu" become impure, they are known as the 'Doshas'. Therefore, the 'Dhatu' and 'Doshas' are only two different states, which stand in the relation of cause and effect.

I am not competent to pass any opinion on this Ayurvedic concept of Physiology and Pathology. It is enough for me to draw your attention to the fact that we have gone beyond Virchow's Cellular Pathology. The original simple conception of the cell has given place to the view that there are enormous complexities in the cell, as evidenced by the growing science of Immunology, Endocrinology and Psychology. Western scientists have begun to talk of emotional and mental states. When will our daily increasing knowledge of Immunology, Bio-Chemistry, Endocrinology, Psychology, Vitaminology, etc., lead us to a radically changed newer concept of disease, it is not possible for me to prognosticate. The tendency appears to be towards a more rational concept of a Humoral Theory, modified, though it may be, from the oldest and most famous Ayurvedic concept.

### Hindu conception of the Unity of life—Religion, Morals and Science.

The stable quality of the Hindu culture lies in the fundamental belief in the Unity of Life, the Wholeness of Life. To the Hindu, all the Three Elements of Civilisation, Religion, Morals and Science, form an indivisible whole. To him, Religion alone is not Truth, nor Science alone. He conceives that Religion and Science should balance each other for the maintenance of good Morals. It has been said that the most stable period in Indian History was the Hindu Period, when Religion, Morals and Science balanced each other, and produced a harmonious whole. But now, Science has ascendancy over Religion among men but to the Hindu to lack Religion is as bad as to lack Science. Osler has said that "the quest for Righteousness is Oriental, the quest for Knowledge, Occidental."

*Hindu Concept of the Body, Mind and Soul.*—In those golden days of the high water-mark of Ayurveda, Religion and Medicine always went together. They were inseparable companions. When Medicine failed to comfort and solace the sick, the physician resorted to Prayer and what specifics failed to do, incantations often achieved.

Religion, Faith and Hope are the most powerful curative agents in disease to-day, as in the days of yore. Patients will continue to seek such aids for a cure. The infusion of Faith and

Hope has a powerful stimulant action on the mental factor of patients, and the Mind plays a very important part in the healing processes. According to the Hindu and the Zoroastrian religions, prayer is the best of all medicines, and it has always been and will ever continue to be the greatest source of solace and comfort to the sick.

In Hindu thought there has never been any isolation of the several branches of study. According to Hindu Physiologists, man is divisible into his physical body, *plus* his mental body *plus* his Athma (and not merely the physical body, according to the Western conception). The Hindus conceived that both Mind and Body are equally "matter." Prof. Sherrington has stated that the physical and mental processes are very much alike. To him, the Mind is as material as the Body. The view of Prof. Sherrington was the accepted view of all Schools of Hindu thought. They have always held that both Mind and Body are alike "matter", though the "matter" of the Mind is subtler than that of the Body, which is comparatively gross.

Therefore, according to the Ayurvedic conception, the functions of Vatha, Pitha, Kapa included both physical and mental processes. It is, therefore, contended that the Ayurvedic conception of the functions of the Tri-Dhathus—Vatha, Pitha, and Kapa—cannot be expressed in terms of Western physiology at

the present day. There is no use trying to fit in Ayurvedic conceptions with Western conceptions of Medicine, where they refuse to harmonise with each other. According to the advocates of Ayurveda, the basic ideas of Ayurvedic Medicine should not be distorted to fit in with those of Western Medicine. The 'Tri-Dhathu Theory' is not the 'Humoral Theory of Hippocrates' or its various subsequent modifications.

The 'Cellular Theory' of Virchow has tolled the knell of the Greek 'Humoral Theory,' but the Tri-Dhathu Physiology of Ayurveda is stated to go beyond the 'Cellular Theory'. At present, the 'Tri-Dhathu Theory' of Ayurvedic Physiology cannot be compared with the existing ideas of Western Physiology.

There is, however, this fact, which has to be recognised: that, whereas the concepts and theories of disease have undergone a large number of variations and alterations in the West, the 'Theory of the Tri-Doshas' of Ayurveda has continued to remain the same, ever since the time it was propounded in the pre-historic Vedic Period.

To those who question why India did not contribute to any great advance in Medical Science until recently, I recommend a closer study of Indian History, including the Social and Religious Institutions.

A brief summary of the recent contributions of India to the Science of Pathology, Human

and Veterinary, will be given towards the close of my address.

*Babylonian Medicine.*—Babylon in Mesopotamia was the cradle of culture in 300 B. C. We have evidences that the Art of Healing was far advanced even then. Surgery was subordinate to Internal Medicine. The proper medical profession was represented by Physicians, who were educated in the Medical Schools. But, the Surgeon had to learn his Art by a period of apprenticeship under a master surgeon. Babylonia was a country devoted to Astronomy and Astrology. Along with mystical conceptions of pathological causes of disease, demoniacal and cosmic influences were considered to be causal agents. That diseases were caused by parasites, gaining entrance into the body from without or originating internally, was known even in those early times. It was thought that actual worms brought about inflammations, suppurations and tumours. But fevers and chronic diseases were supposed to be caused by a derangement of the body fluids, particularly of the blood and lymph. On this the humoral pathology was based. We know that the old Babylonian physicians used a great many medicines, belonging to the three natural kingdoms and have used a great many surgical implements. It is very interesting to read the spirit of that age, which considered that the surgeon should be paid high fees for a successful operation, but should be severely punished for failure.

**Egyptian Medicine.**—The cultures of both ancient Babylon and Egypt appear to be closely allied in many respects. For the History of Medicine, Egypt is very important, because it was in Egypt that the "Papyrus Ebers," which is considered the greatest book on the Medicine of the age was discovered by the famous German-Egyptologist, Ebers. In addition to priest-doctors, famous medical schools existed. The practice of embalming mummies, which prevailed in ancient Egypt, enabled Egyptian doctors to make a superficial study of Anatomy. As dissections were forbidden by the priests a more accurate knowledge of the human body was not possible. As in Babylonia, so in Egypt. Diseases were attributed to the derangement of the body fluids, though in the diagnosis of diseases, the Egyptians were more advanced. The clinical methods of inspection, palpation and auscultation by the ear were known to them. Also the Egyptian medicine was built up on the same Humoral Pathology. There, as elsewhere, the mixing up of Medicine with Religion acted as a great hindrance to real progress. The old Egyptians appear to have had advanced views on Hygiene and Sanitation. The Prophet Moses had drawn up the Sanitary Code for the Hebrews, but Moses wisely incorporated this Code into their Religion. As among the Hindus, so among the Jews. Personal Hygiene and Sanitation were made part of the religious observances.

**Greek Medicine.**—The Greeks were a highly talented and free-

thinking people. They preferred unprejudiced observation of 'Nature' to mere reasoning or unreasoning speculation.

The temples of Æsculapius were places of worship and pilgrimage to the Greeks during the Pre-Hippocratic ages. The Greeks presented to the God of Healing in these temples their offerings, when they were cured, in the form of oblations, made of stone or terra-cotta, in the shape of some parts of the human body, (hands, feet, head or internal organs). Before the time of Hippocrates, the temples were places, where treatment was given by suggestion, often inducing sleep. This is known as the "temple sleep" of the ancient Greeks. With or without the aid of narcotics, the patient was induced by suggestion into sleep. The hypnotic sleep and suggestion were effective as therapeutic agents in certain ailments, especially, neurosis. It was only during the time of Hippocrates that these temples became the real resorts of the sick, Hospitals or Sanatoria.

The members of one family in particular claimed direct descent from Æsculpius, the God of Healing and the family was known as the Asclepiadæ. The monopoly of healing was preserved in the family and the Art was handed down from father to son. To this family of Asclepiadæ belonged the famous Hippocrates, the Father of Medicine, whose statue we still possess and whose 'oath' has been handed down to this day.

It is very interesting to note that he kept the most exact records of his observations engraved on wax tablets, which were then in use long before the invention of paper. From his writings we learn that he was a very keen observer and that nothing escaped his attention. Nothing appeared to him too small or insignificant. On perusing his writings we wonder whether they could have been written 2,500 years ago.

**The Age of Hippocrates—The Father of Medicine.**—The greatness of the Greek civilization is seen in the real scientific approach to the study of medicine. They did not worship Æsculapius as a God of Healing, but based their system of Medicine on Experiment, Observation and Reason. The first complete separation of Medicine from Religion was effected by the ancient Greeks. The Temple of Æsculapius were converted into Hospitals and Sanatoria. In 400 B.C. Hippocrates, the greatest of all physicians, brought about this drastic reform of freeing medicine from the obscurantism of priests. The burden of responsibility for disease was taken away from the heads of the Gods and placed on the shoulders of men. He preached that diseases arose on account of man's ignorance and that man's diseases were man's problems and that, therefore, he should find a solution for them by his own reasoning and research. It may be said that the History of Medicine really begins from the time of Hippocrates, i.e., from the time of

man's acceptance of his personal responsibility for disease. Hippocrates taught that knowledge could be acquired only by observation of the phenomena of 'Nature' and by deduction from the observed and ascertained facts and data. The School of Hippocrates was inspired by the true spirit of medical research. They believed that man is capable of discovering the Laws of Nature by adopting regular scientific methods. Modern Medicine is built up on the principles of science, laid down by Hippocrates. They are: (1) There is no authority except facts. (2) Facts are obtained by accurate observation, and (3) Deductions are to be made only from facts. Science is opposed to Dogma or mere opinion. Hippocrates was the first physician to differentiate diseases. He attempted to divert medical thought away from imaginative speculation and broad-base it on common sense and accurate observation. He has well said;

"To know is one thing; merely to believe one knows is another.

To know is Science, but merely to believe one knows is Ignorance.

**The Hippocratic Humoral Theory.**—Even though Medicine was fairly well advanced during the Hippocratic period, the Conception of Disease was based on the 'Humoral Theory.' In spite of advanced conception of disease and healing. Hippocrates held that poisonous evaporations from

the ground, which he called 'miasmata,' brought about diseases by a derangement of the body humors. According to him, the four cardinal humours, (blood, phlegm, yellow bile and black bile), corresponded to the four temperaments (Sanguine, Phlegmatic, Choleric and Melancholic) (melas, blacke, hole, bile).

The 'Humors' consisted of mixtures of the four 'qualities'—cold, heat, wetness and dryness. "Thus the blood, like air, was hot and wet: the phlegm was cold and wet, like water; the yellow bile was hot and dry, like fire; the black bile was cold and dry, like earth. The blood arose from the heart, the phlegm from the brain, the yellow bile from the liver, the black bile from the spleen." A proper balance and mingling of these 'Humors' maintained health; and an imbalance of them produced disease. Faulty mixture or faulty humors, which he called "Dyscrasia," brought about disease.

According to this speculative "Theory of Humors," acute diseases were regarded as passing through three natural processes,—

- (1) a prodromal or crude stage;
- (2) a stage of ripening ('Coc-tion' or 'pepsis').
- (3) Crisis or resolution; in this stage the diseased material was supposed to be expelled from the body through some natural channel.

But the Science of Pathology did not make any progress among

the Greeks, because the post-mortem study of disease was prohibited. In the Alexandrian period, dissection was limited to animals for the study of Anatomy only. Though clinical observations on disease had been accumulating, for want of proper post mortem study, much ingenuity was expended to fit the Phenomena of Disease into the purely speculative 'Theory of Humors'.

'The Humoral Theory,' reigned supreme for 2,000 years, until it had to give place to Virchow's "Cellular Pathology".

*The Object of the Physician according to Hippocrates.*—The object of the physician was, therefore, to seek which 'humors' preponderated and how to restore the balance of the 'humors'. In pursuance of this object, he taught that the physician should rely, to a great extent, on the "Healing Powers of Nature," ("the vis medicatrix naturæ"). His humoral theory, however, being the product of deduction from observation, was no barrier to the progress of medical thought, but acted as a stimulus to further observation and collection of facts. More and more observational facts accumulated and helped in the testing the soundness of the theory. The theory may be discarded, when it is no longer useful, but the facts will remain. 'Hippocratic Method' is the origin of the Modern Scientific Method.

Hippocrates worshipped 'Nature' and was learned in the

ways of 'Nature'. He is called the 'Father of Medicine'; he is also the 'Father of Physiology'.

*The Hippocratic Conception of the Similarity of the Processes of Disease and of Healing.*—To Hippocrates, the process of illness and the process of healing meant one and the same thing. To him, 'the symptoms of illness are symptoms of healing.' Alas! Very few men of even Modern Medicine grasp the significance of the above conception of Disease and Healing. Hippocrates relied on the 'Self-cure of Nature.'—"Nature sanat" (Nature heals).

Hippocrates lived in the great age of Pericles, a period of the highest achievements of the Greeks in literature, government, arts and sciences. He lived shortly before Plato and Aristotle. The impetus given to the proper scientific study of Medicine by Hippocrates lasted only for a period of 300 years. The Greek civilization declined and the progress of Medicine was also hindered, by unscientific speculations, taking the place of observation and logic. Physicians were divided among themselves into different schools, holding different theories as to the causation of disease and adopting different methods of treatment. 300 years after Hippocrates, Corinth was destroyed and Greek Medicine was transplanted into Rome.

#### Post-Hippocratic Medicine of Alexandria.

The school of Cos in Greece retained its pre-eminence during the time of Hippocrates and only

for a short period after him. Medicine, from being a hereditary art, became a practice, which anybody might learn. With the degeneracy of the Greek civilization, there came into being various Systems of the Healing Art, in which theoretical speculations preponderated. The two great philosophers, Plato and Aristotle are to a large extent responsible for the introduction of theoretical considerations into the healing art. Speculative contemplations have often a tendency to replace correct observation and desire for experiment, thus tending to impede the development of scientific knowledge. The post-Hippocratic period was characterised by subtle theories and dogmatism, which replaced the Hippocratic method of observation, experience and rational inference.

After the decline of Greek medicine, Alexandria in Egypt was destined to inherit it. By the conquest of Alexander the Great, greek medicine established itself in the School of Alexandria. Alexander made Alexandria a centre of culture and established the famous library, which is said to have comprised of almost a million volumes. Among them there were 400 works of Hippocrates, indeed a great literary legacy. The famous library was burnt down by order of the Emperor Theodosius. He was a Christian zealot, who considered all heathen culture abominable. His act of vandalism has never been surpassed in history.

We are told that in Alexandria there were libraries and museums,

botanical and zoological gardens and clinics and hospitals. Great men thronged to this reputed centre of culture in those days. St. Luke, the Evangelist, is stated to have received medical education in the school of Alexandria. The fame of Alexandria rests largely on the fact that it was in this town that the prejudice against the dissection of the human corpse was broken. As a result, Alexandrian medicine was much advanced in its knowledge of Anatomy and Physiology. But the Alexandrian doctors preached the Hippocratic Theory of disease but forgot that the Substance of the Hippocratic Teaching was his Method. Higher value was attached to the Hippocratic Theory than to his Method of observation, rational thinking and inference. It has always been a human weakness to mistake the shadow for the substance. The two important physicians of the Alexandrian school were Herophilus and Erasistratus. Herophilus was a distinguished anatomist and he was considered the disciple of Hippocrates, because he professed the humoral theory of disease. Erasistratus, on the other hand, opposed the humoral theory but held fast to the Hippocratic Tradition and Method. He taught that the Science of Medicine should be based (1) on experience derived from the histories of disease, (2) from actual observations of sick persons, and (3) from analogies drawn between them. He maintained that these three sources of experience should form the Tripod for the Practice of Medicine. The School of Empiri-

cism was built on this. They rejected the Theory of Humors, because it did not square with observed facts.

*Roman Medicine.*—This was also derived from Greek Medicine. The slaves of Greece played an important part in the transport of the Greek knowledge of Medicine to Rome. The Greek slaves freed from slavery began to practise among the Roman peoples. Later on, Cæsar himself granted the civic right of Rome to every doctor; but the Roman Empire did not leave any marked influence upon the development of Medical Science, but the Romans improved Surgical technique and laid the foundations for specialising in the various branches of medicine. We learn from history that, in Rome, Eye specialists, Otologists and Obstetricians practised their respective specialities. The outstanding names in Roman medicine are Celsus and Dioscorides, during the 1st Century A.D. and Galen during the 2nd Century A.D.

*The Theory of Methodism.*—The medicine of Rome, as has already been stated, descended from the Greek and Alexandrian Medicines. There, a new theory of disease was evolved, known as the 'Theory of Methodism.' According to this theory, all diseases were due to disorders in the natural arrangement of those "atoms", of which the body was supposed to be composed. Asclepiades held that the "atoms" were united to form 'pores,' through which the fluids of the body were flowing. If these 'pores' were

choked, the fluids became dammed up.

His pupil, Themison, carried this idea further. He recognised three states of the "Pores," relaxation, contraction, and a mixture of both. He taught that it was necessary to determine the condition of the 'pores' in every disease before proper treatment could be given. Like the Theory of Humors, the Methodist Theory compelled the physician to observe the symptoms of his patient. It served the purpose of the Medical Science by increasing the stock of exactly observed facts.

By the time Galen began to practice Medicine, the sumtotal of observed facts were such that they outstripped hypotheses and would not square with the previous theories, as to the causation of disease. The facts could not be explained in terms of the 'Theory of Humors' or the 'Theory of the Empirics' or the 'Theory of the Methodists'. The Empirics and the Methodists had rejected the 'Humoral Theory.'

*Claudius Galenus* (A.D. 103—200).—He was a native of Asia, but a Roman, by adoption. His name ranks only second to that of Hippocrates. He is said to have engaged himself in scientific feuds. He was intolerable to any opinion, opposed to his own. He settled himself in Rome, the capital of the Roman Empire, and the centre of culture at the time. He was a rich and famous physician. He was an authority on Medicine and a Dictator to his

colleagues in the profession. He was the doctor of the famous Philosopher Emperor, Marcus Aurelius (A.D. 121 to 180). Galen's influence continued for nearly 1,500 years after him. 400 of his medical treatises have been handed down to posterity. Like Hippocrates, Galen was a prolific writer and his works therefore, are of great historical interest. His works served as the 'Doctor's Bible' for many centuries.

According to him, 'Nature' does not act without a purpose. Disease consequently is a deliberate action not an unwarranted by-effect. The symptoms of disease are not the expressions of hostile but of friendly healing forces. According to his theory, the symptoms of disease should not be suppressed but, on the contrary, should be furthered or even aggravated, if necessary.

Galen had a good knowledge of the physical and chemical processes of digestion and nutrition. Though he thought that the brain was the seat of the soul, he recognised that it was the centre of all sensations and body-functions. He laid more emphasis upon treatment than on other branches of medicine. To him the main purpose of the physician was to cure, to make healthy and keep healthy. He taught that the physician should abstain from interfering with 'Nature,' when 'Nature' itself sufficed to bring about a cure. Galen recognised that every illness had a beginning, a period at aggravation and a stage of 'crisis' before abatement. He also differenti-

ated between accidental causes of disease and direct causes of disease. Only Galen's name and his ideas continued to receive great admiration, until the time of Paracelsus, the famous physician of the middle ages. It has been said of Galen that he was not only the summit but also the terminus of the medical science of antiquity.

*The Theory of Pneuma*—Galen built his hypothesis of the 'Spirit' or 'pneuma', which he imagined penetrated every part of the body and was mingled in different proportions with each of the four humors. He taught that the 'pneuma' was subjected to four influences, or 'elements'—heat, cold, wetness and dryness. According to him, health could be adversely affected by faulty combinations of these four influences. 'Distempers' arose owing to the altered 'pneuma' and such 'Distempers' were communicated to the 'humors'. He recognised abnormal states of 'humors', as "yscrasias." He traced these to climatic and other influences, existing outside the body. This theory led him to take a new view as the nature and action of drugs.

Galen's 'theory of pneuma' also compelled the physician to observe disease processes and symptoms, as he had to determine the state of the 'pneuma' and of the 'humors' and of the external elements, such as, heat, cold and the like, in order to adopt a rational line of treatment. In so far as Galen's theory served as a stimulus to

observation and experiment, it was in the tradition of medical progress.

Unfortunately after Galen's time, his 'pneuma' came to be identified with conceptions of religion and acquired a religious sanctity, which was never meant by Galen. With the invasion of Religion into Science, the progress of medical science was hindered. Any criticism of the theory was considered an act of impiety. Observation and Experiment were discouraged. Galen, who was trained in the Hippocratic method, would have, if he had been alive, resisted all such attempt to substitute the Authority of Tradition for that of Ascertained Fact.

With the fall of the Roman Empire, the Catholic Church rose to power and the Moslem power led to the creation of the Mahomedan Empire. The rise of the power of the Church created the "Age of Faith" and the Spirit of the Age was against Science. The Church taught that disease was an expression of 'Divine Displeasure,' and that it could be cured, ameliorated or prevented, only through the intermediation of Priests. Attempts were made to suppress scientific ideas in Medicine. The 'pneuma' of Galen became associated with the religious doctrine of the soul.

*Arabian Medicine*.—Schools of Medicine arose in many cities of Arabia. There, Hippocratic and Galenic medicine were taught. The Baghdad School became famous, because there the culture

of the East, especially from India, mingled with the culture of the West, of the Greeks and the Romans. The Arabian Medicine is characterised by its contributions to *Materia Medica*. Pharmacopæas and Apothecaries' shops arose during this period. The Arab doctor enriched knowledge with many contributions to epidemic diseases, such as, smallpox and measles, and to the Pharmacopæa. The rapid conquest of Europe by the Arabs contributed to the spread of their Medicine as far as Spain. Rhazes' name is famous among the Arabian Physicians. As the Medicine of the Arabs did not challenge the teachings of the Church and as the treatment of the Arab physicians was more effective, the Doctrine of Galen, as expounded by the Moorish and Jewish Physicians, did not offend Religion or challenge the teachings of the Church. The spread of the Arab Medicine gave Europe access once more to Greek Culture. The School founded by Jewish teachers at Montpellier was the most famous.

*A Brief History of the Early Post-Hippocratic Theories of the Nature of Disease*.—As has been already stated, the tendency to speculate and formulate theories without sufficient observation or proper experimental evidence, resulted in the origin of many Schools among the followers of the 'Humoral Theory of Hippocrates'.

The 'Dogmatists' (Dioscorides, Praxagoras) emphasised Theory. The 'Empiricists' laid stress on

previous experience and did not care much for logic or Anatomy.

*The Theory of 'Plethora'*.—Erasistratus (330 B. C.) a prominent member of the Alexandrian School attributed all disease to a state of 'plethora'. To him 'plethora' meant a suffing of organs and vessels with an over-supply of nutritive material. To him pneumonia meant plethora of the lungs; arthritis, plethora of joints; dropsy, plethora of the liver, etc. He attributed the results as the causes of the conditions. It was like putting the cart before the horse.

*Theory of 'Solidism'*.—After the decline of the Alexandrian School, the School of Asia-Minor became prominent. Here Asclepiades (124 to 56 B. C.) propounded the theory of 'Solidism' against the 'Humoral Doctrine'. According to 'Solidism,' diseases were caused by 'contracted' or 'relaxed' condition of the solid parts. This theory assumed that there was a flow of vital fluids, through an infinity of minute tubes or pores between the particles or atoms, that made up the body. A constriction of the tubes caused acute disease, whereas relaxation resulted in chronic illnesses.

*School of 'Methodism'*.—After the school of 'Solidism' came the followers of 'Methodism.' The theory of 'Methodism' laid stress on the increased or decreased excretion from the body, but disregarded local symptoms and associated anatomical changes.

*The Theory of 'Pneuma.'*—The School of 'Pneumatists' came into existence about the year 70 B.C. and lasted for nearly six centuries of the early Christian era. According to them, the 'Pneuma' or 'vital air,' taken in by the lungs 'to cool the inner heat of the heart,' was supreme. Disease resulted, if the 'Pneuma' was disordered in quality.

*School of Elections—Theory of 'Dyscrasia.'*—The School of Eclectics, who flourished in the first few centuries of the Christian era, appreciated the value of observation and experiment and accepted all the best knowledge in their time, without regard to their source. Among them was Galen (130—200 A.D.) Though he appreciated the value of observation and experiment and was the greatest medical man of his time, his theory of disease was an extension of the humoral theory, combined with a dominance of the 'Pneuma.' To the four 'humors,' he added the three spirits, the Natural spirits, (supposed to flow from the liver to the body by the veins); the vital spirit (from the heart by the arteries); the animal spirit (from the brain by the nerves). He divided diseases into three classes: (1) Diseases affecting similar parts or simpler tissues; (2) Organic diseases (inflammations and hypertrophies affecting compound tissues); (3) General diseases ('Dyscrasias,' due to an upset of the equilibrium of the 'humor') According to Galen, health depended on the presentation in proper proportions of the 'humor'

to the various organs and their proper adhesion to them.

The 'Galenic concept of disease' held away for over a thousand five hundred years. Like Hippocrates, Galen was the most important figure in medical history. The dark and middle ages were bereft of scientific progress and medical thought. The authority of Galen suppressed everything, which did not conform to his theory.

But with the Renaissance, came the Spirit of Revolt. Paracelsus is said to have burnt the works of Galen and Avicenna in the market place of Basel.

The Arabs did not add anything new to the pathological concept of disease. They merely accepted the Greek theory of the four 'humors,' made of the four 'elements,' and influenced by the three 'spirits.'

Fracastorius (1478-1583) should be considered as the 'Father of Modern Pathology'. He entertained remarkable views on contagion. He compared the virus transmissible disease to the fermentation of wine. He anticipated Pasteur in the conception of the microbic origin of infectious disease. He recognised eight contagious diseases (Plague, Phthisis, Epilepsy, Scabies, Erysipelas, Anthrax, Trachoma and Leprosy). Typhus fever, Foot-and-Mouth Disease and Syphilis were recognised by him.

*The Theory of 'Archeus.'*—Paracelsus (1493-1541) was the

first openly to oppose Galen. He furthered the use of chemicals in therapy, but he did not further the concept of disease. He promulgated the theory of 'Achæus' or 'vital principle' or the 'essence of life.' He held that this principle was enclosed in an invisible 'Mumia.' What he meant by 'Mumia' is not very clear. The important influence of Paracelsus on his contemporaries was in the revolt against blind authority. He prepared the way for scientific advance through independent observation.

*The Iatro-Chemical School—Theory of Vital Forces.*—The Iatro-Chemical School was founded by Vonhelfmont. He tried to explain all diseased phenomena as chemical changes. Every bodily process was controlled by a "blas". The chemical processes were brought about by a special ferment or 'gas.' The word 'gas' was used in the general sense of 'air.' He conceived of a vital body force, which he called 'Archeus Insitus,' and a divine force, 'Archeus Infleus.' These two forces regulated both physical and psychical activities. When these forces were upset by the "idea morbosa", diseases resulted. He, therefore, conceived of disease, not as imbalance of 'humor,' but as an actual, though an invisible principle.

Franciscus Sylvius (1614-1672) of Leyden was a staunch supporter of the Iatro-Chemical School. He propounded chemical theories of body function and recognised the importance of the blood in health and disease. Sylvius con-

tributed to advance in the science of Anatomy and in our knowledge of Tuberculosis, as he had many opportunities to perform autopsies.

Thomas Willis (1621-1675) advanced our knowledge of Anatomy and also of the Pathology of the Nervous System. He was the first to observe that the urine in diabetes was sweetish.

*Iatro-Physical School.*—Opposed to Iatrochemical school was the Iatro physical school that sought to explain all vital phenomena on the basis of Physics.

Thomas Sydenham (1624-1738).—He emphasised the value of observation and placed chemical experience above theory. He held the humoral theory and conceived of disease as Nature's effort to throw off the 'Materis Morbi' (the morbid material). Each disease was thought of as an independent natural process, following a natural course. He believed acute diseases to be due to inflammation of the blood. He attributed chronic diseases to 'humors,' disordered by diet or habits of life. To him, man's disease is due to his own fault.

Hermann Boerhave (1668-1738) was a follower of Hippocrates and an 'Eclectic.' To him the teachings of the Iatro-physicists and Iatro-chemists were both welcome. He recognised the value of post-mortem examinations and published many important descriptions of them.

*The 'Animistic' Theory.*—The 18th century was characterised

by many speculative theories of disease. George Erenst Stall advocated the 'Animistic' theory. He conceived of the '*Anima*' as the 'life force' which governed the activities of the living body and protected it from degeneration. The '*Anima*' normally produced a series of movements in the body to keep the body healthy. These movements took place in the circulatory system and therefore special attention was paid to the increased pulse rate in febrile diseases. When the '*Anima*' was disorganised, disease resulted and when the '*Anima*' left the body or any of its parts, putrefaction resulted.

*Theory of 'Motion' and 'Tonus'.*—Friedrich Hoffmann, (1660-1742), propounded a new theory that life consisted of 'motion' and death resulted from cessation of 'motion' and that the body was made up of fibres, having different 'tonuses,' which made them contract and dilate. This 'tonus' was supposed to be maintained and regulated by an imaginary 'ethereal matter,' which had its centre in the brain, from where it sent pulsating messages throughout the body. Disease was supposed to be caused by changes of 'tonus,' acute disease being due to Spasm, and chronic disease to Atony. He, therefore, advocated 'Sedatives' in the one case and 'Tonics' in the other. He also believed in disordered humors and excretions. Hoffmann is the greatest of the Iatro-physicists and is credited with being the first person to perceive that "Pathology is an aspect of Physiology".

*Theory of 'Cohesion'.*—Jerome David Gaub. (1705-1780), clearly laid down that Pathology should treat of "Disorder of Function as well as of Structure". He divided Pathology into General and Special Pathologies. Causes of disease were divided into the 'Predisposing' and 'Active' and 'Remote' and 'Proximal'. In spite of the growing accumulation of knowledge in 'Pathological Anatomy,' he was expounding a modified humoral theory. He considered the body to be composed of a wet mobile substance, an inflammable material and saline and earthy substances. According to him, disease was produced by an improper mixture of these substances. He attributed debility to a deficiency of the natural 'cohesion' between these body matters and stated that excessive 'cohesion' of these matters caused stagnation, obstruction, infarction, etc.

*Theory of 'Stimuli'.*—John Brown, (1735-1788), postulated the theory that health consisted "in a constant succession of balanced stimuli from the exterior, which, if excessive, produces 'asthenic' diseases; if insufficient, asthenic diseases". To him, opium and alcohol were the panaceas.

#### A Brief History of Pathological Anatomy.

*Anatomical Concept of Pathology*—Antonio Benivieni, (1440-1502), is considered the "Father of Pathological Anatomy." Garrison regards him as the

Founder of Pathology, before Morgagni. He performed many post-mortem examinations to determine the cause of death and explain symptoms. Alessandro Benedetti (1460-1525) was another Italian, who gave a stimulus to the 'anatomical point of view in disease'. He built the Anatomy Theatre at Padua, which was a centre of learning for such illustrious medical men, as, Vessalius, Columbus, Fabricius, Harvey and Morgagni.

The sixteenth century laid the foundation of the Science of Anatomy. Those were the days 'Universalism' and not 'Specialisation.' The same men contributed to different branches of Medicine—Medicine, Surgery, Obstetrics, Pathology, Etc.

Jean Fernel, (1497-1558), published in 1554 his "Universe Medicina". This work included Physiology, Pathology, and Therapeutics. He emphasised a rational pathological viewpoint in the treatment of disease. His "Pathologica Liebri XCII" is considered the "First Medical Work on Pathology". Fernel subscribed to the theory of the four humors and to the other implications of that theory.

In the 14th, 15th and 16th centuries, surgeons contributed to our knowledge of pathology, which may be called the 'Living Pathology' of the present-day surgical operations.

Marco Aurelio Severino, (1580-1656), wrote the "First Test of

Surgical Pathology." He was also the first to include illustrations of pathological lesions in his book.

Thomas Bartholin (1616-1680) was a Dane. He wrote his "Anatomia Practica", in which he collected many pathological findings in all organs, but, unfortunately, all his papers were destroyed, when his house was burnt down.

Johanne Jakob Wepfer (1620-1695) made many observations including those on apoplexy, abscess and tumors of the brain. He was a famous physician, who recognised the great value of necropsies.

*This by the seventeenth century, the anatomical concept of disease and the study of diseased organs was fairly well advanced.*

Systematised gross Pathological Anatomy may be considered to have begun with Benivieni at the end of the fifteenth century. But no collection of systematised morbid anatomical facts was made, until Theophilus Benetus of Geneva (1620-89), published his great work—"Sepulchretum Anatomicum sive Anatomica Practica" (1679). This work contained clinical and pathological descriptions of 3,000 cases, collected from the literature, since the earliest times.

Steven Blankaart's (1650-1702) "Anatomia Practica" was a record of 200 autopsies. Frederick Ruysch (1638-1731) published his "Thesauri Anatomica",

which contained not only pathological observations but also anatomical illustrations. He collected for his museum a large number of normal as well as morbid anatomical specimens. His famous museum at Leyden is said to have been purchased by Peter the Great for 30,000 florins and taken to Leningrad.

Joseph Lieutaud (1793-1780) published his "Historia Anatomica-medica", which was based on 1,200 autopsies, performed at the Versailles Hospital.

**The Anatomic Concept in Nosology.**—Giovanni Battista Morgagni (1682-1771) is one of the "Greatest Figures in the whole History of Pathology". He initiated the scientific study of gross Morbid Anatomy. He collected a vast amount of Pathological material, which he always closely correlated with clinical findings and arranged and analysed it in a systematic manner. By doing so, he was able to draw logical and far-reaching deductions as to the nature of the diseases in question and of disease in general. To Morgagni should be given the credit of having established the 'Anatomic Concept' in Nosology and for placing Pathologic Anatomy on a scientific basis as a branch of Modern Medicine.

Morgagni taught at Padua, which was the 'Mecca' for medical men in those days. Morgagni was the "last of the great Italians", to be a medical focus for the whole world. A regular autopsy technique was drawn up by him.

### *The Madras Medical Journal*

Antonio Scarpa (1747-1832) made many anatomical discoveries, which he illustrated very artistically. He also made many pathological observations on Hernia, Aneurysms, Diseases of Bones, etc.

William Hunter (1718-1783) was a great Anatomist and Obstetrician. His collection of specimens is preserved in the Hunterian Museum at Glasgow.

John Hunter (1728-1793) the younger brother, but a more celebrated person than his brother William Hunter, collected 13,000 specimens, which are now placed in the Hunterian Museum of the College of Physicians and Surgeons, London.

Mathew Bailey (1761-1823) was the nephew of the Hunters. His contribution to Pathologic Anatomy was his book entitled "the Anatomy of some of the most important parts of the Human Body". By his time, the Science of Pathology had begun to be taught as an independent science.

He published an "Atlas of Pathologic Anatomy", the first of its kind, in which he put in artistic illustrations from steel plate engravings. Bailey's work was translated into a number of languages.

Though theoretical speculations continued to be kept up in academic pedagogy, by the end of the 18th century, Gross Pathologic Anatomy was established on a firm basis, as an

### *A Brief Account of the History of Pathology*

independent branch of Medical Science.

Marie-Francois-Xavier Bichat (1771-1802) is to be ranked as "one of the Founders of Modern Pathology", along with Morgagni and Virchow.

**Tissue Concept of Bichat.**—It was Bichat, who gave a new concept to Morbid Anatomy by his presentation of the various tissues as units,—hence the word "Histology" (histos, a tissue). 'Histology' gradually acquired the connotation of 'Microscopic Anatomy.' Bichat's work was done without the aid of the microscope. He relied on dissection and treatment of dissected tissues with various physical agents and chemical reagents. Bichat's tissue concepts established Tissues rather than Organs as the important Biological Units. His 'Tissue Concept' ranks only second to that of the 'Cellular Concept' of Virchow. Bichat distinguished twenty-one kinds of tissues. He described the tissues as the elementary structures, which combine to make up organs and described the organs as units of specific functions. He divided morbid anatomy into two parts, (1) General Pathology, which dealt with changes common to each system, wherever located, and (2) Special Pathology, which dealt with Pathology, peculiar to each region. It was he, who laid stress on this important fact, that *disease of a tissue is essentially the same, no matter in what organ the involved tissue*

may be. Bichat's tissue concept was furthered by Cruveilhier in France and Johannes Muller and Jacob Henle in Germany.

After the French Revolution, French medicine led the world. The French School of Medicine was dominant, until superseded by the German School of Pathologists and Bacteriologists. Bichat's work brought out the important fact that there was *similarity in disorders of similar tissues*.

Corvisart, who wrote a famous book on 'Heart Diseases' in 1806, did "great service in establishing frequent post-mortem examinations as a means of tracing the development of disease, as well as its end changes".

Rene Theophile Hyacinthe Laennec (1781-1826) was the 'Discoverer of Percussion and Mediate Auscultation'. His pathologic studies unravelled the many mysteries of pulmonary pathology. He was the 'Founder of the Art of Physical Diagnosis'. He stated that diseases could be distinguished definitely only by their anatomical characters.

P. C. A. Louis (1787-1872) made careful studies in the wards and mortuaries of the great Paris Hospitals. He was a master of objective observation and statistical analysis. He agreed with Rousseau, that "truth is in the facts and not in my opinion that estimates them." He placed the 'Statistical Method' of enquiry as one of the exact instruments of medical investigation.

Andral was the pioneer to emphasise the 'Chemical Study' of the blood in disease.

J. F. Lobstein (1777-1835) published his "Traite d'anatomie Pathologique" in 1829. He pointed out that there was *no use trying to look into the dead organ for a rational concept of disease* but that it is necessary to learn the workings of the living organ, exercising the functions peculiar to it. The term 'pathogenesis' was first introduced by him. He emphasised the importance of correlating morbid anatomy with symptoms and pointed out the need for animal experimentation.

Jean Cruveilhier (1791-1873) published his Atlas, "Anatomie d'Pathologie", containing beautiful lithograph illustrations. This is considered as the greatest work ever published of its kind.

Richard Bright (1789-1858) who is well remembered in the disease to which his name has been given, "Bright's Disease", was also among the pioneers in England to *correlate bedside observations with autopsy findings*, without the aid of the microscope. But even with the poor histological methods of his day, he accomplished much by his contributions on kidney diseases and other pathological conditions. It is of interest to know that Bright understood the importance of determining blood urea in conditions of uræmia, long before the birth of the new Science of the Bio-chemistry.

Thomas Addison (1793-1860) is well remembered in the two

diseases, to which his name has been given—Addison's Disease and Addison's Anæmia. Claude Bernard discovered the glyco-genic function of the liver. Both Addison and Claude Bernard may be considered as the 'Founders of the Science of Endocrinology'.

Johann Frederick Meckel (1781-1833) established "that most malformations are not the result of mysterious supernatural influence but represent certain stages in the development of the embryo and of its organs, where growth has stopped or continued abnormally".

Carl Rokitansky (1804-1878) is regarded with Morgagni as "the Greatest of all gross Descriptive Pathologists". He made pathological contributions of greatest importance. But, it is curious to learn that he promulgated an anachronistic humoral theory of disease. He and his successors, Skoda and Hebra, made Vienna a great Centre for Medicine. Rokitansky, in his fifty years, is said to have performed over 30,000 autopsies himself. He had accumulated specimens from over 60,000 dead bodies. Many of the specimens are still preserved in the Museum in Vienna.

*The Theory of 'Dyscrases'.*—Rokitansky's theory of 'dyscrases' for every disease or group of diseases was blown up, when Virchow formulated his "cell theory". It should be said to the credit of Rokitansky that he accepted the truth of Virchow's criticisms of his theory and gave up his concept of 'crases'.

Virchow has written as follows recognizing the greatness of the soul of Rokitansky: "How highly must we esteem the man who could forget and learn so much, for whom it was not sufficient to recognise his mistakes but who took the trouble to correct them in the light of the more painstaking methodical researches of his own pupils!" Rokitansky's contribution to Pathology is great. He developed a method of performing autopsies. He emphasized the necessity for viewing diseases from the underlying structural changes in the organs. He was firmly convinced of the great importance of Pathologic Anatomy, both to the Art of Medicine and the Science of Biology.

Hans Chiari (1851-1916) made Prague the leading centre in Europe for the study of Pathology. Theodore Billroth (1829-1894) contributed to Scientific Surgery, by emphasising the need for the study of Surgical Pathology and general pathological principles to the Surgeon. He based surgical procedures on proper pathologic knowledge.

It is a curious fact that, though the microscope was invented over a century earlier to its use for the study of Biology and Botany, it was not, until well in the 19th century, that it was so used. M. J. Schleiden (1804-1887) demonstrated that plants are made up of cells, in which the nuclei are important structures.

Theodore Schwann (1810-1882) established the "Doctrine of the Cell Structure of Animal Tissue".

He showed the similarity of animal and plant tissues and the basic importance of cells in structure and function. New facts about microscopic anatomy were accumulated in rapid succession. Henley discovered various types of 'Epithelia'. In 1843, Julius Vogel wrote a book on "Pathological Histology", the first book to be written on the subject.

Rudolph Ludwig Karl Virchow (1821-1905) has been regarded as "the Greatest Pathologist of all time." He founded the "Archives of Pathological Anatomy and Physiology and of Clinical Medicine, which has continued ever since as the leading pathological journal. He did not confine Pathology to pure Morphology, but emphasised the proper understanding of Pathological Physiology and the relation of Pathology to Clinical Medicine. Virchow established "the Doctrine of the Continuity of Cell Life" by his well-known axiom, "omnis cellula a cellula". On this he based a rational concept of disease mechanism. He demolished Rokitansky's theories of "crases" and "blastema". He also demolished 'Cruveilhier's doctrine that phlebitis was the all important cause of disease. He distinguished between the two Leukemias and explained the phenomenon of Thrombosis Embolism and Pyæmia. He established "the theory of the cellular nature of vital processes," as opposed to the humoral and other theories of such processes. He maintained that the most important symptom of inflammation was 'Functio leisa' (or damaged function). This

was a 'dynamic concept'. Virchow's contributions to Pathological Anatomy and Pathologic Morphology are very many. He believed in 'Metaplasia,' but he was wrong in his concept of 'Metastasis'. He did not accept the migration of leucocytes from capillaries in inflammation. He denied Darwin's "Theory of Evolution" and was impervious to the discoveries in Bacteriology and Immunology.

In spite of the above facts, it must be said that it was Virchow's genius, which established the principles of 'Cellular Pathology,' which is the greatest advance, which scientific medicine has made, since its beginning. It is to him that we owe the establishment of Pathology as a Basic Science, or, which the Science of Medicine should be built up.

Carl Weigert (1845-1904) was a student of both Virchow and Cohnheim. He discovered the differential stains, which enlarged our knowledge of Normal and Pathologic Histology. His another important contribution to Pathology was his demonstration that "destroyed parenchyma was replaced by an overgrowth of connective tissue."

I have thus traced the 'History of Pathology,' from Morgagni's early observations in Morbid Anatomy, through Rokitsansky's large collections of Pathological material and important contributions to Morbid Anatomy to the Tissue Concept of Bichat, and later to the 'Cellular Pathology' of Virchow, which

placed Pathology on a firm basis. Organ Pathology became Tissue Pathology and Tissue Pathology again Cellular Pathology.

But the attention which was successively and profitably focused on diseased organs, diseased tissues, and diseased cells should in future be bestowed on the still mysterious ferments, fluids, colloidal emulsion, etc., present within the cell itself. The future of Pathology lies in the advance of Bio-chemistry.

I propose very briefly to trace the 'History of Experimental Pathology' in this address. The greatest of experimental biologists was John Hunter (1728-1793). Francois Magendie (1783-1855) of the French School proved that diseased processes as well as normal function could be subject to experimental investigation. His famous pupil, Claude Bernard (1813-78), inaugurated a new era in Pathology by establishing by systematic experiments that *diseased phenomena could be produced in the living*. Julius Cohnheim (1839-1884) was the greatest Experimental Pathologist of the last century." He was the most distinguished pupil of Virchow. Cohnheim emphasised the need for the Functional and Experimental Study of Disease and made many important contributions to Pathology. He established the phenomena of 'Diapedesis' in inflammation. Metchnikoff discovered in 1884 the 'Macrophage' and 'Microphage'. Cohnheim propounded theory that cancer was due to misplaced embryonal rests.

William Welch (1850-1934) was a pupil of Cohnheim. The present day prominence of American Medicine and Johns Hopkins Institute is due to Welch. He correlated clinical and pathologic observations. Von Merring and Minkowski produced experimental diabetes in the dog. Opie and McCallum contributed to the Pathological Histology of the Pancreas in human diabetes. The chemical studies were conducted by Naunyn and others. In 1921, Banting and Best isolated Insulin from the pancreas. Exophthalmic Goitre and Myxodema are being investigated in a similar manner by the co-operation of physicians, surgeons, pathologists, bio-chemists, etc.

Rokitansky foresaw that Chemical Pathology will be the Pathology of the future. Andral applied blood Chemistry to Pathology. Leibig was the Father of the Science of Organic Chemistry. Wohler broke the barriers between Organic Chemistry and Bio-chemistry by the discovery that Urea can be obtained from Ammonium Cyanate. Felix Hoppe Seyler advanced the Science of Physiological Chemistry. Emil Fisher (1852-1919) the leading Physiological Chemist of recent times, has enlarged our knowledge of Carbohydrate and Protein Chemistry. The age-old problems of inflammation and oedema have been attacked by Bio-chemists and Bio-physicists with profitable results. The formation of concretions and the mechanism of calcification are being studied. Fruitful results

have been obtained by the application of Bio-chemistry to Uræmia, Diabetes, Acidosis, Metabolic Diseases, etc.

#### Pathology in General.

'Pathology' is derived from Pathos, suffering or disease, and Logos, a discourse or study. Pathology is the Science of Suffering and Disease. The real name of the Medical Science should have been 'Pathology,' rather than 'Medicine,' but the idea in men's minds, that the work of the physician is mainly the administration of medicine for purposes of healing, has been emphasised in that our Science has all along been called the Science of Medicine.

Though originally 'Pathology' meant a Study of Disease, in all its aspects, the meaning had become restricted to the study of the Cause of Disease and the attendant Structural Alterations and Functional Changes.

Pathology should not be confused with merely Pathological Anatomy, which is only a branch of Pathology, though only this branch of study was considered important, until recently.

The anatomical side of Pathology has loomed large, since the middle of the last century. At the present day, we may consider that our knowledge of Pathologic Anatomy is fairly complete. The contributory branches of Pathology, such as, Bacteriology and Bio-chemistry, have begun to claim greater attention now

than mere Pathological Anatomy. The wider definition of Pathology is not bounded by any circumscribed limits because it means the Study of the Nature of Disease in its Functional as well as Structural changes. The Scientific Clinician is almost identical with the Pathologist. The Student of Disease has to learn at the Bedside, in the Mortuary, by the application of Physical and Chemical Methods, by the Mathematical or Statistical Method, and also by the Experimental Method.

It is a pity that, in most of the teaching institutions and hospitals, the Pathologist should be denied the opportunity of being also a Clinician. In most cases, the Pathologist is a whole-time officer, whose duties are confined only to the laboratory. In many instances, the departments of Pathology, Bacteriology and Bio-Chemistry are made to function as Isolated Departments under Independent Heads. The pathological, bacteriological and bio-chemical laboratories should, in my opinion, be under One Unified Control and that the persons, who are working in these laboratories, should have a living interest in their subject by constant association with patients in the hospital wards. The Modern Spirit of Pathology is expressed in 'Organization'.

*Integrated Pathology—Call for Co-operative Effort in Research.*—Integrated Pathology is a distinct advance in the progress of medical science in the 20th century. The Nature and Manifestations of

Disease should be studied by every possible method of approach—structural (anatomical and microscopic); the functional (including chemical, bacteriological, clinical, and, whenever possible, experimental). Such a combined attack on the Problems of Disease, yet awaiting elucidation, has now become the accepted method of approach. A group co-operation of specialists in all the above branches of Medicine has, therefore, become very necessary in these days.

The story of the investigation into the Parathyroids in relation to Tetany and Calcium Metabolism and Osteitis Fibrosa Cystica, and the story of the Pituitary, in relation to Acromegaly, Frolich's Syndrome, Dwarfism and Cushing's Syndrome, etc., are all of recent date and well known to all of you.

So is the story of the Vitamins and the Avitaminoses—Pellagra, Rickets, Scurvy, etc. The combined contributions of Clinicians, Bio-chemists and Pathologists, are already voluminous. The advantage of correlated study (Integrated Pathology) has been well demonstrated in the above important enquiries into the problems of the Endocrines and the Vitamins.

We may all agree that the day of the philosophic speculative concepts of disease, which are unsupported by evidence, is definitely past. Whatever theories or conclusions are worthy of publication, they should, as far as possible, be based on facts. When

such facts are insufficient, the publication should wait for a longer period for more observation and experiment. There can be no System of Medicine, which is not based on the well-established principles of Pathology and on the Scientific Methods of Pathological Investigation.

### The History of Bacteriology.

*The Theory of Spontaneous Generation of Disease.*—Compared to the "History of Pathology," the "History of Bacteriology and Preventive Medicine" is merely one of yesterday. In the olden times Surgery was attended by great risks and plagues and pestilences swept over every part of the world in periodic succession. Flocks and herds were similarly destroyed. The nature of such epidemic diseases was obscure and mysterious. It was supposed to be due to a 'spontaneous generation depending on cosmic influences'.

The first person to lift this veil of mystery was Louis Pasteur. He was born in the year 1822. Though he was a Chemist, learning 'Crystallography' as his special subject, he later applied himself to the study of the 'Processes of Fermentation'. He was requested by the manufacturers of beet-root alcohol to help them in their difficulties in its manufacture. This led him to the study of 'Alcoholic Fermentation'. In 1857, he published his great discovery that 'fermentation is the result of growth of an organic life, and not due to

any action of inorganic matters. Pasteur concluded that 'fermentation is a phenomenon of life'. The discovery of living "globules" as the cause of fermentation, and that, in their absence, there was no fermentation, was a very great discovery, which led later investigators to peep into "the world of the infinitely small". As in fermentation, so in the souring of urine, the souring of milk, the decomposition of butter and in the processes, in general, of decay and putrefaction, a vast underworld of life was shown to be the cause.

Pasteur promulgated the Doctrine of the Immortality of the Infinitely Small, in the face of severe opposition. He stated that "if the processes of change and decay are indeed processes of life, there must exist in 'Nature' innumerable tribes of living things, eternally active, capable of limitless reproduction. He gave the quietus to the Doctrine of Spontaneous Generation.

*Bacterial Concept of Disease.*—His discovery led to the trailing, of the 'Foes of Disease,' hidden during all the previous ages. Pasteur, like a Crusader, entered the 'Citadel of Disease' and tracked the causes, one after the other, of the Silk-worm plague (Pebrine), Fowl Cholera, Anthrax, Hydrophobia, etc. Just as he conferred the greatest benefit to the wine growers of his country, his contribution to the success of silk industry was equally great.

After discovering the bacillus, which is the cause of Anthrax,

Pasteur observed that his cultures of the Anthrax germ, if kept exposed to the air, lost their virulence. He seized on this knowledge, prepared a vaccine, and injected healthy sheep and oxen and found that these vaccinated animals became immune to the disease. This was the beginning of the 'History of Preventive Medicine'.

Pasteur should, therefore, be considered as not only the "Father of Bacteriology" but also of "Preventive Medicine". Pasteur saved France also from loss of the wool industry by the Preventive Inoculation against Anthrax.

The discovery of the causes of Anthrax and Fowl Cholera and also the discovery of their prevention by preventive inoculation made Pasteur realise the great possibilities of his discovery for the protection of man from Infectious Diseases. Pasteur's work on Hydrophobia, therefore, followed naturally on his work on Anthrax. He used emulsions of the spinal cords of rabbits, infected with the virus of Hydrophobia, for the treatment of Hydrophobia. He was led from the "world of the infinitesimally small" (micro-organisms), into the "world of the infinitesimally smaller" (ultra-microscopic viruses). He showed that there were but two ways of offering resistance to pathogenic bacteria, namely, the destruction of the bacteria and the increase of the resistance of the body against them. Pasteur discovered both these ways and applied both the methods, to fight

disease in man and beast. The Sciences of Bacteriology, Immunology and Preventive Medicine, which were founded by him, have changed the face of world at the present day. To Pasteur must be given the whole credit of relating Bacteria to the phenomena of Disease, though micro-organisms had been observed long before his time by Leeuwenhoefer in the 17th century,

In the meantime, Jenner had discovered the effect of Vaccination as protection against the attack of smallpox. These wonderful discoveries of Pasteur and Jenner formed the basis of all subsequent development in Preventive Medicine. The Greatest Benefactor to Humanity in the 19th century was the greatest Frenchman, Pasteur. He will be remembered to be so for ever more.

Joseph Lister, Professor of Surgery at the Glasgow University, wondered what the cause might be for wounds, becoming septic, and for blood-poisoning. He first accused the air, which was polluted with smoke and stench, and the site of the hospitals. By an accident, he read an article of Pasteur in a journal and began to wonder what possible connection could exist between wine and wound. He wondered why ordinarily a simple fracture healed up, without septic complications, whereas the average compound fracture invariably became septic, often resulting in the death of the patient. He started using carbolic acid spray for killing germs. This was the birth of the

'Antiseptic Surgery'. Pasteur's discoveries helped Lister to effect a complete 'Conquest of Wound Fever.' Antisepsis was later superseded by the Aseptic Method in Surgery. Surgery has, therefore, now become bold and fearless in its methods.

The Hungarian Physician, Semmelweiss, was ignorant of the microbic origin of disease but has anticipated its application in Midwifery.

The discoveries of Pasteur and Lister made their followers seek the cause of every disease in a microbe. The body was looked upon as a fortress, surrounded by microbic enemies all round. Jenner and Pasteur had also pointed the way towards strengthening these defences. Thus, between 1818 and 1890, the causative organisms of a large number of diseases were discovered. The 'Greatest Bacteriologist' of the time was Robert Koch.

The discovery of many of the most important pathogenic bacteria was made by Koch. He was the discoverer of the Tubercle Bacillus and the Cholera Vibrio. This enlarged the foundations of Modern Bacteriology. Not only did he identify the causative organisms but also described their biological properties and the properties of their toxins. He discovered the Tuberculin and made use of it for diagnostic and therapeutic purposes. He was the first to prepare transparent solid culture media. He made researches on Rinderpest, Plague and Trypanoso-

miasis. His discovery of the causative organisms of many dangerous diseases earned him the 'Nobel Prize' in 1905 and 1906.

To von Behring and Kitasato belongs the credit of the discovery of the Antitoxic Sera. The serum, that has afforded the most excellent results, is the anti-diphtheric serum. The prophylactic use of anti-tetanic serum was later well established. A further application of this serum therapy is seen in the recent attempts to treat Measles by injecting the blood from a patient, newly recovered from the disease. Only, in this disease the supply of serum available is limited to the amount, which can be available from human sources. The value of Protective Vaccination against Typhoid and Paratyphoid has now been well established.

The preparation of a Vaccine for Bacillary Diseases was comparatively an easy matter, but it is not so, for the Virus Diseases. But the work done on Dog's Distemper justifies the belief that the Vaccine Treatment for Virus Diseases is possible. It is now known that Influenza, Measles, Whooping-cough, Mumps, Chickenpox, and Smallpox in man and many similar diseases among animals and plants are due to viruses. We are beginning to get just a glimpse into "the world of the infinitesimally smaller".

Metchnikoff (1845-1916) is the 'Father of one of the most

important theories of Immunity'. He was the Discoverer of Phagocytosis'. He was also the recipient of the 'Nobel Prize' in 1908. Almroth Wright gave a new orientation to scientific thought. He showed that Curative Vaccination in Acute Diseases, as opposed to Preventive Vaccination, will lead to disappointment.

Wright's studies, by directing attention to the mechanism of bodily reactions, have served a valuable purpose. The discoveries of Metchnikoff and Wright have shown us that the body is armed with formidable weapons against disease. Schaudinn in 1906 discovered the organism of Syphilis and a year later, Wassermann (1875-1956) discovered the Sero-Diagnostic Method for Syphilis.

*Biochemical Theory of Disease.*—Paul Erlich is the "Founder of Haematology". He discovered his Tri-acid Stain, Diazo Reaction of Urine, Intravital Staining, etc. His monumental works are on dye stuffs and on the chemical explanation of Immunity (the side-chain theory) and in the discovery of Salvarsan, in collaboration with Hata, his Japanese assistant. The works of Erlich have changed the direction of Modern Medicine from the Bacterial to the Biochemical Theory of Disease. Erlich's discovery of Salvarsan obscured for a time the importance of the mechanism of bodily reaction in disease. It was vaunted that Salvarsan could kill the spirochæte, without inflicting any injury upon or causing any distress to the patient. 'Nature'

was thought to be a mere spectator to the rout of the Spirochetes by the drug. The truth has now become clear that the drug acts, in the first instance, not on the spirochete but on the body itself. It is the body, thus stimulated, and not the drug, which effects the cure. The impression, that Quinine in Malaria tracks out the Malarial Parasites and kills them, has been shown to be wrong. It is by its power to stimulate the body, that Quinine helps to kill the Malarial Parasite. A similar process appears to exist in the action of antiseptics, such as, F'avine. We thus see that the body mechanisms of defence are of great complexity, many of which are but little understood. Our attempts in the treatment of diseases should be only to summon and help the powers of 'Nature,' never to replace them.

In 1880, Laveran observed the parasite in the blood of patients suffering from Malaria. Laveran's discovery was not noticed, because it was not known how the parasite gained entry into the human body. Wucherer, Lewis and Bancroft described Filariasis and the small worms in the blood of patients, suffering from the disease. Sir Patrick Manson ingeniously suggested the probable association of Mosquitoes with Filariasis, as he argued that the agent of infection must operate at night. His conjecture proved true. He showed that the embryos were imbibed with the blood by the mosquito and that they reached full development in its body. G.C. Low showed that the embryo filariæ passed into the proboscis

of the mosquito and he suggested that the mosquito carries the disease from one human being to another directly and without the intervention of water, as believed by Manson. The discovery of Manson and Low of the 'Mosquito Transmission of Filaria' was the 'Foundation Stone of the Edifice of Tropical Medicine'. The importance of their work lay in the demonstration, that 'Insects act as Carriers of Disease'.

Manson also suggested that a mosquito might prove the carrier of Malaria and was the inspirer of Ronald Ross in his great discovery. The proof of the mosquito malarial theory by Sir Ronald Ross is one of the 'most inspiring records of human endeavour.' The discovery of the particular species of mosquito as the carrier of Malaria laid the foundation for the whole subsequent development of Tropical Hygiene.

The Reed Commission demonstrated in 1900 to 1901 that Yellow Fever could be induced in healthy men by the bite of certain species of mosquito. The infected mosquito remained infective during the rest of its life of nearly two months. The discovery of the cause of Malaria and Yellow Fever led to a remarkable development in the detection of the carriers of other diseases. Bruce discovered *Micrococcus melitensis* as the cause of Mediterranean Fever and traced it to infected goat's milk. He also discovered Trypanosomes in the blood of domestic animals infected with the disease, known as 'Nagana'. He suggested a

similar cause for 'Sleeping Sickness'. In 1902, Dutton discovered *Trypanosoma gambiense* and in 1910, Stephens and Fantham discovered *Trypanosoma rhodesiense* and incriminated the Tse-Tse Fly, *Glossina Palpalis*.

Kitasato and Yersin discovered the causative organism of Plague, the *Bacillus Pestis*. In 1908, the Indian Plague Research Commission disclosed that Bubonic Plague in man is entirely dependent on the disease in the rat. They showed that sanitary conditions have no direct relation to Plague, except in so far as they favour infestation by rats. The recent work of Martin of the Lister Institute has shown that the method of infection by the Flea is a 'contaminative method' and that the vomit of the infected flea, containing bacilli, infects the area of the flea bite.

In 1907, it was discovered that Relapsing Fever was conveyed by lice. In 1909, Typhus was proved to be a louse borne disease. During the last war, Byam proved that Trench Fever is also carried by lice.

Leiper in 1916 showed that the parasite of Biharziasis passed a period of its development in the body of a water snail.

*Noguchi.*—Hideo Noguchi was the most brilliant Japanese research worker of this century. His researches on original lines were enormous. He made many serological studies. He was the first to culture the organism of

syphilis. He demonstrated the presence of these organisms in the spinal cord in patients suffering from Tabes and in the brain of patients in General Paralysis of the Insane. He proved the syphilitic nature of both these affections. He discovered the organism of Yellow Fever and of Weil's disease. The volume of his researches has given him 'a place in the fore front among the great scientists of the world'.

The technique of Tissue Culture, originally formulated by Harrison and Carrel, has greatly facilitated the study of the growth of different types of cells and tissues and the effect of various chemical, physical and other influences on them.

The Researches into Immunity Reactions began from the discoveries of Pasteur, Koch, Ehrlich and Metchnikoff. The Chemical and Physico-chemical Reactions in the Immunological Processes were studied by Ehrlich, Bordet, Madsen, Arrhenius and others. The practical application of these studies is seen in the employment for diagnostic purposes of the Widal Test, Wassermann Test, etc.

*A Brief Summary of Contributions to Medical Research in Pathology in India.*—As the field over which medical research has extended in India is very wide, I shall only very briefly mention the important contributions made to Pathology (including its branches of Bacteriology, Parasitology, Helminthology, etc.)

Among the earlier classical studies may be mentioned those of Lewis on Typanasomiasis; Vandyke Carter on Spirilla. Leprosy and Mycetoma; Macnamara on Cholera and Fayrer on Snakes and Snake Venoms. Organized medical research dates from 1894, when the Indian Medical Congress moved the Government of India to establish and endow a Research Institute.

In India research work is mainly conducted in the following Government Institutions. The Plague Research Laboratory (later called The Haffkine Institute) was established in 1899. The Bacteriological Department was formed in 1905. In 1906, the Central Research Institute was established at Kasauli, and the Pasteur Institute at Coonoor in 1907, Rangoon in 1915 and Shillong in 1917. In 1920 the School of Tropical Medicine and in 1932 the All-India Institute of Hygiene and Public Health were opened. An important milestone in Medical Research in India in the creation of the Indian Research Fund Association.

*Malaria.*—Malaria, being the major health and social problem in India, received naturally a large amount of attention from medical research workers. It was in India that the mosquito was incriminated as the carrier of malaria by Sir Ronald Ross at the close of the last century. But earlier in 1845, Dempster introduced the Spleen Rate as a measure of malarial endemicity. Giles, James and Liston studied the mosquitoes. Christophers

enunciated the principle of "Species Sanitation." Much work has been done on Entomology by subsequent workers—Adie, Donovan, Patton, Turkhud, Barraud, Senior White, Stickland, Iyengar, Sinton and others. The epidemiological studies of Christophers and Bentley showed that the causative factors in the production of malaria were very diverse.

The Central Malaria Bureau and then in 1926 the Malarial Institute of India were established. Much work has been accomplished in Epidemiology, control of rural malaria and on the Bionomics of various Anopheline vectors. Among other workers on Malaria may be mentioned Bentley, Gill, Acton, Knowles, Krishnan, Das Gupta, Rao, Iyengar, etc., and also Sweet and Russell of the International Health Division of the Rockefeller Foundation. Krishnan's researches on Monkey Malaria and Black water fever will throw a new light on malarial immunity. Shortt's studies on protozoal immunity are worth recording. Tirumurti, has shown that malaria is not one of the causes of cirrhosis of the liver, as it was believed to be for a long time.

*Cholera.*—India is the main endemic home of cholera. It has been, therefore, a subject of considerable attention and study. Koch confirmed in India his discovery of the comma bacillus in 1884. Since then, much work has been done on the epidemiological, preventive, clinical and treatment aspects of the disease.

Greig studied the pathology and bacteriology of cholera. He found that there were many vibrios resembling vibrio cholera, but non-pathogenic. Tomb and Maitra studied the bacteriology of cholera and the carrier problem.

In 1928 de-Herelle studied the bacteriophage in relation to cholera, Malone, Morison, and Asheshov took up the bacteriophage question in relation to the vibrio and the prophylactic value of cholera bacteriophage.

Rogers and Russell and Sundararajan made epidemiological studies to forecast epidemics of cholera. Other workers produced a prophylactic anti-cholera vaccine.

At present work is in progress on the chemical constitution of vibrios, the metabolism, biochemical reaction, variations in vibrios, etc. Different serological types of vibrios have been isolated. Vibrios have been isolated from healthy persons and external sources. Agglutinable and non-agglutinable vibrios have been differentiated. It has been shown that, by the use of suitable methods, vibrios can be isolated from practically all open water sources in India. These studies will show the possible origin of vibrios, which can be isolated from man, in health and disease. Pasricha, de-Monte, Lahiri, Chatterjee and many others are engaged in the Cholera Enquiry.

*Plague.*—Plague was introduced from China into India in

1629, though India had been free from Plague for two centuries previously. Bombay was the first city to be affected, from where it spread to other parts of the country. It was at first supposed that the disease was transmitted from man to man. On this theory of transmission, preventive measures were applied. Naturally, they were completely ineffective and gave rise to considerable amount of suffering to the people and to protests and agitation in the country.

The Plague Research Commission was formed in Bombay in 1905 and worked until 1913. It is to this commission that we owe our exact knowledge of the epidemiology of plague.

Hankin had suggested the possibilities of insect transmission of plague from rat to man but to Liston belongs the credit of proving the flea transmission of plague. Subsequent work showed a flea species factor influencing the epidemiology. Haffkine produced the prophylactic vaccine. This is one of the first prophylactic vaccines to be used on a large scale in man.

Attempts are now made to improve the vaccine and produce a potent anti-plague serum. In this connection the names of Naidu and Sokhey may be mentioned. To carry over the problem of plague is being investigated in the Cumbum valley. It has been shown that meteorological conditions do not affect the fleas in the rat burrows and that hydrogen cyanide gas is the

best lethal agent for the rats and fleas in the burrows. Epidemiological studies have shown that the immunity of the rats for plague is roughly proportionate to the degree of incidence of plague in the areas, from which they were collected.

*Kala Azar.*—In 1903 Leishman recorded for the discovery of the parasite in a spleen smear. So had done also Ross. But, independently of them, Donovan found the parasite in the spleen puncture smears of deceased individuals and also in the peripheral blood smears. Christopher gave a classical description of the pathology of Kala Azar in 1904 and 1905. In 1904, Rogers cultivated the parasite and showed that it was a flagellate. In 1907, Patton discovered that the parasite assumed the flagellate form in the bed bug. In 1913, Mackie suggested the genus *Phlebotomus* as the possible Vector. In 1915 the Tartar Emetic treatment for Kala Azar was introduced by Rogers.

In 1917, Brahmachari discovered the globulin precipitation test; in 1921, Spackman introduced the formal-gel test for Kala Azar. It was popularised by Napier. In 1922, Brahmachari introduced Nrea Stibamine, as a specific for the disease. From that time the modern treatment for Kala Azar may be said to have begun. Chopra's serum antimony test made the diagnosis easier.

In 1922, Brahmachari discovered Dermal Leishmaniasis. In 1923, Shroff and Brahmachari

described the pathology of the disease. In the same year Shortt demonstrated L. D. bodies in the urine of Kala Azar patients. Shortt was the first to suggest *P. argentipes* as the Vector. Knowles, Napier and Smith in 1924 showed that L. D. bodies flagellated in the insect's gut. Shortt, Smith and Krishnan discovered the technique of giving sand flies a second and subsequent feeds. In 1926 Shortt and his colleagues found massive natural infection in the buccal cavity of *P. argentipes*. In 1927, they infected a mouse with the gut contents of the infected sandflies. In 1923, they infected hamsters by the oral and conjunctival routes. In 1928, they described the presence of L. D. bodies in the foreces. In 1930, they showed that the disease was transmitted from infected hamsters to healthy hamsters by close contact.

Lloyd and Paul described the serum changes. De Silva and Swaminath confirmed the identity of the parasites of K. A. and Dermal Leishmaniasis.

In 1931 Shortt, Smith, Swaminath and Krishnan recorded the first successful transmission of K. A. to a hamster by the bite of an infected *P. argentipes*. In 1935 Shortt and Swaminath recorded the finding of L. D. bodies in the nasal mucus of K. A. patients. With the infected mucus they successfully infected a hamster.

*Leprosy.*—Until 1920, no attention was paid to research in

leprosy. Rogers made a clinical study of the disease and tried various preparation of Chaulmoogra oil in treatment. Muir and his co-workers took up later the epidemiological, clinical, pathological and bacteriological studies on leprosy. The types of leprosy were clearly defined. The self-limiting character of the disease was pointed out. The view that leprosy is a highly infectious, always progressive and fatal disease was proved to be wrong. It was shown that children have poorly developed immunity to leprosy and that the solution of the problem of prevention lies in the removal of the children from their diseased parents; in the segregation of the infected parents in institutions for their care and treatment; and in their sterilisation, if possible. Much work is being done on rat leprosy, though neither human nor rat leprosy bacillus has so far been cultured, in spite of repeated attempts on new lines.

*Rabies.*—Semple in 1911 first introduced the dead carbolised antirabic vaccine. Harvey and Acton showed that the results from this carbolised vaccine were better than from the use of the original Pasteur vaccine, made from the dried cord. The introduction of the carbolised vaccine made possible its preparation also in the plains and the decentralisation of treatment. Anti-rabic treatment is now given in most of the important cities. Mc Kendrick and Cornwall did research on the pathology of rabies and the accidents in treatment. Cunningham in 1927

introduced the carbolised vaccine made from fixed virus brain substance. Studies are in progress on the value of anti-rabic serum and the combined use of serum and vaccine.

**Nutrition Research**—In 1912 McCay published his book on the 'Protein Element in Nutrition', when he was the Professor of Physiology in the Medical College, Calcutta. This was the first work to draw attention to the relation between diet and physique. McCarrison (1913 and 1914) showed the effect of faulty food on the thyroid gland. Ltaer, he studied the pathological changes, caused by defective diet, in most of the organs of the body. The nutritive value of food stuffs is being investigated. AyKroyd has succeeded McCarrison as the Director of the Nutrition Research Laboratories, Coonoor. It is at present one of the largest institutions in the world, devoted solely for Nutrition Research. Keratomalacia, Stomatitis and Epidemic Dropsy are under investigation.

**Other Subjects**.—Many contributions have been made on general Protozoology, Medical Entomology, Helminthology, Snake Venom and Indigenous Drugs. It is not possible in this address to cover all the ground. Col. Chopra has founded Pharmacological Research in India in the School of Tropical Medicine, Calcutta, and has made very many important contributions.

No research on Cancer was undertaken until recently. We

owe to Vishwa Nath much of our knowledge regarding the prevalence, age distribution, the sex incidence, order of frequency, as regards site, etc., in India. He has exploded the dogmatic statements of foreign medical men about the rarity of the disease in India. He has shown that the age of maximum incidence of cancer in India is at least ten years earlier than in the Western countries and that the incidence of cancer of the cervix falls heaviest on Hindu women and Buccal Cancer is more in the male than in the female and in Muslims than in Hindus.

For much of the information in this brief review, I am greatly indebted to the recent publication of "the Indian Medical Review" by Major General E. W. C. Bradfield, D.G., I.M.S. A reference may be made to it for fuller details on the subject of Research in India. The book is a mine of information to medical men in India and elsewhere and such a book was long overdue.

**A Brief Summary of Indians' Contribution to Veterinary Pathology (including Protozoology, Helminthology and Entomology)**.—The scope for Veterinary Research in India is large and during the last decade considerable amount of work has been done, notably in Veterinary Helminthology and to some extent in Veterinary Protozoology and Entomology.

In the field of the contagious and epizootic diseases, the notable improvement is the use of the

**Goat Spleen Tissue Vaccine** in the control of Rinderpest in cattle. This method of vaccination has been evolved from the discovery of Edwards, that Rinderpest virus can be fixed and reduced in its virulence for the ox, by passage through a series of goats. For the poor cultivator of India, whose very existence depends on his cattle, this discovery has been a boon in fact. There are other diseases, such as, Hæmorrhagic Septicæmia, Black Quarter and Anthrax, against which antisera and vaccines are being used, but it seems necessary that more work has to be done to evolve a more satisfactory method for their control.

Progress has been made in the study of protozoa, pathogenic to live-stock in India. Ray, at Muktesar, has recently described a piroplasm, which resembles *Babesia bovis*; Sen has described in cattle *Babesia annulata*, which is believed to be pathogenic. Ray has described a new species of *Bartonella* in the dog. Shortt and Swaminath working in Madras have elucidated the life history of *Babesia gibsoni* of the dog. They found that the tick, *Hæmaphysalis bispinosa*, is the vector concerned. Ray of Muktesar has redescribed the morphology of *B. gibsoni*.

It is interesting to note that the research of these workers has confirmed Rao's findings published as long ago as 1926.

The first trypanosome, known to be pathogenic to animals, was

discovered in India by Evans and there have been some controversies whether that trypanosome, *T. evansi*, was actually the cause of outbreaks and deaths in cattle, as it is in other domesticated animals, like the horse, dog, etc. The researches of Edwards, Sen and Rao seem to confirm that *T. evansi* is as pathogenic to cattle as it is to other animals. Rao holds that cattle are not the accredited reservoirs of *T. evansi*, like camels in North India. The study of this protozoon will not be complete, unless its life history, which at present is not known, is worked out. In Africa almost all the trypanosomes have a vector in *Glossina*, but in India, biting flies, like the *Tabanus*, do not play the same role as the *Glossina* in Africa. There is yet another trypanosome, *T. theileri*, about which very little is known here. At Madras, Valladares and Rao have obtained some evidence to show that sometimes it is pathogenic to cattle and causes symptoms as in Piroplasmosis.

Datta working at Muktesar on the Hill Hæmaturia of Bovines has adduced some evidence to show that it is caused by an *Amœba*, which he calls *E. Kamala*.

Turning now to Veterinary Helminthology, I feel proud to say that a large share of the work has been done in Madras. The most notable researches seem to be in Bovine Nasal Schistosomiasis. Rao, Datta and Malkani seem to have simultaneously discovered that the so-called bovine

nasal granuloma is a true nasal schistosomiasis. Rao and Datta described in some detail the histopathology of the lesions and the eosinophile character of the so-called "clubs and granules" formed around the refractile schistosome egg shell, containing larval remanants, or even a fully developed miracidium. The so-called 'clubs' have been explained as the manifestation of the host's protective reaction. It is interesting to note that Rao has demonstrated the so-called pseudo-tubercles of schistosoma origin in the growths of horns of cattle and maintains that one of the etiological factors of horn cancer in cattle may be the nasalschistosome. Datta has rightly pointed out that most of the outstanding contributions regarding the nasal schistosome are contained in a series of articles by Rao. With carefully planned transmission experiments Rao has definitely proved that nasal schistosome is a new species and that Sewell's *Cercaria indica* XXX is the larva of that species.

Datta found that one of the causes of 'Persistent Debility' in horses in India is associated with nodulated calcareous lesions in the liver, caused by the ova of schistosoma indicum.

Chandler, while working in North Bengal, described a schistosome egg in faeces collected from defæcating areas and believing it to be from man considered that it was a new species affecting man. He named it *S. incognitum*. In 1933, however, Rao discovered a new

schistosome in the pig, whose ova are exactly like those described by Chandler. Rao has endeavoured to show the mistake Chandler has made in believing the faeces he collected was from man and because the name *S. incognitum* is a nomen nudum the name *S. suis* has been suggested. The discovery of this in the pig is interesting, because, unlike *S. japonicum*, which parasitises the pig and man in the Far East, this worm does not affect man in India. It, however, affects dogs and Rao has shown that it is one of the causes of dysentery in dogs.

As regards other trematodes, Bhalaras has found that *Limnea Acuminata* is the intermediary host of the Indian liver fluke—*F. gigantica*. Rao found that *P. exustus* and *L. luteola* to be the molluscan hosts of *P. cervi* and *F. elongatus*. Besides these Rao has described some larval trematodes new to science in addition to what Sewell has described in his valuable monograph, *Cercariæ Indicæ*. Rao has recorded lung flukes *Paragonimus westermani*—from dogs.

Coming now to the Nematode parasites, the important discoveries are by Panda and some others. Panda in Assam found that the cause of Hump sores in cattle was parasitic. He described a new nematode, *Stephanofilaria assamensis*, which is the cause of hump sores. Krishna Iyer discovered that the so-called periodic ophthalmia in horses was a micro-filaria similar to the ophthalmia, associated with

Guatemala nodules of man, but the adult worm remains undiscovered. It is possible that the adults are *Onchocerca*. At Muktesar a new type of cutaneous affection in cattle caused by micro-filaria has been studied and more work on this is awaited. A fairly large number of nematodes, some of which are new to science, have been recorded in this country and time does not permit me to detail them here.

As far as I could gather, a number of tape-worms have been studied in India, and some new ones have been recorded from poultry, but from larger animals very few cestodes have been recorded. It is interesting to note that Rao and Vaidyanatha Mudaliar have recorded *Diplopilydium nolleri* from the cat and *Pseudo-anoplocephala crawfordi* from the pig, respectively, in South India. It would appear that tape-worms have not received sufficient attention in this country.

As regards Veterinary Entomology, it is gratifying to note that some interest has been evinced in that subject. Sen has recorded the presence of *Ornithodoros Megnini*, the spinose ear tick in the Central Provinces. Sohni working on warble flies has deduced some important points in their life history and he has also shown that ticks cause as much loss in the hide industry as warbles. Rao working on the cutaneous myiasis of animals has confirmed the work of Patton that *Chrysomia bezziana* is the fly responsible for that condition.

In conclusion, I may say that Rhinosporidiasis appears to be yet another disease, which can be classed among those diseases common to man and animals in India. Tirumurti published an exhaustive account of clinical and pathological appearances of the Rhinosporidial growth in man in the nose and other parts of the body and suggested to Krishnamurti its possible occurrence in domestic animals. Krishnamurti was the first to record the parasite in the nasal lesions of bovines and ponies in South India and his work has been confirmed by Rao. Rao has shown that the organism affecting man and animals is the same and he has also discussed the probable modes of infection. It is interesting to note that last year Shahi discovered Rhinosporidium in the nasal lesions of a pony in the United Provinces. So far this condition has been found in bovines in South India and now that its presence has been noted in a pony in North India, it may not be long, before it is found there also in cattle.

#### The Need for Historical Approach to the Study of Medicine.

Having been a teacher of Pathology for some years, I have become increasingly convinced that a historical approach to the handling of the subject is very necessary, and that every teacher should know the History of Medicine and also the History of his Special Branch of Medicine. I am not a medical historiographer. Neither have I made any special

study or research on the History of Medicine. I had only to depend for this address on the information, which I could obtain from various sources. I have drawn liberally from Krumbhaar's Pathology in the series (Clio-Medica). I should prescribe this little handbook to every medical student, who comes into the third year of his studies. Having now become acquainted superficially with the History of Pathology, I wish I could begin my career as a teacher now; but I am old and shall have to retire from office soon. Nothing will give me greater pleasure than to find that this address of mine has pointed the way, in however poor a manner, to medical students and teachers to the rich storehouse of knowledge, granered in books on the History of Medicine and its branches and to the still unexplored field for research in this country.

#### **The Future Progress of Medical Science.**

The brightest chapter in the History of Pathology is the period, which began with Pasteur. It is glorious and fortunate to live in these days, when exact knowledge in the Science of Pathology (including Bacteriology, Protozoology, etc.), has placed weapons of great power in our hands for the prevention and cure of a large number of preventible diseases. No progress is possible without exact knowledge.

The most important part of the medical sciences, which have given the world to day the healthiest period it has ever known in its history, is Pathology, including Bacteriology, Protozoology, etc. The study of Pathology has become the basic discipline of Scientific Medicine and shall continue to be so for evermore. What has been accomplished is small in comparison with future possibilities of preventing suffering and prolonging life. Prophylaxis is taking the place of Therapy. It is literally true that man controls his own destiny. Medical science can progress only so long as the scientific spirit survives. The test of civilization may well be standard of its scientific spirit. 'Research' is the watchword of Modern Medicine. 'Empiricism' is the refuge of 'Ignorance'. "Medicine and Civilization advance and progress together. The conditions essential for advance are Intellectual Courage and a true Love for Humanity. It is as true to-day, as it has been in the past, that further advance or even the holding of what has been won depends upon the extent, to which Intellectual Courage and Humanity prevail against Bigotry and Obscurantism.

"We stand upon the intellectual shoulders of those medical giants of bygone days and because of the help they afford us, we are able to see a little more clearly than they were able to do."  
(Claude Bernard.)

## **Clinical Memoranda.**

### **TWO CASES OF ECTOPIC GESTATION TREATED IN THE GOVERNMENT HOSPITAL, CANNANORE.**

BY V. H. VENKATARAMAN, B.A., M.B.B.S.

1. A Hindu woman, aged 35, was admitted in the Hospital for pain in the lower abdomen. She gave a history of amenorrhoea for three months with regular periods before that; and her last child was 11 years of age. Her temperature was normal and pulse was only 80. She was put on observation. In the small hours of the next morning, her abdominal pain became very acute. Temperature rose to 100 and pulse shot up to 125 with an anxious expression on the face. As on the previous day, with a small dark discharge, ectopic gestation was doubted. Now the diagnosis became clear and she was immediately taken to the Operation Theatre and operated upon. On opening the abdomen the right tube with a ten-week-old developing ovum had ruptured into the peritoneal cavity. The right lower abdomen and the whole of douglas pouch were full of blood and blood clots.

The pregnant tube was clamped, ligatured and cut away. The ovary of the affected side and the other side ovary and other appendages were examined and found normal. The blood and blood clots were removed and the peritoneal cavity washed with hot saline lotion and the abdomen closed in layers.

She made an uneventful recovery and was discharged cured.

2. The second was a young Hindu woman, aged 20. The history of this case was rather interesting. She had an abortion in the fourth month, about a year previously. After amenorrhoea for six weeks she had severe pain and slight show for two days; and then more bleeding for two days more. Then the pain and bleeding subsided for about ten days. On the 14th day after the first onset of pain and bleeding, she had an attack of very acute pain in the lower abdomen and vomiting. I was called in for consultation. She had slight bleeding and the abdomen below the umbilicus was swollen and very acutely tender. Her temperature was 100.8 and pulse 120. The diagnosis of extrauterine pregnancy was easily made and the patient was advised to be taken to the Hospital for immediate operation.

She was brought to the Hospital accordingly and operated upon. On opening the abdomen, blood squirted out of it with force and the lower abdomen was full of blood. The blood was walled round above and on the right by adhesions at

about 2" below the umbilicus. As much as could be removed was taken out and the parts examined. The pregnant right tube had ruptured into the peritoneal cavity, and was 2" in diameter, near the corner of the uterus. The whole tube was clamped, ligatured and removed. All blood was taken out, and the peritoneal cavity washed out with hot saline solution. No drain was considered necessary. The abdominal wall was closed in layers.

She made a very good recovery and was discharged cured.

## Obituary

We greatly regret to record the demise of one of our esteemed colleagues, Dr. P. V. Venkataswamy, M.D., M.R.C.O.G., at the end of January 1939 in London as the result of a nervous breakdown. His was a quiet and amiable temperament and he was greatly beloved by all that came into contact with him. Our heart-felt sympathy goes to his bereaved family. We can ill afford to lose the services of men, such as he was.

## Abstracts from Current Medical Literature.

**Pituitary and Water Metabolism.** (P. WERMER 1938 *Wien. Arch. Inn. Med.*, 3", 189)—The anterior lobe of the pituitary contains a diuretic substance which is associated with the growth of hormone. Diabetes insipidus is a disturbance of the balance between the diuretic principle of the anterior and the anti-diuretic principle of the posterior pituitary. Excess of anterior pituitary hormone may be caused by basophil adenoma or pregnancy changes produced by the ovaries. Destruction of the anterior lobe of the pituitary produces oliguria. (*Brit. Chem. and Physiol. Abst.*)

**Role of Copper in Iron-Deficiency Anaemia of Infancy.** (J. H. HUTCHISON *Quart. J. Med.*, 1938, 7, 397)—In six cases of Fe-deficiency anaemia of infancy,  $\text{FeSO}_4$  was given until the haemoglobin level showed no further rise. Addition of Cu then produced a further increase. In three cases,  $\text{FeSO}_4$  was given in small doses so as to produce Fe storage without increase of haemoglobin. Again administration of Cu produced a rise. It is suggested that Cu acts as a catalyst enabling Fe to be converted into such a form that it can be transported from the storage depots to the bone marrow and there turned into haemoglobin. (*Brit. Chem. and Physiol. Abst.*)

**Regarding the Origin of Epilepsy following Malaria.** MOHR (*Deut. Med. Woch.*, July 15, 1938). Epilepsy following malaria has been described by many writers. The author reports in detail on two cases of malaria followed by epileptic attacks. In neither case was there any history of hereditary taint. One patient contracted malaria in 1916 and the first epileptic attack followed one year later, with recurrences. In the second case malaria was diagnosed in 1917 and the first epileptic attack took place in 1920, the spleen being then enlarged.

The epileptiform attacks may follow the malaria at widely different intervals. The author stresses the importance of diagnosing true epilepsy, which is said to occur always before the 20th year.

(Reviewed by J. D. Fulton in the "Tropical Diseases Bulletin", Oct. 1938, pp. 727 and 728.)

M. N. P.

**Treatment of Cholera by Adrenalin.** NAAME, *Rev. Med. et Hyg. Trop.* September-October 1937, Vol. 29, No 5, pp. 254-257. Treatment of cholera by adrenalin was instituted by the author as long ago as 1911. The basis of the treatment was the similarity which exists between the cholera

syndrome and suprarenal insufficiency. The cholera syndrome consists of vomiting, sweating, rigidity, cramps, diarrhoea and arterial hypotension. These symptoms may be due to a selective action of the cholera toxin on the suprarenal glands. It has been noted that cholera patients are very tolerant of adrenalin. In guinea-pigs who have died as a result of inoculation of cholera toxin experimentally, the suprarenals are found enlarged, hyperæmic and hæmorrhagic.

In the treatment of cholera, subcutaneous injections of adrenalin have been tried in doses of 4 to 6 mgm. every 24 hours for some days, in addition to the usual measures.

(Reviewed by W. F. H. in "Tropical Diseases Bulletin", October 1938.)

M. N. P.

**Some Nutritional Problems of Childhood.** LEONARD G. PARSONS (*B.M.J.*, 1938, Nov. 5, 929). (The Dawson Williams Memorial Lecture delivered in the section of Diseases of Children at the Annual Meeting of the B. M. A. 1938.)

**Observations from Celiac Disease.**—Hypochromic microcytic anæmia occurs so often as to constitute a characteristic symptom of coeliac disease. It is an iron-deficiency anæmia, and essentially similar to Witts's anæmia of adults, since hypochlorhydria is also a common find-

ing. In a few cases megalocytic hyperchromic anæmia has been found; in one case this was apparently due to the absence of intrinsic factor; in others to the lack of absorption of the hæmatinic factor, since improvement occurred when the diarrhoeal period was over. This type of anæmia can be cured by giving liver extract orally or parenterally.

In investigating the anæmias of coeliac disease, my colleague, Dr. Smallwood, discovered in three children a condition of microcytosis without anæmia, the cell count being normal and the cells deeply stained. This he thought was probably due to spherocytosis, the cells being thicker and more globular than normal, as in acholuric jaundice. In view of more recent clinical and experimental investigations, however, I would suggest another explanation. During the cure of nutritional anæmia a condition known as Hagen's phenomenon sometimes occurs in which the red cell count rises to six millions or more per c.mm. before the hæmoglobin reaches normal figures, but when the hæmoglobin does become normal the red cells fall to the normal number. Recently, Dr. Cleland has found that sometimes, after the progressive diminution in the red cells which is known to occur in early infancy, the cells increase to more than the normal number, while the hæmoglobin still continues to fall—that is, the reverse of Hagen's phenomenon. In our opinion both this and Hagen's phenomenon are manifestations of

a mild degree of iron-deficiency anæmia.

We believe that the first change in an iron-deficiency state is an increase in the number of cells but a decrease in their size without any alteration in the percentage of hæmoglobin, probably because the available hæmoglobin is used to better advantage if a small cell is well filled than if a large cell is relatively less well filled (Smallwood). I think, therefore, that the condition found by Smallwood was a manifestation of this early iron-deficiency anæmia. The experimental evidence on which my explanation is based was obtained by feeding rats on a diet which, although deficient in iron, is not so deficient as to produce a definite nutritional anæmia. Rats fed on such a diet from weaning at the age of three weeks until three months old showed practically normal growth and did not appear pale or anæmic. Their hæmoglobin was 100 per cent, but the red cells showed an increase of about two million cells per c.mm. Moreover, the red cells were smaller than normal. This combination of microcytosis, polycythæmia is corrected by addition of a trace of copper to the diet, thus proving that it is a response to a deficiency of iron.

**Carbohydrate and Fat Metabolism of Celiac Disease.**—A few years ago we repeated and confirmed the observation of several workers that oral glucose-tolerance tests in coeliac disease gave a flat and low blood-sugar curve. Moreover, we were

struck by the similarity of these curves to the low blood-fat curves which we had found in coeliac disease after test meals of fat, and since there was considerable evidence that the latter were due to impaired absorption of fat from the intestine, we concluded that the low blood sugar curves were also due to poor absorption, and not to an endocrine defect as suggested by other workers.

Defective fat absorption in coeliac disease has been repeatedly demonstrated by balance experiments, but this method cannot be applied to carbohydrates because bacterial fermentation in the intestine splits up carbohydrate, so that the amount unabsorbed cannot be estimated by faecal analysis. Our theory therefore could not be substantiated directly, but my colleague, Wallace Ross, suggested that the problem might be solved by the comparison of intravenous and oral glucose-tolerance tests. He accordingly began work on those lines, and the results obtained have completely confirmed our view that carbohydrate is badly absorbed in coeliac disease, and have led to valuable advances in treatment. The suggestion that glucose tolerance should be estimated by the intravenous injection of glucose is not an original one, but in the test as devised by Ross the following points are new; the glucose (20 per cent) is dissolved in normal saline; the amount of glucose being 5 grammes up to a weight of 10 kg., 10 grammes up to 30 kg., 20 grammes for older children; the maximum injection time is two minutes; the

blood sugar is estimated directly after injection and at short intervals thereafter—namely, 2, 4, 6, 8, 10, 15, 20, 30, 40, 60 minutes—from an ear-lobe puncture, using only 0.02 c.mm. of blood.

There are certain other important points about the test; first, the child should be, as far as possible, on a normal diet from three to five days before the test; secondly, the test should be done after a night's fasting; thirdly, everything should be done to keep the child free from emotional disturbance, which itself affects the blood sugar. The diet is important because it is now recognized that the glucose tolerance of a healthy individual is directly proportional to, and solely dependent upon, the amount of carbohydrate the diet contains during the few days preceding the test. In the normal individual a low carbohydrate diet leads to impaired glucose tolerance, which is shown by a high and rather slowly falling blood-sugar curve, whether glucose is administered intravenously or orally; whereas a carbohydrate diet will lead to the opposite effect—an increased glucose tolerance giving a low blood-sugar curve.

According to Thaysen a flat oral curve is one in which the rise from the fasting level is less than 40 mg. per 100 c.cm. Even more important, however, is the absence or great delay in the occurrence of a true peak and the failure of the curve to fall to the fasting level in two and a half hours even after a small rise.

The form of an oral curve depends upon two factors; first, the rate at which sugar enters the blood—and this may be impaired as the result of gastric stasis or through failure of absorption; secondly, the rate of its removal from the blood—that is, the tolerance of the individual. In impaired absorption less sugar enters the blood, thus tending to produce a low curve; but because of this carbohydrate deprivation glucose tolerance is impaired and this tends to produce a high curve. The resultant curve depends, therefore, on the degree and duration of the absorptive disability. A mild degree of impaired absorption, although leading to impaired tolerance, probably allows a considerable part of the test dose to enter and thus produce a high curve; whereas although as absorption gets worse the tolerance does also, the test dose cannot get in to show it. Actually during the early stages of coeliac disease the oral curve rises and then, as the disease develops, falls to the flat curve. This phenomenon was observed in a child whose symptoms when she first came under observation were failure to gain weight and listlessness, at which time a fairly high curve was obtained, whereas six weeks later, when the diagnosis of coeliac disease was obvious, flat curve was obtained. During recovery exactly the reverse of this process has been found—namely, the replacement of flat curves by curves rising to a higher level, often with a delayed peak—these curves falling later to the normal level. It is

not surprising, therefore, that some cases of coeliac disease and abdominal tuberculosis have shown almost normal oral curves, although the intravenous curves revealed pronounced impairment of tolerance. It is just such variations in absorption which have enabled Ross to make out a strong case for his view that the correct estimation of glucose tolerance can only be made by intravenous blood-sugar curves, since they are concerned with a single factor—the removal of glucose from the blood.

These results, and the fact that in established coeliac disease the combination of low oral and high intravenous curves has always been found, furnish important evidence in favour of our thesis that the absorption of glucose from the bowel is impaired in coeliac disease. Furthermore, if our assumption were really true it would follow that the glucose tolerance and general condition of these children should be improved by the administration of glucose. This in fact has proved to be the case, and I have seen the most remarkable success follow this treatment in the severest exacerbations of coeliac disease.

The problem of carbohydrate absorption has been attacked in another way. It is known that glucose tolerance is directly proportional to the sensitivity to injected insulin: therefore, the fall in blood sugar when estimated every five minutes for half an hour after crystalline insulin is

injected intravenously into a fasting person—the so-called insulin depression curve—is less in a normal individual on a low carbohydrate diet than when the individual is on a normal diet. If there is impaired carbohydrate absorption in children suffering from coeliac disease they should therefore show an insulin depression curve similar to that found in a normal individual on a low carbohydrate diet, and this is exactly what they do show.

*Insulin Kinase.*—The third phase of these investigations was based upon the assumption that insulin, whether produced in the body or injected, is inert until acted upon by a 'kinase,' formed, chiefly in the liver, in response to the stimulus of an elevated blood-sugar level. If this assumption is true, kinase would be deficient—either as the result of lack of stimulus consequent upon a low carbohydrate intake, such as we have postulated in coeliac disease and in diet deficient in carbohydrate, or because the liver, possibly as the result of disease, is unable to respond to the stimulus and produce kinase. Attempts were therefore made to see if the glucose tolerance and sensitivity to insulin of children suffering from coeliac disease could be improved by giving liver preparations intravenously or orally. The same results were achieved by both methods, although more rapidly with campolon than with liver by mouth—namely, that the intravenous tolerance curves became normal, an effect which

was not due to campolon itself having an insulin-like action. It was therefore clear that the poor absorption of carbohydrate in coeliac disease resulted in a diminished production of something, perhaps 'insulin kinase' which is supplied by campolon or liver extract. Campolon was chosen by Ross because it is prepared by simple expression methods, and therefore is more likely than the more purified products to contain the kinase; actually a more purified and concentrated preparation—ana-hæmin—was found to have little effect on the glucose tolerance, indicating that insulin kinase is not identical with the hæmatinic factor. Another interesting fact is that although the intravenous curves are rendered normal by treatment with liver, and there is ample clinical evidence of improvement in the general condition of the children, the oral glucose-tolerance curves do not improve. The reason for this improvement cannot therefore be an immediate increase in carbohydrate absorption, but according to Ross, it may be due to better utilization of the carbohydrate formed in the body from protein. In view of these findings we now give liver extract as a routine in coeliac disease, and have been convinced of its value, although the results obtained are in no sense dramatic, like those obtained in severe relapses by the intravenous administration of glucose.

It is interesting to note that Minot and his colleagues regard sprue as primarily a deficiency disease closely allied to pernicious

anæmia, and believe that in both there is involved a failure of a reaction between an extrinsic factor in the diet and intrinsic factor present in the gastric juice of a normal person. Moreover, they class coeliac disease and idiopathic steatorrhœa with sprue, and state that those substances in liver extracts which are effective in pernicious anæmia have a highly beneficial effect on the major features of sprue. Recently, Barker and Rhoads have investigated blood fat curves in sprue after a fat test meal and obtained results similar to those found by us in coeliac disease, but they also found that after the parenteral administration of liver extract the curves approached normal. In one patient a single injection sufficed to produce this change, but in two other cases several daily injections were required—a result which they say suggests that liver extract exerts some specific effect in converting malabsorbing intestines to normal function. Liver treatment does not produce this dramatic effect in coeliac disease and low blood-fat curves may be found after months of liver treatment. Again, although carbohydrate absorption gradually improves as the child approaches normal health, it does not, as I have shown, improve immediately after, or even in a relatively short time after, the institution of liver treatment; moreover, the factor in liver which improves glucose tolerance in coeliac disease is not the hæmatinic factor. Coeliac disease is therefore not a conditional deficiency caused by lack of specific reaction

between extrinsic and intrinsic factors, although the megalocytic anæmia of coeliac disease can be cured by the parenteral administration of hæmatinic factor; furthermore, the results of the American observers, if confirmed, seem to differentiate sprue from coeliac disease.

I have followed Ross in postulating the existence of an insulin kinase produced chiefly in the liver. The theory that insulin requires an activator, insulin kinase, is due to Himsworth, but, unfortunately, with the help of McNair Scott he has recently proceeded to strangle the infant to which he had given birth. They now suggest that the reduction in carbohydrate tolerance and decreased insulin sensitivity produced by a low carbohydrate diet are better explained by an increased secretion of the anti-insulin substance of the anterior pituitary—that is, by an inhibitor rather than by an activator such as insulin kinase. It is, however, as pointed out in an annotation in the *Lancet*, possible that both inhibitor and activator may exist and that the anterior pituitary extract may act by inhibiting the production of insulin kinase. If an activator of some variety is not present in liver it seems impossible to explain the results which I have described, because Ross has quite convinced me of the accuracy of his observations.

**Phosphorylation.**—There is, however, another interesting and possible explanation of the undoubted improvement brought

about by liver extract in coeliac disease. According to Verzar, fat, glucose, galactose, and vitamin B-2 (lactoflavin) are absorbed from the intestine by phosphorylation, a process which, together with dephosphorylation, constitutes a mechanism for the transport of phosphoric acid from one compound to another. By this process fatty acids are synthesized to phospholipoids and neutral fat in the intestinal mucosa, glucose to a hexose phosphoric acid, and vitamin B-2 to lactoflavin phosphoric acid. Furthermore, the "yellow respiration ferment" of Warburg, which is a combination of lactoflavin phosphoric acid with a specific protein, is probably necessary for phosphorylation to be carried out, and is also the form in which lactoflavin is chiefly absorbed and stored in the liver. If, therefore, phosphorylation does not take place the absorption of fat, glucose, and lactoflavin is greatly impaired, although a certain amount of glucose may be slowly absorbed by diffusion. Verzar maintains that phosphorylation is regulated by adrenal cortical hormone because it does not take place in adrenalectomized animals. Phosphorylation may also be prevented by the administration of moniodoacetic acid, and young rats chronically poisoned by this acid become stunted in growth and show impaired absorption of fat and glucose from the intestine, a condition which Verzar regards as experimental coeliac disease. He found that this disease in rats could be cured "as effectively as in man" by the administration of yeast or

liver, because these substances contain lactoflavin phosphoric acid, and he also found that injection of adrenal cortical hormone into adrenalectomized animals rendered their fat absorption normal. He therefore believes that coeliac disease may result from adrenal cortical insufficiency, and that the administration of liver extract, yeast, or adrenal cortical hormone will cure the condition by rendering fat, glucose, and vitamin B-2 absorption normal.

Now all our patients suffering from coeliac disease are given liver and marmite (crude yeast extract) as a routine; therefore, if Verzar's theory is accurate and coeliac disease is due entirely to failure of phosphorylation, cure should be as rapid and absorption should be rendered normal as quickly as described by the American workers when patients suffering from sprue are treated with liver. Unfortunately, as I have already stated, our experience in coeliac disease has been that whereas clinical improvement undoubtedly does occur following liver treatment, there is no immediate and dramatic improvement in absorption of fat and glucose; that, moreover, absorption only approaches the normal after months of treatment; and that indeed, even after such a lapse of time, oral blood fat and sugar curves may still be low and flat.

I can therefore sum up by saying that all our work on coeliac disease supports the theory

that the symptoms of the disease are the result of defective absorption from the bowel.

*Carbohydrate Metabolism in other Diseases.*—Observations on carbohydrate metabolism have also been made in many conditions other than coeliac disease; indeed, abdominal tuberculosis has already been referred to. I mentioned a short time ago that, accepting the formation of insulin kinase in the liver, impaired glucose tolerance might be expected to be found in cases of liver disease. This has been observed to be the case in catarrhal and chronic jaundice, cirrhosis of the liver, etc.

The suggestion has been made by J. H. Sheldon that anorexia nervosa is a 'functional Simmond's disease—a pituitary back-out of psychological origin', but Ross, in a recent paper, maintained that it could be explained on the ground of starvation. Thus, if for psychological reasons there was a brief abstinence from food, impaired glucose tolerance would be produced, and this would lead to a high slowly falling alimentary hyperglycaemia. Now it is known that hunger pains are brought about by injecting insulin and that these are accompanied by gastric contractions of the normal type and an increase of hunger. Therefore, hyperglycaemia should lead to failure of hunger and loss of gastric tone. The administration of liver, by improving sugar tolerance, should produce a fall in blood sugar and stimulate

appetite, and if, after the appetite is stimulated, a high carbohydrate diet is given, improvement should occur. Treatment on these lines was carried out with great success in a child age 12, weighing 40 lbs. After seven weeks she increased in weight to 67 lbs., and her intravenous glucose-tolerance test became normal. We have also used liver extract or campolon for restoring appetite and increasing weight in wasted infants and children. The results have been most encouraging, and almost as

dramatic as in the case of anorexia nervosa which I have just described.

*Conclusion.*—There are many other deficiencies of nutrition in coeliac disease, which time does not permit me to deal with, but I thought that an account of the work on liver and carbohydrate metabolism which was inspired by a study of coeliac disease, and of its application in the treatment of nutritional states, might prove interesting.

### In Lighter Vein Worthwhile

When Swampy woke in hospital  
In snowy sheets and cosy crib,  
He stammered out: "Well, bless my soul!  
Somebody's pinched me blooming rib.  
"It's true I got a trifle bruised,  
But sure as I'm alive  
I had six ribs before I snoozed,  
And now I've only five!"  
"Now Adam in the days of old,  
He lost a rib the same as me,  
But that was taken so we're told  
To manufacture Eve yer we see".  
Then he saw Nursie lookin' in  
And peepin' round the door,  
Said Swampy: "Well, if that's my rib  
I'd like to lose eleven more.

### Two's a Crowd

Before I heard the doctors tell  
The dangers of a kiss,  
I had considered kissing you  
The nearest thing to bliss.  
But now I know Biology  
And sit and sigh and moan,  
Six million mad bacteria—  
And I thought we were alone.



WHEN YOUR PATIENT REQUIRES  
**LIVER AND HAEMOGLOBIN**  
SPECIFY  
**HEMO-HEPALIX**

The Original and Genuine Product of Highest Potency.  
*A Powerful Restorative in*  
**Anæmia, General Debility, Weakness, Etc.**  
Specially indicated in the Anæmias of Pregnancy  
*Available from all Chemists and from*

**WILFRED PEREIRA LTD.**  
QUALIFIED CHEMISTS  
**Madras and Branches.**



**TO LET**



***Antiphlogistine*** . . always indicated in  
TONSILLITIS • PHARYNGITIS • LARYNGITIS • BRONCHIOLITIS

*Write for sample and literature*

THE DENVER CHEMICAL MANUFACTURING COMPANY  
163 VARICK STREET, NEW YORK, N. Y.

Medical  
not free.

—Rs. Two

Twelve Annas.

# 5 STANDARD INSTRUMENTS for DIAGNOSIS

- ZEISS MICROSCOPE
- ZEISS IKON BLOOD-SUGAR COLORIMETER
- ZEISS IKON HAEMOMETER
- ZEISS HAEMACYTOMETER
- BRAUN SPHYGMOMANOMETER

Full Particulars on request.



Sole Distributors:

## ADAIR, DUTT & CO., LTD.,

MOUNT ROAD, MADRAS.

CALCUTTA

BOMBAY

MESSRS. GORDON & CO., LTD. (Gordon Press), 768-770, Triplicane High Road, Madras,  
Managing Director, R. Ravaimanickam. Published by Dr. J. Christodoss David,  
M.B., B.S., Ph.D, Madras Medical Association.



## The Madras Medical Journal

THE OFFICIAL JOURNAL OF THE MADRAS MEDICAL ASSOCIATION.

PUBLISHED QUARTERLY.

|           |             |        |
|-----------|-------------|--------|
| Vol. XIX. | APRIL 1939. | No. 2. |
|-----------|-------------|--------|

Joint Editors: 3783

J. C. DAVID, M.B., B.S., PH.D. (EDIN.).

G. V. SATYANARAYANAMURTI, M.D.



### RATES OF SUBSCRIPTION.

For Members of the Madras Medical  
Service on payment of an Annual Member-  
ship fee of Rs. Five only.—Free.

For non-Members including Medical  
Practitioners—Rs. Three per annum, post free.

For bona-fide Medical Students—Rs. Two  
per annum, post free.

Foreign 7sh. 6d. Post Free.

Single Copy Twelve Annas.

# MYELADOL

**A biologically assayed nutritive reconstructive tonic  
containing Vitamins A, B, D, & G, with iron**

*Each Fluid ounce contains :*

|                                      |     |     |           |
|--------------------------------------|-----|-----|-----------|
| Super D Cod Liver Oil                | ... | ... | 120 mins. |
| Glycerinated Extract Red Bone Marrow | ... | ... | 10 mins.  |
| Iron and Ammonium Citrate            | ... | ... | 4 grs.    |
| Malt Extract, non-diatatic           | ... | ... | q.s.      |

Myeladol contains 25 per cent by volume of Super D Cod Liver Oil which is biologically standardized by the Official U.S.P. methods for both Vitamins A and D. The Vitamin-A content is also verified by colorimetric and spectrographic methods. Each ounce of Myeladol represents not less than 10,940 U.S.P. units of Vitamin A and 772 U.S.P. units of Vitamin D.

The Malt Extract furnishes a generous supply of the Vitamin-B complex. Each ounce of Myeladol is biologically standardized to contain 60 Sherman units of Vitamin B and 50 Sherman units of Vitamin G.

The iron salts with Bone Marrow Extract are of value in anemias of nutritional origin.

Myeladol is an excellent source of nourishment, having a caloric value of about 150 calories per ounce.

Myeladol is particularly useful as a nutrient tonic in wasting diseases, underweight, malnutrition and convalescence, where there is apt to be some degree of nutritional deficiency disease and anaemia.

## DOSAGE :

1 to 2 dessertspoonfuls after meals for adults, and  
1 to 2 teaspoonfuls after meals for children.  
Available in 3, 8, 32 and 128 ounce bottles.

*For sample and literature write to :*

*Manufactured by*

**THE UPJOHN CO.**

U. S. A.

*Sole Agents :*

**T. M. THAKORE & CO.**

5, Sunkurama Chetty Street,  
G. T., MADRAS.



*Head Office :* 43, Church Gate, Street, Fort Bombay.

*Branches :* KARACHI. LAHORE, NOYA-GOA, CALCUTTA  
AND RANGOON

## The Madras Medical Journal.

Vol. XIX.

April 1939.

No. 2.

*Joint Editors :*

J. C. DAVID, M.B.B.S., PH.D.

G. V. SATYANARAYANAMURTI, M.D.

*With the Collaboration of*

M. D. ANANTACHARI, M.B.B.S.

R. E. S. MUTHAYYA, M.B.B.S., L.O.

C. RAGHAVACHARI, M.B.B.S., F.R.C.S.E.

R. SANJIVA RAO, M.B.B.S., D.T.M. & H.

R. K. K. THAMPAN, B.A., M.B.B.S., F.R.C.S.E., M.R.C.O.G.

*Editorial Secretary :*

S. K. SUNDARAM, B.A., M.D.

## EDITORIAL NOTICE.

The Madras Medical Journal is issued quarterly, in January, April, July and October about 20th of the month. All Editorial communications, reports, books for review and exchange should ordinarily reach the Editor, The Madras Medical Journal, Dept. of Pharmacology, Medical College, Madras, one month prior to the date of issue of the Journal, preferably earlier. Original articles, clinical lectures, case reports, abstracts, Medical Society addresses are invited. Contributors of original articles will be supplied gratis with twenty reprints of papers, if applications for the same are received by the Editor along with the contributions.

## BUSINESS NOTICE.

### Subscription Rates.

To Members of the Madras Medical Service on payment of an Annual Membership fee of Rs. Five only --Free.

To non-Members including Medical Practitioners and others Rs. Three per annum, post free.

To bona-fide Medical Students --Rs. Two per annum post free.

Foreign 7 sh. 6d., post free.

### Rates of Advertisement.

|                               | One Page. | Half Page. | Quarter Page |
|-------------------------------|-----------|------------|--------------|
|                               | Rs.       | Rs.        | Rs.          |
| Single insertion              | 20        | 12         | 7            |
| Three insertions              | 40        | 24         | 14           |
| 4 insertions                  | 50        | 30         | 20           |
| 4 insertions (inside reading) | 60        | ...        | ...          |

Discount of 33½ per cent will be given if advertisements are inserted for 3 complete years.

All advertisement charges and subscription are payable in advance. Letters relating to the publication, sale and advertisement department should be addressed to :--

**Dr. S. K. SUNDARAM,**

Secretary, The Madras Medical Journal,

Boag Road, Theagarayanagar, Madras.

Copies of the Journal can be obtained at twelve annas each from Messrs. Gordon & Co., Ltd., Printers, 768-770, Triplicane, Madras, or at the Editor's Office, Medical College, Madras. Changes of address and complaints of non-receipt of Journals should be immediately communicated to the Secretary, to the above address. Matter for advertisement should reach the Editorial Secretary, at least ten days before the date of issue of the Journal.

## THE MADRAS MEDICAL JOURNAL.

Vol. XIX.

APRIL, 1939.

No. 2.

## CONTENTS.

|                                                                                                                                                                                   | PAGE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. PRESIDENTIAL ADDRESS TO THE SCIENTIFIC SECTION OF THE SEVENTH ANDHRA MEDICAL CONFERENCE HELD AT ELLORE ON 4TH MARCH 1939.<br>By Dr. P. Kutumbiah, B.A., M.D., M.R.C.P. (LOND.) | 95   |
| 2. A CONSIDERATION OF THE CONGENITAL DEFORMITIES MET WITH IN MADRAS.<br>By N. S. Narasimhan, F.R.C.S. (ENG. & IRE.)                                                               | 105  |
| 3. ABSTRACTS FROM CURRENT MEDICAL LITERATURE                                                                                                                                      | 147  |
| 4. SERVICE NOTES                                                                                                                                                                  | 167  |
| 5. NOTICES                                                                                                                                                                        | 168  |

The  
**Madras Medical Journal.**

The Journal of the Madras Medical Association.

PUBLISHED QUARTERLY.

Vol. XIX.

April 1939.

No. 2.

**Presidential Address to the Scientific Section  
of the Seventh Andhra Medical Conference held  
at Ellore on 4th March 1939.**

BY DR. P. KUTUMBIAH, B.A., M.D., M.R.C.P. (LOND.),

*Professor of Medicine, Medical College, Vizagapatam.*

In inviting me to preside over the deliberations of this Conference you have done me much honour and I am very thankful to you for the same. If your choice is an outward expression of the respect which the numerous students, who have passed through the portals of the medical school and college, Vizagapatam, bear to one who has laboured long to inculcate the fundamentals of medical science into them, then I am proud of the honour you have this day conferred on me. It would be inappropriate to criticise your choice on this occasion. I am fully conscious of my own unworthiness to occupy this exalted position and

discharge the responsibilities attached to it. I command no wide practice. I have no pretensions to original research. I am a child in scholarship. I am a humble votary in the temple of science and a seeker after truth. It is by sheer accident I have attained the exalted position which I now occupy. For any guidance in the matter of the many problems concerning the profession which are engaging the minds of you all, you must look up to President of the Conference. In him you have an experienced and trusted leader. I shall content myself with a few remarks on the science of medicine, pertaining to its

present and future in so far as it concerns our Presidency.

It is a truism to say that we are living in the midst of stirring times. The last twenty years have witnessed an intellectual ferment without parallel in the history of our land. Movements fraught with the greatest consequences to our existence have been set on foot in the political, social and economic fields. Everywhere we see the old order giving place to the new. The enormous strides that have been made in the political as well as in the social and economic spheres, are mostly due to improved means of communications and travel and the contact with various countries and progressive movements. The greatest stimulus has been given by the experiments in political and economic thought, in Russia. The Russian experiment is perhaps the boldest attempt in history of the application of scientific principles to the solution of the problems of the State. This red dawn has bewitched not a few of the younger generation. This contact with the methods of science has by a kind of psychological cross-pollination seems to have sown in us the rudiments of a new epoch. Hitherto our attitude was characterised by an intense admiration and veneration of the past. "But now honest doubt and a spirit of inquiry are replacing credulity and dogmatism. Men are learning to trust reason more than authority, to assert the liberty of the individual judgment, to set the natural above the supernatural and to look to the future rather than to

the past. Stimulated by these ideas, more men than ever before are turning away from the barren controversies of religion and devoting themselves to scientific pursuits." All that hankering and veneration of the past which has hung so long as a millstone round our neck in the way of our progress has been discarded. We are no longer enamoured with our hoary past and its glorious achievements. We are more concerned with the living present, and its problems and of the uncertain future.

The practical results of this new outlook are already apparent in the political, social and economic fields. It is not my intention nor is it the time to venture into these fascinating fields of thought. I would like to take a bird's eye view of medicine as it exists in our Presidency and trace the results of this new outlook on it. It is fortunate that in the domain of medicine, the experiment of introducing scientific methods for the solution of the problems that concern public health has commenced much earlier than in other fields. We have had a century of the reign of scientific medicine in our midst. Its achievements are before us to assess its value. True wisdom lies in consolidating the achievements thus far gained and devising ways and means how to extend its sway into fields awaiting its advent. Instead of doing this some among us have thought fit to raise at this juncture a false alarm and force on a credulous public false issues. They have thought it fit to assert that

modern medicine is not what India needs, but Ayurvedic medicine, the medicine which in her palmy days had played such a glorious part in Indian history. As medical men into whose hands is entrusted the future welfare of this infant nation, it is our bounden duty to view these claims dispassionately and arrive at a proper decision. Besides, the time is opportune. Just at present there is a wide propaganda set on foot to advance the claims of Hindu medicine and to enlist the sympathies of the vocal public in its favour. The advent of the Congress ministries is taken advantage of to capitalise its claims. As I have told you the veneration of the past has been the main cause of our inertia in all fields of political life. To revive ancient Hindu medicine, solely on patriotic grounds would be to commit national suicide. It can be revived only if it is capable of solving the various problems of health and disease with which we are confronted at the present time. This cry of the revival of the Hindu medicine is not a new one. In some form or other it has been heard from time to time. But from want of public support it had died down in the past. But now it is raised at its loudest in the belief that the popular government will readily accede to its clamorous demands. The government on their part have not been oblivious of the legitimate claims of ancient Hindu medicine. As early as 1919 they deputed Dr. Koman to collect information about drugs and specifics used by ayurvedic doctors with a view to subjecting

them to analysis and test independently of their place in the treatment of disease and with a view to incorporate into the British Pharmacopoeia those that have satisfied this test. But the protagonists of ayurvedic medicine loudly protested at this attempt to whittle down the claims of Hindu medicine. They were not willing to concede that their *materia medica* was the only contribution they can make to modern medicine. In 1921, the Government of Madras in G. O. No. 1351, P. H., dated 17th October 1921 appointed the Usman Committee to report on the question of the recognition and encouragement of the indigenous systems of medicine in vogue in this Presidency. This Committee came to the conclusion that from the standpoint of science the Indian systems of medicine are logical and scientific; from the standpoint of art they are not self-sufficient at present in the surgical line, but the medical line they are quite self-sufficient and efficient and economical; in the best interests of science as well as of suffering humanity, it is highly desirable that the followers of Indian medicine should study the scientific methods of the west and adopt into their own system whatever is useful in western medicine and *vice versa*; it is only through the promotion of the Indian system of medicine that, under the present circumstances the State can hope to achieve the ideal of bringing medical relief within easy reach of all people, especially in the rural areas; it is therefore incumbent upon the

state to explore to the full the possibilities of the Indian systems of medicine with a view to make them wholly self-sufficient and fully efficient in both its medical and surgical branches. They further pointed out that schools may be established for the teaching of Indian medicine where additional training in western medicine can also be given. They were of opinion that this additional training which the leaders of Indian medicine were keen on giving to all their students should be not only western surgery and midwifery but also medical jurisprudence and every other subject, the study of which is necessary or desirable for practitioners of every school of medicine—Indian as well as European.

Every student of Hindu medicine will concede the scientific methodology of the ancient Hindu medical writers. But this is not to say that they had a perfect or anywhere near perfect science of medicine. As in the history of evolution of every system of medicine, the art of medicine long preceded the science of medicine. The Hindus reached a high degree of excellence in the art of medicine but their conception of medicine as a science was very imperfect. All sciences in their infancy are independent of other sciences. It is only as they evolve they pick up alliance with other sciences. The art of medicine is based on a science which is based in its turn on physiology, anatomy and pathology. The Hindu scientists had not the necessary data to

create any perfect science of medicine. Physiology and pathology of the scientific variety is of very recent development. Prior to the development of these sciences, the data which could only be supplied by these sciences for the construction of the science of medicine was wanting. Hence in the evolution of every system of medicine there is necessarily a metaphysical phase, when metaphysical creations not founded on natural facts observed but upon the intellectual faculties of their inventors who developed their doctrinal systems according to their own light take the place of the data supplied by ancillary sciences. The doctrine of *tridosha* is such a metaphysical creation. It has never been replaced in the Hindu system of medicine by any other conception because Hindu physiology and Hindu anatomy never reached a degree of excellence capable of supplying such necessary data. As such, the Hindu science of medicine has not completely evolved to the scientific phase. It has stopped short in the metaphysical phase.

The contention that the Hindu medicine from the standpoint of art is not self-sufficient at present in the surgical line but in the medical line it is quite self-sufficient and efficient and economical is contrary to facts. The art of the surgery was the strongest arm of Hindu medicine and its decadence is ample evidence that it was based on an imperfect science of medicine. Except in the case of a few really learned doctors of the Ayurvedic classics, Hindu

medicine as it is practised to-day has degenerated into a matter of dangerous dilettantism if not of disastrous quackery. The assumption that it is only through the promotion of the Indian system of medicine that under the present circumstances the state can hope to achieve the ideal of bringing medical relief within easy reach of all people especially in the rural areas is difficult to concede. Medical aid is certainly being brought to the doors of the villages by the various governmental dispensaries and other network of institutions which the government have established throughout the Presidency. Whatever the circumstances might have been in 1921, in 1938 the assumption is palpably wrong. The scheme of subsidized rural dispensaries and rural practitioners is conceived to carry medical help into the villages. It is only a matter of time for the medical aid to become available to all the villages in this Presidency. Imperfections in this line is no argument for the resuscitation of Hindu medicine but only for the acceleration of the schemes of Government to bring medical relief to the villages.

The contention that Ayurvedic medicine can be made self-sufficient by incorporating into it modern surgery and midwifery cannot be allowed by any body of scientists. Surgery, medicine, obstetrics, gynaecology, public health are all branches of one indivisible science, the science of medicine and are governed by the same laws. There cannot be an

art of medicine which is not linked to a system of scientific medicine. You cannot link the art of surgery as it is practised by modern countries of the world based on the modern science of medicine to the ayurvedic medicine which is based on altogether different hypothesis. Either you have an Indian medicine which is self-sufficient in all its parts based on its own postulates or you do not have it. The findings of the Usman Committee have conceded that Hindu medicine is not self-sufficient as it stands at present. Western medicine as it is practised in all the civilised world is self-sufficient in itself. It has been tried in India for the past one hundred years and it has shown that it is quite as good and efficient as it is found in other countries. Other systems of medicine as ancient and as scientific as the Hindu system of medicine have faded away before the inevitable advance of modern scientific medicine. The attempt to resuscitate ancient Hindu medicine and make it self-sufficient would be a colossal waste of money and energy on the part of the nation. The contention of the Usman Committee which regard to the cheapness of Ayurvedic medicine is fallacious. The cheapest is by no means the best. The nation will find, it is the best that will be the cheapest in the long run

Lastly they suggested the establishment of colleges for giving additional training to students of Hindu medicine in western surgery, midwifery, medical jurisprudence and every other subject, the study of which

is necessary or desirable of practitioners of other schools of medicine, Indian or European. This recommendation is a very short sighted one; if Hindu medicine requires that much addition as that of western surgery, midwifery, medical jurisprudence, one is tempted to ask why resuscitate a system of medicine which requires so much doctoring? It is much easier to incorporate in the existing studies of medicine in the various medical colleges a course of Hindu medicine. This would obviate the necessity of duplicating the whole machinery of medical education and other institutions necessary for the resuscitation of Hindu medicine, if ever such a thing is possible and would conserve all that is best in Hindu medicine.

To have two systems running side by side is inimical to the progress of the nation itself. To resuscitate Hindu medicine at this juncture is like trying to convert by laborious process of research a bullock cart into an aeroplane. Aeroplanes are available and ordinary wisdom would demand we should learn the building of the aeroplanes and utilise them. In ancient times, the bullock cart was as sure and as ready a method of reaching a place one wanted to reach. But now the aeroplane has taken its place. Both satisfy the demands put on them at particular times. Hindu medicine like another Rip van Winkle has slept far too long and too deep and has awakened all too late and it is absolutely impossible for her to

get the bearings of modern India and cater to the necessities of her growing population. I have dwelt at some length on this question because it is vital in the interests of the Indian nation that once for all this conflict between Hindu medicine and modern medicine should be settled. Conflicts as we all know are dangerous and if not solved may lead to undesirable results. At the present moment India can ill afford to fritter away her energies and resources, which are far too limited on an Utopian scheme to make ancient Hindu medicine self-sufficient and efficient.

Conferences like this are very essential to take stock of the present state of our knowledge and to consolidate our achievements and chalk out programmes for the future. The Andhra Medical Conference, year after year, in its deliberations has fulfilled this function. There is a more vital reason why this Conference should take stock of its present position and dispassionately think out the programme for the future. We are all agitated over the question of the Andhra Province and today its achievement seems to be a reality in the near future. You will be having a province of your own and it will devolve on your shoulders to organise the medical services. The Andhra Medical Conference must be able to give a correct lead to the members of the province in this direction. As one who has been associated with medical education and the science of medicine for the past

15 years in Andhra Desa, I may be pardoned if I presume to place before you some problems of utmost importance as far as this province is concerned. I have no time to dilate on any length on these problems. I would merely indicate to you the problems so that you might in your present deliberations and in future Conferences may discuss these problems. The prevalence of heart disease and the mortality resulting from that one cause alone is very great in this province; working on the medical side of the King George Hospital I have been struck with the large number of cases of heart diseases we are called upon to treat. Analysing its causes, I find the most important one is rheumatic infection and its sequelae—mitral stenosis, aortic regurgitation and other dire consequences. The extent of the prevalence of rheumatic infection in this province is not understood by many. In my own humble way I have tried to place before the medical public of this province the enormities of the ravages of rheumatic infection in childhood. At a previous Conference I read a paper on this subject. The disease is preventable if proper measures are taken to inspect children at the proper age and take them on in well manned clinics. This would prevent the advent of various complications which form such a fruitful source of mortality from heart diseases in this province. The other important cause of heart failure in this province is the prevalence of high blood pressure and its sequelae. It is commonly asserted that rheumatic

infection as well as hyperpiesis is unknown in the east. It is one of those statements which have been repeated by one authority after another without adequate basis. The number of persons suffering from chronic interstitial nephritis and high blood pressure in this province is very great indeed. In the past eight years I have handled a good many of these cases. We have not the proper understanding as to the cause of high blood pressure. Research in this direction is not even attempted. It is one of the problems that await serious consideration and thought at your hands. Another problem which I would like to place before you is the problem of venereal diseases. If our bacteriologic reports are any indication of the prevalence of venereal diseases in this province then the amount of venereal diseases is alarmingly great. I have on many occasions brought the urgency of this problem before various bodies but my cry has been a cry in the wilderness. Here we have a preventable disease which can be eradicated by proper organisation. We want centres for the early treatment of this disease; we want a wide propaganda for the dissemination of knowledge concerning the venereal diseases and how they are contracted and what are the ravages they produce. In the interests of the people of Andhra Desa particularly on the threshold of the constitution of a new province can I plead with you to focus more attention not only on the treatment side of this disease but also on prophylaxis

and the propaganda part of this problem? It is no good to wink at this problem; our apathy does not make the problem non-existent. It is a delicate problem but it has to be tackled. The whole question of prostitution, brothels, medical inspection, certification — all these things have to be taken in hand to prevent the very founts of your national health from being contaminated by this dire diseases.

Another problem which also demands your careful consideration is the prevalence of nervous diseases in this province; neurology is an infant science in India. As one who is interested in neurology, I have been struck with the extraordinary wealth and variety of neurological cases that are found in our hospitals. There is a popular belief among the laity as well as in the profession that a study of neurology is not profitable because for the labour wasted in diagnosis, there is nothing much to be done by way of treatment. This belief is altogether baseless.

I have only to mention the great strides made in the diagnosis and treatment of tumours of the central nervous system and the hopeful future for the treatment of the various types of meningitis with the advance in chemotherapy and the great alleviation which has been brought to the people suffering from various forms of neuritis by the isolation of the vitamins, to prove how baseless are such assertions. We have in this province the enormous incidence

of peripheral neuritis particularly in the female population after puerperium. Certain amount of research has been done on this aspect in the King George Hospital but much more remains to be done. I may briefly mention the prevalence of cases of mental deficiency in this province; cerebral diplegias of all forms are seen fairly commonly in our clinics and it opens to us the problem of prevention of this disease. The State must come forward with some sort of legislation which will prevent the marriage of the undesirable or sterilisation of the unfit.

I may briefly mention in passing the prevalence of infantile paralysis and the growing need for orthopedic clinics where the life of the poor infants may be made more bearable. There is no need to dilate on tubercular infection and its ravages as a nation-wide propaganda in its cause is just now being conducted. The problem of leprosy is really baffling, when we take into account the enormous number of lepers in this province. These are all problems which await solution at the hands of you young medical men. Some of them are big problems; India just now is having big visions and it cannot be said of her medical men that they are afraid of tackling these big problems.

That brings me on to the question of organisation of scientific centres where research into these vital problems that concern the health of the province may be carried on uninterruptedly.

We want men trained in research who have dedicated their life to research who will be ceaselessly engaged in solving these problems. No limit or restriction can be put to the subjects of research. This must be done as and when clinical problems arise and research may lead us to wider avenues of medical knowledge and labour. It is not possible to keep medical science alive by manufacturing in the various colleges medical men alone. These men are necessary and they will be engaged in taking to the remote parts of the country the much needed knowledge and medical help to the suffering millions. The medical practitioner has neither the time nor occasion to study diseases in all its bearings critically and contribute to the advancement of science. It has been well said that the Harley Street is the grave of clinical research. The vast host of private practitioners, who form the army of medical science which brings medical help to the very doors of suffering humanity, when they are engaged in the work of the profession are more concerned with the immediate problems that arise in the treatment of their patients and have no time to think of other things. The products of our universities are so enamoured and encumbered with the problem of earning livelihood that the nobler side of medical science is forgotten. Everywhere the art of medicine is practised and praised and methods to make it more successful adumbrated. But the science of medicine is neglected. I would like to

remind you of the pregnant words of Francis Bacon "Medicine is a science which hath been more professed than laboured and yet more laboured than advanced." If we look at the contribution which the medical men of India have made to the science of medicine in general their contribution is infinitesimal. The medical men are more bothered with the ways and means of enlarging their practice and earning money, rather than to enlarging the boundaries of medical science. There are far too many practising the art of medicine and far too few concentrating their mind on the science of medicine. If this state of affairs is not rectified the same fate that has overtaken Hindu medicine and all other systems of ancient medicines will surely overtake modern medicine. The fault is not that of practitioners; the fault lies in faulty organisation. We want a body of men engaged on the science of medicine doing research and tackling all the problems as they arise. This can only be achieved in the centres of learning. The sole aim must be to instruct students in the knowledge of the science of medicine and the many students that go out into private practice from its portals must not be left to fritter away their energy and knowledge in private practice alone, to the detriment of the medical science. Periodical facilities must be afforded to bring to these vast numbers of medical practitioners the latest advances in medical science at these centres by courses of post-graduate study.

An attempt was made a few years back by the Medical Union, Vizagapatam, to organise post-graduate courses of lectures for the various medical practitioners. We were able to run it for two years but owing to circumstances over which we have no control, we had to give up this experiment.

Finally, what of the future? All round we see disturbing signs. The atmosphere is thick with rumours of a coming catastrophe both at home and the world at

large. But our duty is clear. It is for us to keep ourselves calm and collected and pursue our allotted task without wavering. Ours is a noble task and will endure for ever. All that is required is faith in our mission and steadfast courage to pursue it without being deflected from our chosen path by the pull of the politician, philanthropist or the press and thus earn the gratitude of the millions of our suffering brethren whose welfare is entrusted to our keeping.

#### THERAPEUTIC INDEX

If your patient has "go,"  
Use sulfanilamide;  
If he's water on his knee,  
Use sulfanilamide.  
If he's bothered by the hives,  
Or echinococcus thrives,  
Don't you fret, just busily  
Use sulfanilamide.

If little Johnny has a spell,  
Use sulfanilamide;  
If it's just his feet that smell,  
Use sulfanilamide.  
If his liver seems to quit,  
There's no need to have a fit;  
What you need to make him well  
Use sulfanilamide.

If you want her to conceive,  
Use sulfanilamide;  
If it's piles you would relieve,  
Use sulfanilamide.  
If you've fallen down on knowledge,  
You don't need to go to college;  
For your reputation to retrieve,  
Use sulfanilamide.

Samuel L. Miller, M.D.

(From J.A.M.A.)

## A Consideration of the Congenital Deformities met with in Madras.\*

By N. S. NARASIMHAN, F.R.C.S. (ENG. & IRE.),

Orthopædic Surgeon, General Hospital and Lecturer in Orthopædics,  
Madras Medical College.

At the outset I may discuss the etiology of congenital malformation. This may be dealt with under

(a) The Mechanical Problems;  
and

(b) The Hereditary Mechanism.

In the group study of the different congenital deformities of cases as they have been seen by me in Madras and which will be dealt with by me now, I shall indicate the predominating factor.

The problem may be reviewed as a whole at first. A large and important class of deformities are due to (a) *Mechanical Problems* (Dennis Browne, 1936). The evidence for this is the presence of dimples. Depressions and indentations are seen in the infant over the knuckles, the elbows, the external condyle of the femur and very often over the acromian process. These occur when there is a bony contact of the foetus with the uterine wall. The tissues then become adherent by

the compression of the wall against them, and when that pressure is removed there remains the pitting around the surrounding fat. Any deviation from the normal position of the foetus would produce dimples in other parts.

I shall deal with each deformity with reference to mechanical problems.

Regarding talipes, there is abnormal position alone without fault in development. The feet are the parts most exposed to pressure. In double talipes it is always noticeable that one foot is worse than the other. This is the foot that lies on the outer side in the cross-legged position *in utero*. But it must be remembered that no case of talipes has been recorded in twin children.

Postural torticollis can be explained in a similar way. Transient facial paralysis in the infant may be caused by the pressure of the shoulder on the facial nerve.

\* Lecture delivered under Dr. Elizabeth Mathai Endowment Fund, in the University of Madras, 1938-39.

In *Syndactylism* it is possible that the hands and face might have been jammed so that a *mutual pressure deformity* resulted.

There may be *normal mechanical pressure with both abnormal position and defective development*. In cases of congenital fracture of the tibia, there is an acute bend found in the tibia, invariably over a dimple. Club hand can be brought under this mechanism.

There may be *normal position but increased mechanical pressure*. If the limbs are kept confined for a considerable time a peculiar degeneration of the tissues with stiffened and atrophic limbs results. In the infant the muscles might be found badly developed and the joints extremely stiff may arise as a result of alteration in the hydraulic process.

Alteration in *mechanical and hydraulic pressure with abnormal position* would result in a variety of talipes equino varus in which muscles and joints were defective. This type of talipes would be extremely difficult to treat.

In *hydramnios with increased amniotic pressure* the foetus could take up attitudes and stiffen in them which would be impossible in the normal uterus.

*Spina bifida* combined with talipes and paralysed legs might arise as the result of an accentuated bend in the foetus, the spina bifida appearing at the

point of maximum pressure and the legs being compressed.

Ring constrictions of the limbs and congenital amputations are usually due to mechanical causes. At what stage of foetal deformity this must arise is not certain but it must be in the early weeks.

Sprengel's deformity is rather a *failure of migration*, like incompletely descended testicle, than a pressure effect; this must also operate in the very early weeks of foetal life because in one of my cases even cervical vertebræ differentiation had not taken place.

The valuable experimental method is not available here as it is impossible to interfere with normal gestation process without wrecking it.

The experiments of the Chinese on the female human foot would show what pressure effects can produce.

It can be imagined that if anything goes wrong between the growing foetus and its expanding surroundings similar deformities can occur.

Middleton (1934) objects to the theory of mechanical pressure on account of the fact that talipes occurs in foetuses three months old, but Dennis Browne remarks that compression can begin its work when the foetus is two millimetres long. Proofs for the existence of compression at such an early stage of foetal life are not available.

(b) *Hereditary problems*:—Professor J. B. S. Haldane approached the study of the subject *through a study of inherited abnormalities in animals*.

*The Hereditary Mechanism*:—Consider the cases in which the hereditary mechanism was obvious or at least fairly clear. Prof. Haldane instanced *split hand and feet*, sometimes called "*Lobster-Claw*" and showed a pedigree in which every affected individual was the child of an affected individual, the disease never skipping a generation. The affected individuals passed the disease on to approximately half of their progeny without regard to sex, fathers and mothers transmitting equally to their sons and daughters.

He also showed a pedigree of presenile cataract.

A relatively trifling defect shown in the pedigree was *short fingers*, handed down by persons abnormal in this respect to one half their progeny. But there was one interesting exception. Two first cousins, both of them carrying an abnormal gene, married, and in addition to a daughter who had short fingers and another daughter who had no fingers or toes at all and showed other gross skeletal abnormalities. It was extremely probable in such a case the child had received an abnormal gene from both parents.

To make an analogy, let it be supposed that a child inherited one eye from each parent. In

that case one half the children of one-eyed persons would themselves be one-eyed. But if two one-eyed persons married approximately one-quarter of their children would be completely eyeless. The analogy, though crude, had some justification. The genes responsible for hereditary differences were organs within the nucleus of a cell. Each gene appeared to control a specific function rather than a structure but, unlike the organs in the body as a whole, they reproduced themselves directly—that is to say when a cell divided the new genes were formed by a process which might be regarded as a division or as copying according to taste.

When these pedigrees of dominance were traced backwards the appearance of an abnormal individual from two normal parents were constantly found.

Consider another analogy. Suppose 1 per cent of people had only one kidney and that this defect was handed down to half the offspring. Such a condition would be noticed relatively rarely. But when two persons with one kidney married, one-quarter of their children would have no kidneys at all, and therefore would not live.

In a hereditary disease like juvenile amaurotic idiocy, which could not be handed down from parent to offspring, because the afflicted person almost invariably died before reproducing, it seemed likely that a recessive gene was handed down from one ancestor

to the two different lines of the man and his wife, and on marriage a number of their children had an abnormality due to the presence of two abnormal genes.

There are metabolic diseases as phenylketonuria associated with mental defect probably due to a recessive gene.

There is a sex-linked inheritance in ichthyosis, colourblindness, hæmophilia, retinitis pigmentosa, acholuric jaundice and Huntingden's chorea.

In the hereditary fragility of bone, the presence of blue sclerotics gave some indication in the pedigree, but little idea could be formed as to the conditions which the sufferer from that diathesis would develop, whether fragility of the bones or otosclerosis.

There were many cases of irregular inheritance when a disease or abnormality ran in a family and yet nothing could be said as to whether a given individual, apparently normal, would or would not transmit it to a proportion of his or her children.

Pharaohs of old married their own sisters and nieces and Ptolemys, though Greeks, followed this to satisfy the priests and for the purpose of keeping the royal blood pure. In one case a Ptolemy married his step-mother. Attic law allowed marriage between children of the same father, provided that they had different mothers. Marriage between children of the same mother, even

when not of the same father, was incestuous (Budge—1902).

Intermarriage amongst the near relations as sister's daughter, first cousin is extremely common both among Hindus and Muslims in this province; this is probably the rule in certain sub-sects.

Therefore it is imperative that the most extreme eugenic measures were taken with regard to the carriers of such abnormalities; and the number of congenital deformities would be greatly diminished.

Our knowledge of congenital deformities comes largely from a literature antedating the X-ray, and pathological reports for the most part are not modern. With the study of these cases by X-ray the frequency of real bony defects becomes evident, which must place many of the cases in the class of primary congenital defects and diminish the importance of the influence of the amniotic bands so much alluded to in the older literature.

Murphy (1938) reviewed 130,132 death certificates of persons dying during five years in Philadelphia. Among them, 1,476 had a congenital defect. The author was unable to secure any evidence that pre-natal environment played a part in producing congenital deformity. *Deformity occurred relatively twice as frequently in white persons as in Negroes.*

The data which the author secured point to heredity as the cause of congenital deformity.

The author suggests that *re-productive inefficiency was the cause*, as shown by the relative sterility of the parents before the birth of the deformed child, the presence of deformity in sucklings, the frequency of miscarriage and still-birth among the mothers of such persons and the duplication of defects in brothers and sisters.

One can now summarise "that for each type of deformity the mechanism of production must be a special one and interfere at the same stage with the normal course of development. The explanation in each case must depend upon an understanding of the normal course which has been perverted (Maccallum, 1938).

In club feet and extra fingers, the normal development has been disturbed at some point in a way that is followed by *typical abnormal continuation of embryonic growth and produce familiar types.*

The observance of eugenics would appear to be a great desideratum in minimising the incidence of congenital deformities.

Congenital deformities are divided into two classes:

(a) Primary, and (b) Secondary.

(a) *Primary* or idiopathic (hereditary); hereditary element exists in about 25 per cent of cases in congenital cases.

*Acquired deformities cannot be inherited.*

*Secondary congenital deformities*:—The congenital deformities are grouped as follows, for purposes of this study:—

*Congenital Deformities*.—

1. General diseases of the foetus which affect its skeletal growth before it is born:

(a) Achondroplasia.

(b) Fragilitas ossium.

2. Due to injury to the child at birth or due to difficult labour:

(a) Fractures.

(b) Peripheral nerve lesion.

(c) Central nerve lesions—cerebral spastic paralysis.

(d) Torticollis.

3. From infections of the parents—congenital syphilis:

4. Errors of development:—

(A) Spine—spina bifida, cervical ribs, anomalies in the ossification of the first rib, vertebrae etc.

(B) Upper extremity:—

i. Cranio-cléido-diastasis.

ii. Congenital dislocation of shoulder joint.

- iii. Sprengel's shoulder.
  - iv. Epicondylar process.
  - v. Synostosis of superior radio ulnar joint.
  - vi. Club hand.
  - vii. Congenital contraction of fingers.
  - viii. Supernumerary, absent or deficient fingers.
  - ix. Syndactylism.
  - x. Bifid phalanx.
  - xi. Malformed fingers.
- (C) Lower extremity :—
- i. Congenital dislocation of hip, knee, patella.
  - ii. Genu recurvatum.
  - iii. Congenital contracture of knee.
  - iv. Absent bones—femur, tibia, fibula.
  - v. Congenital talipes equino varus.
  - vi. Talipes valgus.
  - vii. Calaneo and equino valgus.
  - viii. Hallux valgus, hammer toe
  - ix. Hallux varus.
  - x. Metatarsal varus.
  - xi. Deformities of toes—syndactylism macrodactyly.
- xii. Absence of bones of foot.
  - xiii. Congenital amputations.
- (D) Multiple deformities—
- i. Dychondroplasia.
  - ii. Arthro-gryphosis congenita.
- (E) Of muscles.
- Bone is developed in two main ways :—*
- (a) Intra-membranous ossification.
- I. Arrest or perversion (Anosteoplasia).
- Hereditary craniocleido dysostosis.
- (b) Endo-chondral ossification.
- II. Arrest or perversion Achondroplasia.
- III. Idiopathic fragilitas ossium.
- (a) Osteogenesis imperfecta is a congenital defect in the evolution of the osteoblasts; clinically defective ossification of skull and multiple fractures are met with due to hereditary hypoplasia of the mesenchyme.
- (b) Abers Schönberg disease (1904) Marble bones (late stages similar to (a).
- VI. Dyschondroplasia.
- V. Arachnodactyly.

*Achondroplasia* is due to a congenital defect or interference with the development of the cartilaginous skeleton at different periods of intra-uterine life. There is retardation of the growth of the bone in length although the epiphyses are normal. The epiphysis consolidates very early. The bone is never normal.

Always congenital and sometimes inherited, the changes are produced during the early weeks of intra-uterine life.

The condition may be evident at birth or becomes obvious in growing children. The patients come for short extremities which become evident in the first or second year.

In the case of the mandible the synostosis due to *Achondroplasia* may be serious. The deformed underhung lower jaw will not permit of opening the mouth; the treatment in such a case consists in splitting the symphysis menti.

The mechanical condition must be watched to avoid deformity. In case of any posterior curvature of the back in infancy recumbency on a frame is desirable.

Congenital and often inherited faulty deposit of bone—(Keith's view).

There are certain typical secondary distortions and deformities of the skeleton.

It affects males more than females.

Only 5 per cent of reported cases come from parts of the world (other than German, French, English); evidently they are not reported.

Manifestly inherited in 2/3 of cases, being reported in four generations. There is retardation of the general skeletal growth, the patients are always of medium height or below, and the *retardation occurs chiefly* in the limbs.

The following *deformities* may be present :—

Spine—lateral curve.

Knock knee.

Neck of femur—short, thick.

Nerve complications may be present.

There are changes in forearm and ankle; ulna disproportionately short to the radius; the radius is not affected and continues to grow. There may be an upward and backward dislocation of head of radius. (Distinguish this from congenital dislocation of radius.) Weak wrist and club hand are seen.

(Fibula becomes short and valgus at the ankle is the result).

Following cases were seen in this Hospital :—

(1) Abdul Rahiman, aged 28. was seen for deformed hands; on examination, he had aneurysmal swelling of thoracic descending aorta; serum reaction Wasserman positive. His forearms and hands

were radiographed. Left forearm—Radius is short and ulna longer by one inch than the right side. The third metacarpal is one inch longer; first metacarpal is very short; there is backward displacement of the lower end of the ulna; the head and neck are bent backwards there is displacement of the lower end of the ulna; the head of the radius is much smaller. Right forearm—the head and neck are bent backwards; there is displacement of head backwards; wrist joint is normal; the lower end of the radius is normal but lower end of the ulna is misshapen.

(2) Ramudu.—Right femur short. Humerus is short and bent; ulna is bent and short; superior radio-ulnar displacement; metacarpal very short.

(1) 1st lumbar vertebra is misshapen in lateral view looking like a compression fracture. Metatarsals are very short. Big head with flattened nose.

Pituitary fossa is small.

(2) A congenital deformity of left humerus which is shorter; there is epiphyseal arrest of both ends of the left humerus in a boy of 10. Radiology of other bones normal. His blood calcium is normal. There are no signs of rickets in other bones.

(3) Govindaraj 19, male, Hindu. Multiple deformities with shortening of forearm, genu valgum, and talipes.

Left knee — Genu valgum. Tibia longer than fibula. The

medial malleolus is on a lower level than the lateral. There is abduction and unilateral displacement of the foot.

Arm and Left forearm—There is no elbow joint. Humerus and ulna are fused. Left ulna longer and curved. Radius has no head—does not articulate with ulna and is much shorter at its lower end.

Right arm and forearm—The elbow joint is formed; radius is bent outwards and longer; the ulna is very short by two inches and does not enter into the wrist joint.

The epiphyses are not present in other bones though there is ulnar epiphysis on left side; there is premature synostosis of other bones.

*Achondroplasia*.—20—F.

Came in for defect in right shoulder.

X-ray shows shortened shaft of humerus with enlarged ends.

The typical hand as seen in the diagrams shown in Choyce text book have not been seen by me here.

*Osteogenesis-Imperfecta (Fragilitas Ossium)*.

It is a rare congenital condition; it is a primary congenital defect.

There is defective development of osseous tissue from cartilage, so that the bones are brittle or

soft; they are easily bent or broken. Bone shadow resembles in its thinness that of osteomalacia. Other congenital deformities are not usual.

Histological changes in the bones:—

(1) Persistence of cartilage cells in their capsules.

(2) Calcification of the trabeculae between, very little bone being formed and that of a defective type.

*Congenital Fractures*.—The commonest bone to be affected is the tibia, and this with the femur constitutes nearly  $\frac{2}{3}$  of a recorded series of cases. It may be united, ununited, or with a pseudoarthrosis, but if united there is nearly always deformity consisting of an anterior angulation at anything up to 90°.

Over the apex of the deformity there is a dimple present; these dimples are not true scar tissues, but pressure effects of a chronic inflammatory character.

Fracture of the lower third of the tibia with congenital absence of fibula is common but cannot be explained.

The etiology is not known; there is a strong hereditary tendency in 15 per cent of cases. The disease has been recorded as occurring in three or four generations.

Fractures may occur before birth, at birth and after birth.

(1) They are still born with broken or deformed limbs;

(2) Many die within the first year of life.

(3) If the child lives the fractures unite.

The condition is very rare—an obstetrician of large experience is able to remember only one case which was still born.

The second instance was that of a female child aged 2 in a well-to-do family who in 1924 had multiple fractures of long bones of the body. Her blood calcium was normal and was therefore not rickets; the fractures united well and she is alive.

The third case was that of a female child seen this year, aged three months who began to have fractures a few weeks after birth; the child had severe diarrhoea and vomiting; in spite of the general condition the fracture united; the child succumbed to Broncho-Pneumonia.

The fourth case is a baby seen for talipes; there was a defect in the lower third of the leg in the form of an angulation over which there was a dimple; there was healed intrauterine fracture of lower third of fibula.

*Birth Injuries* :

(a) Hæmatoma of the sternomastoid:—

Yutharadoss, male child, 1½ months old, came on 23rd August 1938 from a woman's hospital, he

had a fracture of the upper end of the left humerus; had a calcareous nodule on right sterno-mastoid as seen in the radiogram. It is difficult to demonstrate the hæmatoma ordinarily and some doubt its importance as a factor in the causation of torticollis.

(b) There was one case of Sterno Clavicular Dislocation in a new born baby this year which was kept in position by strapping.

(c) Fractures of the shaft of the humerus and shaft of the femur are common. Three cases of fracture of the shaft of the humerus and two of the shaft of the femur were treated this year. Two cases of fracture of the shaft of the humerus had musculospiral paralysis with dorsi-flexion position of wrist; the muscles recovered; all the fractures united well. Fractures of the shaft of the humerus have been treated with card-board side splints and sling. Fractures of the shaft of the femur have been treated with moulded plaster of paris splints and sent home with the mother; there had been no complications.

*Erb's Palsy*.—Is much commoner than is thought of. Cases with fracture of clavicle and fracture of humerus may have Erb's palsy and with an obvious bone lesion.

The condition may not be recognised.

Three cases were seen during the year.

With treatment the child's condition will improve a great deal.

For the first few days of life, it is enough if a padded bandage is applied to the wrist and the bandage secured around the head of the baby or to the head of the cot; this will secure abduction at the shoulder and supination of the forearm.

As soon as the baby is a month old, a wire splint can be improvised with plaster of paris to secure abduction of the shoulder, supination of forearm and dorsiflexion at the wrist.

This position will have to be kept up for nearly a year.

If the child is seen at a later period, say a year or two, then there would be contractures. These could be easily overcome under anæsthetic and gradual correction is obtained. Massage and muscle re-education must be systematically given. Exercise and re-education must be in the nature of attempts to reach for toys and to hold them; voluntary movements are important.

When the child is older more exercises could be given. Sometimes the aeroplane splint must be continued for a long time to prevent contractures.

If the child is seen only at the age of four or five, then there are contracures; the condition can be improved by operation.

The procedure consists of division of insertion of subscapularis muscle to secure external rotation; if abduction is imperfect, division of the infra-spinatus and

coracohumeral ligament is required; extreme limitation of abduction and external rotation require division of Pectoralis major and Teres major.

After the operative procedure systematic muscle re-education and active exercises must be continued.

To secure supination, Pronator radii teres must be divided and secured to the extensor carpi radialis longus and brevis; this strengthens dorsiflexion and ulnar deflection.

This procedure has been adopted in Volkman's contracture several times and is very useful to secure supination.

Partially recovered cases are seen in adolescence and will have to be differentiated from other affections as progressive muscular atrophy, anterior polio-myelitis, and leprosy. Cases of the upper arm type are generally able to raise the arm to the shoulder level, but supination remains poor; in the lower arm type the outlook is not good. The arm cannot be supinated sufficiently to be thoroughly useful; it is possible to put the hand on the opposite shoulder, but not on the top of the head or the back of the neck; some elbow flexion is often present.

*Spastic paralysis* of childhood is not considered here.

*Torticollis*.—Torticollis is said to be a common enough complaint; there are three types:—

Acute or Rheumatic;

the Chronic; and  
the Spasmodic forms.

The acute or rheumatic is the commonest; out of 30 cases seen this year nearly 22 belonged to this group, spasmodic one case, but of the seven chronic cases, six were due to tuberculous disease of the spine and only one due to shortening of the sterno-mastoid muscle.

On examination of 200 radiograms of the cervical spine at all ages, no congenital deformity of cervical vertebra was noted by me except in one case of Sprengel's shoulder.

Torticollis and congenital elevation of the scapula can be considered under contractures.

Torticollis is of congenital origin due to intrinsic shortening of one or both sterno-mastoids. They are of two types (a) Primary—at birth or seen at ten years of age (b) Secondary.

The fibrosis affects only the sternal or anterior half of the muscle and usually only its lower part.

#### Differential Diagnosis:—

1. Cervical scoliosis.
2. Astigmatism.
3. Reflex torticollis.
4. Paralysis of opposite sterno-mastoid muscle.
5. Unilateral dislocation of cervical spine.

6. In Tuberculous disease of the Spine—there is spasm of all the muscles; chin points towards the contracted muscle; in torticollis it is twisted away from the contracted muscle.

The one case of chronic torticollis was seen in a baby of nine months and was relieved by subcutaneous tenotomy of the sterno-mastoid at the sternal end. This was followed by daily stretching exercises by holding the child with the head.

Reference has been previously made to the case of hæmatoma of the sterno-mastoid.

This condition is not commonly met with in this province. A girl of 15 was operated four years ago in the Madras General Hospital. I have met with two cases of untreated torticollis in two male adults both doctors.

The time required for the facial asymmetry to disappear after operation is from 18 months to three years.

*Syphilis* is the most common of congenital infections and it offers also the greatest scope for preventive treatment. Every pregnant mother must be adequately treated. The following five cases of congenital syphilis were seen during the year:

#### 1. Congenital Syphilis.

K. 6 yrs. F. C. Left femur—periostitis.

K. 1½ yrs., F. C., arm and forearm and metacarpals osteo-periostitis.

2 yrs., M.C., osteochondritis both ankles.

1½ yrs., M.C., diffuse periostitis of all long bones.

F.C., 1 month, Lower end femur swelling. Swelling of left knee.

The following lesions are met with:—

1. Osteochondritis above and below the joints. This leads to inability to use affected limbs and is called pseudoparalysis.

2 (a) Complete separation of epiphysis when the function of the limb is impaired and there will be a variable degree of shortening.

(b) Incomplete separation of the epiphysis causes inequality of the growth.

3. Periostitis, localised or diffuse, may be seen.

4. Double hydrops of the knees may be met with.

Some of these conditions in this province closely stimulate lesions of Yaws; treatment is identical.

X-ray appearances of Yaws differ and this will be referred to again in the next lecture.

#### Spina Bifida.

Occurs 1 in 1,000 births and is often incompatible with life.

It is met with almost equally in the two sexes; it is due to some somatic defect; occasionally it affects a whole family.

The condition is extremely common in this province. Majority of the children die of septic meningitis or complications from hydrocephalus before the age of 5.

Interference with the nervous system is present unless the lesion is very low in the lumbosacral region. These nervous phenomena take the form of paralysis in the legs, talipes, perforating ulcers and other trophic changes, ankylosis of the joints of the foot and interference with the function of the bladder and rectum. These nervous symptoms do not always appear until the child is a few years old.

#### Contra-indication for Operation.

1. Hydrocephalus.
2. Myelocoele and syringomyelocoele.
3. If the lesion is above the first lumbar vertebra.
4. In cases accompanied by paralysis or contra-ures evidencing irreparable defects in the cord substance;
5. In cases of abdominal and vesical fistulæ.

Parents must be instructed to look after the skin with scrupulous care. Sometimes an urgent operation may be required to prevent rupture.

The period at which curative operations can be undertaken varies—Fraser puts it down at 5 months and Binney not before 5 years. Operation before the

age of 5 is more hazardous than after that age. It is difficult to follow up our cases; three babies below one year were operated in 1930; there was no immediate mortality; the children were seen a few months afterwards in good condition.

In 1936, a young man of 15 came in for a large meningocele in the lumbar region without any other symptoms.

Oxygen was injected for a radiogram after removing sufficient fluid. There was mild infection and the sac had to be laid open; the wound healed up and with that the meningocele. During the year three cases were seen: (1) one male baby aged 6 months came in for bilateral talipes; (2) another, a boy aged about 8 had paralytic symptoms of legs with a large meningocele. The skin was unhealthy and eczematous and no operative procedure could be carried out; (3) another male of 23 in very good health came in for a chronic ulcer on the foot which were quite flat. The X-ray print of the foot is marked No. 1. Although there is weakness of both legs he manages to get about well and he has a large meningocele.

The X-ray changes seen in the foot resemble those of neuropathic affections; an amputation was refused.

The Surgery of spina bifida is not brilliant but a good deal can be done for them seeing the cases that live to a sufficient age. The proper selection of case is of utmost importance.

**Cervical Rib.**—Cervical rib is a developmental defect.

A cervical rib is found in 1 to 2 per cent of all cases, but of these only 5 to 10 per cent produce symptoms.

Symptoms occur eight times in females as frequently as in males which is probably due to the more marked drooping of the shoulder girdles in the females, causing a greater strain on the lowest trunk as it arches over the abnormal rib.

Schonbeck recorded the presence of scoliosis in 22 of a series of 61 collected cases of cervical rib (Jones & Lovett, 1923).

An examination of the skiagrams of cases of fractures of clavicle and shoulder injuries seen during the year revealed the following anomalies and defects regarding cervical ribs:—

18 yrs., F. H. Bilateral free cervical rib. No symptoms.

4 yrs., M. H. Separate articulation, Bilateral, rudimentary free cervical ribs.

45 yrs., M. H. Bilateral, longer on left.

4 yrs., F. C. H. Rudimentary right side—free—separate articulation.

5 yrs., M. H. Separate joint—free on left side.

8 yrs., M. H. Prominent transverse process left.

2 yrs., 8 months, M., Enlarged transverse process of left.

15 yrs., M. H. Bilateral, transverse process of left.

7 yrs., M. H. Bilateral, transverse process of left.

12 yrs., F. H. Prominent curved transverse process (left). Fracture rib on right side (rickets case). Bilateral cervical ribs.

None of these had symptoms.

There was no association of scoliosis.

It is strange that when cases with muscular weakness or sensory disturbances are sent for X-ray for evidences of cervical rib, they are not found.

The findings in two cases of muscular weakness of hand were as follows:

23 yrs., M. H. right transverse process of C. VII—is longer than the left and beaked.

41 yrs., M. H. for weakness of limb—prominent transverse process of VII.

Three cases have been seen one in a male, aged 45 and two in females, aged 30 and 35 with marked prominent complete cervical ribs without any symptoms.

Those without symptoms are not to be operated on.

They represent the ribs which are normally developed in some lower vertebrates; a rudiment is always present in the foetus.

It may be very short and represented only by a head, neck

I. R. M., aged 30. Spina bifida with chronic ulcer of the foot. Shows atrophic changes of bones of foot.

II. Male. Non-fusion of two centres of normal first rib on left side.



V. Sprengel's shoulder in a male of 18. The left scapula is high, small. superior angle is shaped differently from normal.



VI. Defect in the development of the body of the last dorsal and first and second lumbar vertebrae. Female, aged 7, first born; angular curvature with lumbar lordosis; there is defect in the body of the eleventh and twelfth dorsal vertebrae; these latter have altered in shape; there are pre-auricular fistulae and pilonidal sinus present.

## Congenital Deformities

119

and tubercle; sometimes it is movable; sometimes it is ankylosed to the vertebra and its transverse process.

I have met with enlarged, elongated transverse processes in two cases of injury to the Brachial plexus. I cannot say whether this abnormal length has anything to do with the aggravation of the injury to the plexus.

One case of bilateral cervical ribs was operated upon in a man of 35 on the left side as there were pressure symptoms; the rib was articulating with the first rib; it was removed completely by the Technique of Stiles.

Cervical ribs with associated pressure symptoms may be traced through several generations of the same family. Pain in cervical rib cases is not due to cervical rib but it is due to loss of shoulder support.

The difference between adult man and woman is the squareness and droop of shoulder. Shoulder droop means traction and tension on plexus and direct pressure against the rib.

In Wood Jones's specimen, a rudimentary first rib is attached to second segment of rib; cases of pressure of Brachial plexus have been found even in this connection, that is, without any cervical rib at all (Keith).

"Scalenus Anticus syndrome" was not diagnosed during the year.

## Non-Fusion of Two Centres of a Normal First Rib.

With symptoms of cervical rib.

Normally the shaft of the first rib is developed from one centre. Attached is the skiagram II of a case of a young male with symptoms of cervical rib. There is an articulation at the centre of the shaft of the first rib on right side. This developmental anomaly is described as very rare in the literature (Köhler: Radiology).

## Sprengel's Shoulder.

Is rare; familial.

It is a reversion to a more primitive type; the scapula has a form common in the lower mammals; while plaques of bone or cartilage often found along its vertebral border may represent the suprascapular bone of the primitive vertebral shoulder girdle.

The bone itself is similar to that of the lower mammals such as the rabbit; in that its long axis is horizontal instead of vertical, the vertebral border being shorter than the axillary border. It is also curved on the flat with the concavity forwards so that the supraspinous fossa, so to speak, opened out and the upper edge of the bone bulges out into the neck. These points are fairly constant.

The bar of bone passing to vertebra is called omo-cervical from base of scapula to neck to third cervical vertebra.

In unilateral cases a piece of cartilage is present. The vertebra of the third segment is irregu-

lar in high shoulder as is seen in the third case here.

Sometimes a bifid clavicle is a remniscent of omo-cervical. There is no embryological explanation for this.

Berzel found the deformity in approximately 1 in 3,000 military recruits between the ages of 20 and 22. One in 10 is bilateral.

It is to be classed as a primary congenital defect as it is often associated with other congenital deformities.

(a) The scapula may be rotated on the flat in either direction so that the upper or lower angle is nearer to the vertebral spines than the other.

(b) Scoliosis.

(c) One or more ribs absent or deformed or fused.

(d) Spina bifida.

The normal superior angle is situated on the lower border of the second rib.

#### *Clinical defect.*

(1) The whole shoulder seems displaced forward.

(2) Movement of the arm is restricted in abduction in about half the cases.

(3) Torticollis is present in 10 per cent of cases.

(4) Scoliosis is present in 48 per cent of cases.

(5) 25 per cent of cases show bony attachment between scapula and vertebral column.

Four cases of Sprengel's shoulder—three women and one man were seen. One woman of 56 was seen for a fracture of surgical neck. She has a diminutive high scapula. There is not much restriction of movement of the shoulder. (Print III.)

The second case is that of a female child aged one. There is bilateral elevation of the scapula and she has bony bridge extending towards the neck. There is no defect of the seventh cervical vertebra or the first nine dorsal vertebra. Movements of the shoulder are restricted; there are no cervical ribs.

The third case is the most interesting. There are no recorded cases of the type. The radiograms were shown in a meeting of the Madras General Hospital Clinical Society.

The girl aged 5 was seen three years ago by me and again this year. Her intelligence is good; there is practically no neck, the chin is resting on the sternum; the scapulæ are highly placed; no cervical vertebra are to be felt; the movements of the shoulder are restricted in that they cannot be elevated and brought behind the head; there is slight nodding movement but no lateral movement of the neck (Photo IV).

Radiographs taken show a bar of bone resembling the laminae of the lumbar vertebra below the occiput. There is no differentia-

VII. Same case as that of VI.

VIII. Radiogram of a male child aged 3, third of the family. The first of the family suffers from a similar defect; X-rays are Nos. VI and VII. The second child is normal; the twelfth dorsal vertebra and the first lumbar are deformed.

There is no record of isolated defect of the humerus.

*Epicondylar Process.* Was present in a woman aged 24 with symptoms of median nerve paralysis; the process was removed and the nerve that was passing over it was released.

*Congenital Radio-Ulnar Synostosis.*

Forearm is in pronation.

It is due to a partial fusion of one intermediate segment of the limb bud with its fellow. The upper inch or so of the radius is fused by bone with the upper part of the ulna. In these cases it is likely to exist at the distal ends of these bones a fibrous union which after remedy of the synostosis may check rotation. There may also be union between the humerus and both forearm bones.

*N.B.*—This union between humerus and ulna is noticed in the Achondroplasia case.

The forearm may be curved from bending of the radius if the radius is growing faster than the ulna. Movement at the elbow is unimpaired but no rotation of the forearm is possible. On a casual examination it is hard to convince oneself that the radius and ulna move as one bone, because rotatory movements take place at the shoulder and at the carpus; rotation at the carpal joints is much greater than normal; the disability is not incompatible with earning of the livelihood; in fact some cases are not diagnosed until adult life. No attempt

should be made to divide the synostosis. The operation invariably fails in its object because not only are the two bones united proximally by bone, but they are also connected throughout their length by unstretchable fibrous tissue; moreover the patient lacks muscles with which to rotate the forearm even were it possible to separate the two bones. (Seymour and Barling, 1937).

*Synostosis of Bones of the Forearm.*

Is closely related to defects as luxation of the radius (17 instances in 51 cases).

The following cases of synostosis of superior radio-ulnar joint were seen during the year :—

21 yrs. M. H. History of old injury to right forearm—Nil in X-ray. Right superior radio-ulnar joint synostosis. (Radiogram IX.)

11 yrs. M. H. Limited movement of superior radio-ulnar joint. Right side bone of bony union for  $\frac{1}{2}$  inch.

16 yrs. M. Right side-restricted movement at elbow.

*Defects of the Radius.*

Familial, Partial congenital absence of the radius. It is more often unilateral.

The defect is not a total absence of bone; X-ray investigation is necessary.

Persistence of proximal with absence of distal end is most often

found, but absence of the middle portion may occur. There may be other anomalies as absence of bones of thumb or fingers and muscular anomalies.

Radial artery may be absent; thumb and carpal bones may be missing.

Club hand is present in all cases.

Function may be good or seriously impaired.

The hand is displaced radially so as to project at right angles to the forearm but, in spite of this extreme deformity, the fingers are often quite useful and the grip is strong. Yearly one or two cases are seen; a male baby, one month old, was seen with bilateral absence of radius. There was club hand; there was syndactyly; the thumbs were absent; one case was operated with bone graft. From earliest infancy persistent effort must be made to correct the position of the hand by manipulation and splinting so that when an operation is performed later to make an artificial radius, there may be no secondary contractions to interfere with its success.

The operation may be done when the child is about 12 months old, and by this time the hand should have been brought into line with the forearm.

The operative procedures are:—

(a) bone graft to the upper end of the radius;

(b) the upper end of the graft is fixed to the shaft of the ulna about its centre so as to act as a strut to hold down the radial side of the carpus. Splitting ulna is difficult; the ulna may be displaced to the middle of the carpus.

*Defects of the Ulna.*

They are three types:—(Kummell).

(a) Ulna wholly absent, radius normal or bent, little finger absent.

(b) Ankylosis of the radius and humerus or radius and proximal fragment of ulna.

(c) Luxation of radius upward.

Any part of the ulna may be absent, and the hand is displaced to the ulnar side (ulnar club hand). Some of these defects are seen in the cases of Achondroplasia. (X and XI.)

*Club Hand.*

This may be primary or secondary type.

There is permanent deviation of the hand in relation to the forearm.

The varieties are:—

(1) Radial club hand—(a) Radio palmar; (b) Radio dorsal.

(2) Ulnar club hand—Radio palmar.

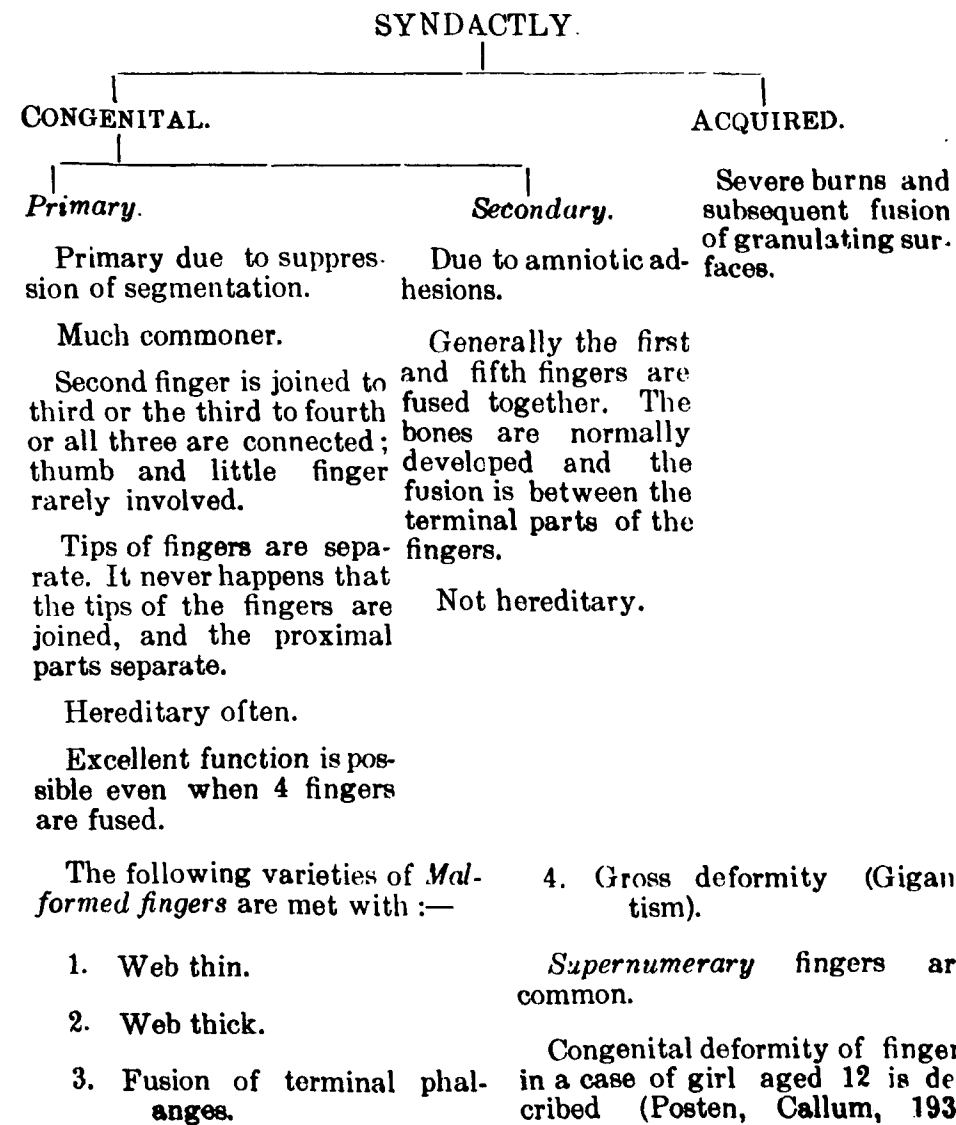
(3) Wrist may be flexed.

## (4) Wrist hyper extended.

The deformity may exist with (1) normal bones, (2) curved bones or (3) with defective bones.

One of the most serious defects is the retarded development of the arm.

Clinical photos of congenital club hand are shown in Photo XII. The function at the wrist is quite good even to do good manual labour; I have seen men and women from 30 to 60 with these defects carrying on good work. There is no indication for interference except that acquired deformities should be prevented.



XI. Absent radius—only four digits in a baby.



XII. Club hands—good function.

was with us in 1931. Since then many cases have been diagnosed.

My own experience in this Hospital consists of 12 cases:—

(1) 6 yrs., M. C. H. Bilateral; the male younger brother had bilateral Talipes Equino Varus of a bad resistant type. Native place Cochin. This case is reported in the General Hospital Reports.

(2) 3 yrs., M. C. H. Right (N. Arcot District)

(3) 3 yrs., M. C. H. Right (Tanjore District)

(4) 5 months, F. C. Bilateral (Madras)

(5) 3 yrs., F. C. Bilateral (Madras)

(6) 3 yrs., F. C. Bilateral (one younger child) has talipes.

(7) 10 months, M. C. Left (Madras)

(8) 3 yrs., M. C. Left (Madras)

(9) 6 yrs., F. C. Left (Coimbatore and Malabar)

(10) 12 yrs., Right (Madras)

(11) 18 days, M. C. (Malabar) Both with bilateral contracture knee, T. E. V. both sides; congenital contraction of shoulders and elbows with a birth fracture of Right Humerus with radial nerve paralysis.

(12) 6 yrs., F. C. Right (Madras)

There was one case of arthrogryphosis congenital in a male child.

From this one learns that it will be uniformly present in all districts; there is a distinct tendency for familial defect and a marked developmental anomaly. The museum specimen in the Medical College shows the presence of dislocation at birth.

The sex incidence varies from the quoted figures; seven male children and five female children; five bilateral, four right and three left. The incidence in other countries is 85 per cent of boys and 15 per cent of girls. Unilateral usually on left side in either sex and one-third bilateral.

There is a difference of opinion whether the dislocation occurs before birth though at what stage of development is not known or whether the dislocation occurs when the child attempts to walk.

In a foetal specimen the poor development of the upper margin of the acetabulum is noticed; this is the primary fault; this defect involves cotyloid ligament, cartilage above. All the other changes are secondary.

Whether it is a primary congenital deformity or a secondary congenital deformity due to excessive flexion and abduction in utero is also not settled; probably may occur primary or secondary like club foot. None of these points are of any importance as regards the

treatment. (Primary—in the developing cells; secondary due to small pelvis, large head, flexed knee).

From a prophylactic point of view it looks ante-natal supervision would be of great value. In the report of the South End Hospital it is stated that the congenital dislocation of hip is exceedingly rare in England and that there is a large support for W. Howell's theory of congenital dislocation "abnormal position in utero with or without increased intrauterine pressure, resulting in a breech presentation".

This according to Howell is supported by the following facts:—

(a) A child with C. D. H. is invariably born by the breech.

(b) It is common in areas like Italy where there is no ante-natal supervision.

This statement could not be verified in the present series of cases.

"It is claimed that the condition is unknown in lower animals, that it is in fact one of the prices paid by mankind for the orthograde position" (Fraser, 1926).

It is to be noted that the early recognition and treatment are attended with satisfactory results whereas mistaken diagnosis and delay in treatment until after the first years of life condemn the patient to lifelong and serious disability.

The early signs noticed by the mother:—

The mother notices some little asymmetry, something unusual in the shape, the outline or the attitude of one limb. One limb seems to her to be shorter than the other; one of the feet turns outward; in separating the lower limbs she saw or felt that one went less easily than the other; she observed that if one limb was held in a certain degree of flexion, or that, if she tried to correct this flexion, the child cried. It is such small signs that make one suspect a dislocation and one which should induce one to have an X-ray examination" (Putti).

*Differential Diagnosis:—*

(a) Old pathological dislocation of the hip, due to infantile arthritis.

(b) In severe Coxa Vara—there is very marked limitation of abduction of the thigh.

(c) In inflammatory diseases of the hip there is general limitation of movement.

(d) The real difficulty is to distinguish the condition in its mildest form from a normal hip. In these very mild cases, the head of the femur is nearly opposite the acetabulum but not in it, the shortening may be less than half an inch, which is about the margin of error in measurement, and it may be difficult to observe the Trendelenberg's sign if the child is restless under an examination.

A radiograph helps but not always owing to the excessive

cartilage at the skeleton at this age. In a doubtful case with less than half an inch of shortening, the examination should be repeated every two months or so and it will soon be evident whether or not the condition is progressive.

*At a later date—*

The three most useful and striking clinical signs are (1) with the child placed flat on a couch, supine, and the lateral outlines of the trunk and legs are observed from above, the profile is that of an adult female, (2) the dipping of the shoulder to the affected side on walking and (3) the shortening of the thigh.

*Putti's X-ray signs of dislocation or subluxation of the head of femur in the first 12 months of life :*

(1) The centre of the epiphysis is absent on the dislocated side, or if present is smaller than the sound side. This only applies after the sixth month.

(2) The top of the femur is some distance from the floor of the acetabulum, and is higher than normal.

(3) The roof of the acetabulum is sloping.

*X-ray Lines described by Perkin's* to estimate the amount of dislocation of the hip (for slightly older children—older than 12 months).

Verticals are dropped from the outer lip of the acetabulum; the horizontal line is drawn through the lowest part of the

inner border of the ilium. The ossific nucleus of a normal head should be wholly below and within these lines.

*Putti's abduction treatment for children below 12 months of age.*

A rectangular splint is applied on either side, the short arm to the side of the abdomen and the chest and the long arm to the lower limb which is abducted and internally rotated; it is used for both unilateral and bilateral cases, and is kept in place day and night, but is removed every time it is necessary to clean the child, and also regularly twice a day for gentle gradual manipulation into abduction and internal rotation. Every two months the patient is X-rayed and examined; the average duration of treatment is 8 to 12 months; this is an ideal treatment; there is no risk of anaesthesia, trauma to the hip, no wasting of muscles and no rigidity of the joint.

*Modified Lorenz's method of reduction for cases between the ages of 18 months to 2 years.*

The classical method of Lorenz involved a large amount of trauma. Modern method is to coax the head back into the acetabulum by the most gentle procedures. No hard wedge is required. The position which will usually hold the hip in articulation is one of 90° flexion and 90° abduction, but in cases which easily slip out the knee may have to be brought up almost to the axilla. In any case the horizontal plane passing across the most anterior part of

the knee must be behind the plane of the anterior superior iliac spines and the knees must be kept well back.

This differs from the former method of Lorenz :—

(1) The manipulation is carried out under deep anaesthesia.

(2) No kneading and stretching of the muscles is done.

(3) Tenotomy of abductors is not done and is not desirable.

(4) The carrying of the limb into abduction must be done slowly.

When reduction is successful, the hamstrings become taut on attempted extension at the knee, as in a normal joint, while in a dislocated hip full extension of the knee is possible while the hip is abducted.

Check reduction always by X-ray.

After reduction, both the hips are immobilised in plaster, the plaster extending below the knee on the affected side. Check the reduction by X-ray. The plasters are changed every three months and a re-X-ray is done.

The duration of immobilisation varies depending on the growth of the acetabular roof. In favourable cases walking may be allowed after nine months protected by a short spica above the knee including the waist and leaving the other hip free. This method is successful in 70 per cent of cases. Because the other leg is abducted,

give a cork on the sound leg for walking. A study of the cases treated by the "Bloodless method of Lorenz" reversed the opinion amongst American Surgeons.

We get 75 per cent cures if done at the age of 2.

*Complications :—*(1) They get Perthes.

It is doubtful if any occur at the age of 5 or 6 years. Results of cases treated by the Lorenz's method from 5 to 30 years after reduction are not good. No complete and permanent restoration of function occurs apart from complete and perfect anatomical reduction. On the other hand perfect anatomical reduction does not result in perfect function. The primary causes of imperfect reduction are anatomical, but the abnormalities of the capsule and ligaments are more important than bony ones.

The most uncertain element on which success depends is the reactive processes of the joint due either to the trauma of reduction or prolonged immobilisation.

Putti places the maximum age for single dislocation as 7 and for bilateral at 4 years. Putti believes that the open operation is not the best solution of the problem but that it lies in early diagnosis and treatment. The current American opinion is that closed manipulation is the operation of choice under 2 years of age and open operation afterwards up to the age of 6, after which shelf stabilization is the

most satisfactory operation. Fairbank would prefer open reduction after 6 or when closed reduction fails. If closed reduction fails twice I am in favour of open reduction. In one instance when 5 or 6 attempts at reduction failed, the head simply disappeared.

*Open Operation.*—The adhesion of the capsule to the side of ilium is the main factor in preventing reduction. The operation was practised by me in 4 cases this year. The child has to be protected from shock as the application of the plaster subsequent to the operation exposes the child to sudden chill. It is impossible to assess the ultimate function in Madras. Open operation cases will leave behind stiff hips.

Shelf operation is practised for re-dislocated hip or for unreduced C. D. H. over six years of age to overcome the pain, lack of stability, dipping and lordosis.

*The shelf operation may be done, either after reduction or as a reinforcement to the false acetabulum.* There is no use of applying traction before operation after the age of 10. The result of a shelf operation is to get a painless, stable and freely movable hip with limitation of movement only in extremes. There is improved weight bearing and disappearance of lordosis and its accompanying backache, there is a decrease in shortening averaging about one inch, improved walking and lessening of the limb.

*Arthrodesis of the Hip.*—Is not a good operation as backache is

likely to ensue in five years owing to the increased strain on the lumbar spine.

Lower subtrochanteric osteotomy (Schanz) than Lorenz. By this a more effective barrier to the Trendelenberg dip is provided. In the absence of treatment the condition steadily becomes worse as a result of weight bearing. The weight of the body falls on the tense capsule which gradually stretches and permits further shortening.

Average amounts of shortening are 1 inch at 2½ years, and 1½ inch to 2 inch at 5 years. During childhood there is no pain. With increased shortening, there is limitation of abduction.

Untreated cases complain of pain during adolescence when the increased weight of the body throws extra strain on the limb. The pain is due to the pressure of the displaced head on the sciatic nerve or a definite neuritis. In a bilateral case, the waddling gait is ugly, inefficient as a means of locomotion; there is extreme lumbar lordosis which may cause difficulties in parturition; they complain of backache in bilateral cases at 18 or 19, or in single cases at 25; there is mechanical traumatic arthritis in the false joint, pain and stiffness.

They lose their abduction; stretch them under anaesthetic once in a year and they come regularly for it.

Three methods are available at this age.

### Congenital Deformities

(1) Make a lip for the false acetabulum.

(2) Arthrodesis where it is.

(3) Lorenz oblique osteotomy; this is satisfactory; there is shortening; they get scoliosis.

*Congenital Dislocation of the Knee.*—Congenital dislocation of the knee is exceedingly rare; one case was seen in Madras General Hospital three years ago; occurs in infants born with extended or hyperextended legs and is sometimes associated with calcaneo valgus—both of which conditions are due to malposition *in utero* and can be prevented by supervision of the life of the foetus. The dislocation is backward.

*Treatment.*—Bandage the knees gradually into flexion on a malleable iron splint; complete cure is obtained in six to eight weeks.

*Congenital Dislocation Patella.*—Is exceedingly rare. Great pain is caused by the dislocation particularly on full flexion of the joint; the disability may be severe and even endanger life.

Operate while the patient is young, before contracture; bony deformity and arthritis have occurred.

(1) Implant the tubercle of Tibia medially.

(2) Raise the external condyle by a graft.

(3) Practise early active movements in Thomas's splint with Pearson's attachment.

*Congenital Genu—Recurvatum* is a rare condition. There is stretching of crucial ligaments. In the congenital form it is probably the result of faulty position *in utero*, the legs being extended instead of flexed; in these instances the knee cannot be bent; the patella may be absent or other deformities may be present. Two cases of male babies are under treatment; they were brought in the second week after birth. Clinically it would appear that crucial ligaments were absent, the patella are felt. The knee is kept flexed on a splint and bandaged. A good deal of improvement is noticed within a month's treatment.

Congenital contractures occur in the following situations in approximately this order of frequency—foot, fingers, toes, hand, knee, elbow, hip and shoulder.

In the four large joints (hip, knee, elbow and shoulder) they are very rare and are often accompanied by other deformities. The joint is nearly always flexed and is maintained in this position by ligamentous shortening and frequently by abnormal fibrous bands. There is one specimen of contracture of the knee in the college museum; one case is undergoing treatment for contractures of all joints.

*Suppression of lower limb buds.*—Congenital absence of the upper half of the femur is the commonest example. No evidence of bone is visible in the radiogram when the condition is discovered, the upper end of the femur is usually present.

*Defects of the femur:* Partial defect is common and; when present, the patella is generally absent as well as the fibula, and flexion contracture of the knee and outward rotation of the tibia co-exist.

Five varieties of defects are identified:—

(a) Shortening and delayed development with coxa vara.

(b) Femur consists of an upper and a lower end and the middle section is absent.

(c) The lower end of the femur alone present and is united with the tibia.

(d) The upper end of the femur is not differentiated as to head and neck and is curved and is sometimes luxated.

(e) The hip and knee joints are well developed but the shaft is greatly shortened.

The one case of this anomaly seen in the Madras General Hospital is a baby girl; you see the radiogram XIV the femur and fibula are absent; the foot is normally formed.

*Treatment:*—(1) Artificial leg with foot rest.

(2) Bone lengthening.

(3) Thomas's walking knee splint with a ring at the bottom; this can be lengthened as the child grows.

*Congenital pseudo-arthritis of the tibia.*—In this condition there

is at the junction of the middle and lower third of the tibia, an area of disordered osteogenic activity where the bone is weak or even absent. Soon after birth a fracture may occur at this site. The resulting weak union leads to an angulation of the tibia when the child attempts to take weight on the leg.

The importance of the condition is that the angulation is liable to be mistaken for a rickety deformity, and an osteotomy or osteoclasia may be done to correct the alignment. Such an osteotomy will be followed by pseudo-arthritis and resists all attempts to obtain union.

*Congenital absence of tibia* is rare, for the disability is extreme; the fibula is displaced upwards behind the lower end of the femur and is often curved posteriorly. Foot is in extreme talipes valgus.

*Defects of the tibia* is rare. Functional defect is extreme.

The thigh is rotated out and abducted, the knee is flexed, the upper end of the fibula is dislocated out and back so that the function of the knee joint is seriously interfered with. The external malleolus is very prominent and the foot is dislocated into marked varus, with curving and thickening of fibula.

A muslim male baby aged four months had right talipes and an obvious deformity at the right knee. A radiogram XV revealed absence of lower third of tibia, and probably a fracture of fibula at almost the same level; there is

evidence of some constriction at the middle of the femur. The deformities are being gradually corrected; the child will require a graft eventually.

*Congenital absence of fibula* is common; the tibia is short and has a forward angulation at the junction of middle and lower third and over the summit of the bend there is a dimple; the foot is held in equino-valgus. By persistent orthopaedic measures the foot can be made plantigrade; but as the child grows the affected leg becomes shorter than the other; until when adult life is reached the degree of shortness renders an amputation and the replacement of the leg by an artificial limb the best procedure.

*Congenital absence of fibula.* Franke in 1905 collected 118 cases; foot is in extreme talipes valgus position. Disability is less severe than in absence of tibia. Do osteotomy to straighten tibia. Fashion an external malleolus.

Defect of the fibula is common; more often single. The tibia is shortened and curved anteriorly as a rule with often a dimple over the apex of the curve. The foot is most often in a position of equino valgus and the outer toes may be missing and the limb is usually shortened. (See prints and photo XVI.)

*Congenital Talipes Equino-Varus.*

A paper was published by me in the March 1938 issue of the

*Madras Medical Journal* on this subject detailing the treatment followed; the technique of the manipulative treatment is published in the *Medical Practitioner*, 1938.

The present study of the subject gives details of 80 cases seen in this year.

The statement below gives particulars regarding the sex, side affected, the period at which they come for treatment, number of the child in the family, nature and presentation of labour, evidences of intrauterine pressure, other abnormalities noticed in the patient or other members of the family.

#### Talipes.

Total number of cases of Talipes, 80.

Talipes equino varus, 72.

Talipes equinus, 3 (one had angioma of gastrocnemius).

Talipes calcaneus, 2.

Talipes valgus, 2.

Talipes varus, 1.

1. Sex Incidence:—

Males, 50; Females, 30.

2. Side:

|            |    |
|------------|----|
| Right side | 19 |
| Left side  | 13 |
| Unilateral | 32 |
| Bilateral  | 39 |

Males, 24; Females, 10.

## 3. Age at which patients come for treatment:—

## Within a month, 15:

|         |   |
|---------|---|
| 3 days  | 3 |
| 7 days  | 1 |
| 10 days | 1 |
| 12 days | 1 |
| 15 days | 5 |
| 16 days | 1 |
| 3 weeks | 2 |
| 23 days | 1 |

## Within a year, 26:

|           |     |
|-----------|-----|
| 1st month | 8   |
| 2nd "     | 2   |
| 3rd "     | 6   |
| 4th "     | nil |
| 5th "     | 3   |
| 6th "     | 2   |
| 7th "     | nil |
| 8th "     | 1   |
| 9th "     | nil |
| 10th "    | 4   |

## After a year 39:

## Within 1 to 5 years, 27 cases.

|   |                                  |
|---|----------------------------------|
| " | 5 to 10 years, 4                 |
| " | 10 to 15 years, 5                |
| " | 15 to 20 years, nil              |
| " | 20 to 25 years, one at 22 years. |
| " | 30 to 35 years, one at 35 years. |
| " | 40 to 45 years, one at 45 years. |

## 4. Number of the child in the family among 36 cases:—

1st child, 12 cases—one of which is only child and another first child by second wife.

|           |   |
|-----------|---|
| 2nd child | 6 |
| 3rd child | 2 |

|            |     |
|------------|-----|
| 4th child  | 4   |
| 5th child  | 3   |
| 6th child  | nil |
| 7th child  | 3   |
| 8th child  | 3   |
| 9th child  | 1   |
| 12th child | 2   |

Order of child in the family not ascertained in 44 cases.

## 5. (a) Presentations:—

Breech full term, 2.  
Pelvic, 1.

Cephalic. Presumably all the rest being described as (natural labour).

## (b) Nature of labour:—

Prolonged labour, 2.  
Natural, all the rest.

## 6. Cases showing evidence of Intrauterine pressure:—

Spina bifida, 1.  
I. U. Fracture femur, 1.

Notch on the outer aspect of both sides of foot, 2.

## 7. Other abnormalities:—

## (a) In the patient:—

(1) Cleft palate; Branchial fistula, 1 case.

(2) Protuberant belly and depressed bridge of nose, 1 case.

(3) Right middorsol scoliosis (Paralytic) and  $1\frac{1}{2}$  inches shortening of right limb, Flat foot left 1 case.

(4) Genuvalgum separation of malleoli  $3\frac{1}{2}$  inches in 3 cases;

one inch in 2 cases and  $4\frac{1}{2}$  inches in 1 case.

(5) Foot drop with absent jerks 1 case.

(6) Deformity of both hands and undescended testis 2 cases.

(7) Flexion of knee and hip joints and contracture of flexor muscles, 1 case.

(8) Phimosis, 2 cases.

(9) Umbilical Hernia, 1 case.

(10) A. P. M., 1 case.

(11) C. D. H. After treating for talipes, 1 case.

(12) Shortening of left foot by one inch, 1 case.

(13) Contracture fingers, both hands, 1 case.

(14) Myotonia congenita, 2 cases.

## (b) In the other members of the family:—

This last is a difficult condition to find out, as there is the natural reluctance in giving out the family disabilities.

(1) T. E. V. in elder sister, 1 case.

(2) C. D. H. Bilateral in elder child, 1 case.

(3) Fall which mother had in the eighth month of pregnancy, 1 case.

(4) Two children by first wife father and youngest brother had T. E. V., 1 case.

Mother lost 6 children at or immediately after birth.

Mother's blood sent for W. R. positive, 1 case.

Two children of first wife had T. E. V.

Grand-father and younger uncle had T. E. V.

## Radiological study of talipes cases:—

X-ray study of all the cases are not available; in the case of the new born babies it was not done as the babies used to be brought alone without mother and they had to be sent home as early as possible. It would appear there are no gross bony abnormalities except that there is some delay in the ossification of the small bones of the foot especially navicular.

The following are my observations in the present series of cases:—

Talipes Equino Valgus.—Age 16 yrs., M., following an injury.

Lateral view. Calcaneus shorter; posterior surface is not tilted up. There is spur on the inferior surface; the articular surface for the astragalus is looking upwards and is diminished in area. Talus not well seen.

A. P. view. The two malleoli are on the same level the tubercle of the Navicular is approximated to the medial malleolus. Bones are normal in density and structure. Not A. P. M.

*T. Equinus*.—Age 12 yrs., F. Right. Pes cavus with talipes equinus—the foot appears to rest on the head of the metatarsals. Considerable osteoporosis.

18 days. M. C., C. D. H. bilateral; flexion contracture both knees and T. E. V.

(5) F. C. 5 months Scaphoid looks smaller and is not nearer to internal malleolus.

(6) 2½ months F. C. Right scaphoid not yet appeared. There is varus of the 3 inner metatarsals: foot both wider and is spread out.

(7) Rani 8 yrs., F. C. There is no navicular. The talus is looking horizontal (important).

(8) 1½ yrs., M. C. Two cuneiforms only visible. Bilateral.

(9) F. 18 yrs., Talipes Valgus. There is Metatarsal Varus. The internal cuneiform itself is extended; the talo navicular joint line is not horizontal but looks obliquely.

(10) 11 yrs., M. Right Talipes equinus. Head, neck and shaft of the femur is smaller, thinner; right foot—calcaneus is short; talus is deformed; it is bent downwards at the neck.

(11) 1½ yrs., M. C. Cuboid is seen. No cuneiform is seen. First Cuneiform is delayed. Epiphyseal line shows rickety change.

(12) 8 yrs., F. C. Bilateral. X-ray looks as if the fore part of the

foot is dislocated at the astragalo navicular joint.

(13) 4 yrs., M. C. Left navicular on either side is absent. The articular surface of the cuboid is irregular.

Operated by another Surgeon on the lateral aspect of the foot. The foot has relapsed into the varus condition. It would look as if no correction has been obtained. One year ago he was X-rayed with his shoes on, the foot has not corrected itself.

(14) 1 month female child Right side. X-ray nil abnormal. Hip also X-rayed. } Talipes

(15) 18 yrs., M.—congenital Talipes equino varus left side.

Lateral view—There is deformity.

There is more curve of Talus.

A. P. view—the first 4 metatarsals are abducted towards the middle line of the body.

(16) 3 yrs. F. C. The navicular has not appeared.

(17) 5 yrs. F. C. Nil abnormal (Left side).

(18) 4 yrs. F. C. feet.....

(19) 3 yrs. F. C. After correction the foot X-rayed. No changes.

(20) 2½ yrs., M. C., No changes. Bilateral; only one cuneiform has appeared and 2 absent.

(21) 55 yrs., M. Talipes corrected and put in plaster. Bones normal.

(22) 1 yr., M. The toes in varus; film shows after cuneiform osteotomy, all the bones and the joints are normal. Complete rarification in plaster. For metatarsal varus osteotomy of first and second metatarsals have been done. Not enough correction is obtained.

(23) 3 yrs., F. C. Bilateral. No cuneiforms or scaphoid is seen.

The condition is a congenital medial dislocation of the navicular at the talo-navicular joint.

It is common in the poorer classes; the hereditary taint is on the male side.

Treatment must be begun as early as possible (Hippocrates) and the following is the routine adopted:—

(1) Manipulate them on the first day of life without pain, force or vigour.

(2) In 3 weeks or a month they become stiff.

(3) Correct abduction. Inversion. Equinus. Keep up correction with strapping and feet on outer side. Change every week.

(4) From 3rd week to 3 or 4 months. Forcible manipulation.

(5) Fourth month and after—manipulate under anæsthetic.

(6) Many a foot that looks anatomically well is not function-

ally good. If it is manipulated early you get good function.

(7) Dangers of manipulation under anæsthetic.

(a) Slipped tibial epiphysis.

(b) Injury to knee joint.

(8) No Tenotomy of Tendo-achillis.

(9) Test of good correction.

Look from behind—the foot should be in valgus position.

(10) Internal rotation of tibia is not so common now as tenotomies are not done.

(11) After 4 or 5 years open correction gives a good anatomical as well as functional foot.

The treatment done as a routine is gentle manipulation in new born babies and strapping the foot in the corrected position; it takes nearly six months for the foot to be kept in the corrected position.

For the night a plaster mould is given; in bilateral cases it is found that one foot is more rigid than the other especially if there is rotation of the tibia. This rotation of the tibia is often found out by the mother and they are able to see if this is properly corrected. Care should be taken that this is corrected.

From a study of a few cases treated by others, it becomes obvious that keeping the foot in plaster of paris is not enough. The composite deformities must

be over-corrected by manipulation with an anæsthetic before the retention apparatus is put on. The retention apparatus may be strapping, or plaster of paris, or Dennis Browne splint. I have no experience with the last; I have not noticed much muscle wasting with the plaster of paris—a point always enquired of by the mother; if the plaster is not heavy, the baby can always kick about and play well. In a bilateral case the calf muscle may be found thinner on one side than the other. The foot itself may not be quite symmetrical. Probably there is hypoplasia of the muscular structures. A wrench or wedge has to be used when the child is more than 6 months of age to obtain correction. When the child is more than 2 years old or when a poor mother cannot stay with her baby in Madras for a long time, correction is obtained by open operation.

During the year, out of 80 cases, 8 cases were treated by the open operation.

#### *Open Operation for Talipes.*

1. Kothandaram, 8 yrs., M. H. Ober's operation.
2. Veerabadran, 2 yrs., M. C. H. Ober's operation.
3. Ranjitham, 11 yrs., F. C. H. Ober's operation on 13-12-1937.
4. Krishnaswamy, 10 yrs., M. H. Ober's operation.
5. Kothandam, 1½ yrs., M. C. H. Left side muscle sliding and reduction.

6. Rukmaniamma, 3 yrs., F. C. H. Ober's Operation.

7. Rajeswari, 13 yrs., F. H. T. E. V. Right tendo achilles lengthened 18/5.

8. Srinivasan, 2 yrs., M. C. H. T. E. V. Both sides—Ober's operation 14-10-38.

Cases 2, 5, 8 were operated because the mothers could not stay for long time in Madras.

Case No. 3 requires to be dealt with separately.

It is difficult to say whether the other cases will give a more supple foot quicker and whether the relapses will be diminished in numbers. The after treatment is the same and watchful care is kept up; the open operation does not correct the metatarsal varus; this has to be dealt with separately. The seemingly corrected foot cased in a boots or in plaster of paris would show the metatarsal varus under X-ray examination.

Regarding the details of the operation, this is always performed under tourniquet; the land marks may get obscured but they have to be determined and stuck to. The talo-navicular capsule is a thick structure and has to be identified properly and divided; the tibialis posticus is bluntly separated from the navicular bone; the navicular is very deeply placed, may be an inch or an inch and a half deep according to the amount of varus deformity. The ligaments

#### *Congenital Deformities*

on the under aspect of the navicular should also be divided.

The navicular is always undeveloped and no harm must be done to the nucleus. The muscle structures must be slid down from the inferior surface of the os-calcis. Excision of the talo-navicular capsule is required in the relapsed cases. No tenotomy was done during the year. Tenotomy of the tendo-achilis is not required. In a boy of 10 whose tendo-achilis was tenotomised elsewhere, it was noted that the calf is not well developed; the cavus deformity had to be corrected by a muscle sliding operation.

It is necessary to mention that the thick skin on the other aspect of the foot will disappear in course of time—6 months in the younger children and in a year in the older children. The number of cases between 5 and 10 years of age was 4, and between 10 and 15 was 5. They all require open methods of correction. One girl aged 11 was a bilateral talipes. Her feet were very rigid. The child remained as an inpatient for nearly 8 months. Several operative procedures were undertaken to get a planti-grade foot. In the beginning manual correction with wrenches was tried; it was found that the inner border of the foot was very short and very concave and that the skin would give way, muscle sliding from the inferior surface of the os-calcis and excision of the talo-navicular capsule was done; the skin on the inner border of the foot gave

way and the foot was wrenched; this had to be done on the opposite side after a fortnight.

The appearance of the foot was not encouraging; then wedge osteotomies were done on the outer aspect of the foot; in one, a wedge was taken according to Kirshner's model; in the other a wedge was taken according to Mac Murray's method. To my mind it did not matter which method was employed; the bones are extremely spongy; a definite and methodical study is required from the X-ray and an actual mould to determine how much to take out. But generally I think one takes away less than more. These wedge osteotomies brought the foot into planti-grade position.

With a straight plaster, in three weeks time the girl was encouraged to walk about. These children walk about in plaster with the support but not without the support. The foot looked ugly, misshapen, the outer border of the foot was still convex, the inner border of the foot still concave and the skin tight.

After the wounds had healed the wedge osteotomies were done on the first and second metatarsals to correct the varus; osteotomies of fibula were done to bring the foot into proper weight bearing line. The final result was satisfactory so far as function of the foot was concerned but the foot has not been restored to a nice shape. A special boot has been prepared. Adaptive shortening of the soft structures as

(7) Congenital Hallux valgus is rare.

(8) Hypertrophy of the foot, leg and thigh. (See photo XVIII).

(9) Macroductly with soft parts—two cases were seen, one a girl of 6 and another a boy of 4; Macroductly in a girl of 6—left foot. The second toe is very much longer; all the phalanges of the second and fifth toe are very much enlarged; there is enormous hypertrophy of soft parts. (See prints XIX).

*Right foot*—the fourth toe is very long; the soft parts are enormously thick.

In the second case, that of a boy aged 5, the toes were enormously distorted and amputations of the hypertrophied parts had to be done. It is instructive to compare the diagrams of the foot of the Chimpanze and man. (Lake, 1938).

*Extra Ossicles of Foot.*

35 yrs., M. H. Osvesalius, left.

19 yrs., M. H. Ostrigonum (big) came for injury.

18 yrs., M. I. C. H. Tuberosity of navicular (looks fractured). Has fracture of second metatarsal.

22 yrs. M. H. Osvesalius, left.

44 yrs., M. H. Sesamoid bone in the medial side of head of fifth toe (left).

29 yrs., M. H. Sesamoid bone in Tibialis anterior insertion (right).

30 yrs., F. H. Sesamoid bone in Tibialis anterior insertions (left).

20 yrs., M. H. Extra ossicle between navicular and cuboid (right).

50 yrs., M. H. Ostibiale externum (right)

25 yrs., F. H. Ostibiale externum (left).

40 yrs., M. H. Ostibiale externum (left).

44 yrs., M. H. Osvesalius (right).

30 yrs., M. H. Ostibiale externum (right).

32 yrs., M. H. Ostibiale externum (left).

47 yrs., M. H. Ostibiale externum.

19 yrs., M. H. Sesamoid bone in Peroneus Longus right.

26 yrs., M. H. Ostrigonum.

15 yrs., M. I. C. H. Ostrigonum and Ostibiale Externum.

Congenital amputations of foot are seen in Maternity Hospital Museum specimens; there is a male beggar aged 20 going about in Madras with congenital amputation below the middle of the two arms; in another case it resembled a Symes amputation. Other congenital anomalies seen were:—

(1) A girl of 18 well developed in every other way had one of her legs thin, shrivelled with talus, scaphoid, internal cuneiform, first

metatarsal and toe; the fibula and the other bones of the foot were absent. An amputation was done through the middle of the leg so that she could get about with an artificial limb. The tibial arteries were exceedingly fine.

#### Dyschondroplasia.

A. Hereditary deforming chondrodysplasia, Diaphyseal Aclasis or hereditary multiple Exostoses.

(2) A middle aged well-developed adult was seen during the year for fracture of left patella. He had congenital deformities of both feet and shortening of five inches of the right leg. You see the skiagram; many of the tarsal bones are absent.

They are often regarded as the same disease because of

- (1) broadening of the metaphyses, and
- (2) exostoses.

But there are points of difference, there are intermediate cases.

##### A. Diaphyseal Aclasis.

B. Ollier (1899) Dyschondroplasia.

B. Dyschondroplasia (Ollier)

1. Hereditary—striking feature.

1. Not hereditary.

2. A disease of growing ends of bone in which the normal ossification of cartilage fails to take place so that, as the bone increases in length, there remain in the diaphyses areas of cartilage which do not ossify.

The pale areas shown in radiograms are really cartilage and have been confirmed on histological examination.

3. Tendency to be unilateral—not strictly so.

4. A marked facial asymmetry in 25 per cent of unilateral cases.

#### Congenital Deformities

5. Presence of ossifying echondromata invariable; pedunculated; arise anywhere in the length of the bone; point away from the end of the bone and are well defined and clear cut.

5. They arise near the epiphysis, point in any direction and are rough and irregular and never reach any size.

6. Broadening of the metaphysis is essential for Diaphyseal aclasis. It is fairly regular with sudden trumpetting of the shaft and with sides approximately parallel.

6. Metaphysis normal in size and shape but may be fusiform in shape.

7. Regular ossification giving a homogeneous structure to bone.

7. Regular arrangement of cartilage.

*Positive diagnosis of dyschondroplasia depends on three main points:—*

(3) A portion of tissue corresponding to a pale area in a radiogram is found; when excised and examined histologically, it is found to consist of cartilage.

(1) The onset is in early childhood.

(2) Radiogram shows changes limited to the ends of long bones; there is stripping of rarefied areas. The epiphyses are involved only secondarily. Speckling appears in the affected metaphysis and epiphysis as the growth proceeds.

*N.B.*—That is, within the cortex. There is no fibrous zone upon parts of the surface of the remnants nor are there any portions of cartilage within the fibrous periosteum.

##### Course.

Speckled appearance is due to irregularities of dense calcification. The epiphyses are completely unaffected at birth. The centre of the shaft remains normal except in severe cases.

(1) The actual age of onset is not known.

*N.B.*—In every difficult case of affection of the ends of the long bones or of the bones of the hand or foot, radiograms of the entire skeleton must be taken, otherwise a case of dyschondroplasia may be over-looked.

(2) Some abnormality is often noticed between the 1st and second years of life, when, as a rule, one limb is found to be shorter than its fellow.

(3) Differences in length become progressively greater as growth proceeds.

(4) By about 6 years of age bending of the limbs or enlargement of one or more fingers may be apparent.

(5) Deformity may be due to weight bearing, due to bending of the bones, to the irregular rate of growth in those cases in which only a portion of the diaphysis is affected, or to different rates of growth where only one of the paired bones is affected.

(6) At the earliest stage only the diaphysis is involved and the epiphyses are unaffected. After about 5 years of age the epiphysis may become involved. The radiographic appearance suggests that the disease spreads from the diaphysis to the epiphysis.

(7) As the patient gets older, areas of calcification appear in the affected areas; this change probably occurs round small patches of degeneration in the cartilage. It does not usually commence until about 6 years and it may be delayed much longer.

(8) It is probable that the bones never become completely normal.

The widest diameter of the bone corresponds to the region of the metaphysis. In order that the growing shaft shall maintain its tubular structure, it is necessary that the region of the actual metaphysis at one time shall be reduced in diameter in order to become incorporated at a later date. Thus the expanded ends of the shaft in the growing bone are subjected to a process of absorption and consolidation, to which

Jansen has applied the term 'tubulation'. Keith thinks the condition of multiple exostoses is due to a failure of process of remodeling.

Perumal aged 20 had a growth on the lateral and posterior aspect of the lower end of left femur. He had proneal nerve pressure symptoms; the tumour was excised; it was not malignant.

X-ray of other bones is normal.

(1) Kunju, 20 yrs., M. Deformity right forearm.

Radius is long, curved with radial convexity with a dent at its lower third by the cancellous exostosis of the ulna from its metaphysis. The ulna is short and is far away from the wrist joint. There are cancellous exostosis of both fibulae, of both tibiae, and of the right humerus. There is gross deformity of the right forearm with swelling on the radial aspect due to the bend of the bone; supination and pronation is limited, movement of wrist, good.

(2) Devaki—aged 13—Diaphyseal aclasia.

Mother and mother's elder sister and younger sister have similar complaints. Came for deformity of right forearm; radius is longer and curved; there is an exostosis in the lower third of the ulna. Left forearm—there is small exostosis at the lower third of the radius. There are exostoses of upper end of tibiae, and lower end of femoræ

### Congenital Deformities

and lower ends of tibiae and fibulae.

**Cretinism.**—The arms and legs do not grow as fast as the body. The epiphyseal cartilages do not ossify normally and may be found in an ununited condition 20 or 30 years after.

The characteristic and pathognomonic change is seen in the X-ray as a broad transverse osseous shadow at the end of the diaphysis, particularly in the knee and evidently formed by dense bone. This bony barrier is the cause of the retarded epiphyseal union and exists in no other condition; the shadows of the carpal bones may be absent at birth and there is no shadow of os-calcis.

**Myotonia Congenita.**—Thompson's disease.

Characteristic feature of this disease is a slowness of relaxation of muscles on making a voluntary movement after a period of rest as noticed in a hand grasp and in getting up from a chair. Rare. Both sexes. Both hereditary and familial.

The symptoms may appear in early childhood but become more conspicuous about puberty.

On tapping a muscle group such as the thenar eminence, with a percussion hammer, the myotonic reaction is obtained, i.e., the muscles contract and fail to relax until several seconds have elapsed. The disease does not shorten life; in old age the symptoms may disappear.

Three cases were seen:—two in association with congenital talipes; both male children; one a girl of 7; this girl was trained to help herself with an apparatus to shove about.

*Congenital absence of muscle is rare.*

Lower portion of Pectoralis major.

Trapezuis

S. Magnus and the Quadriceps and abdominal muscles.

**Myositis Ossificans Progressive.**—Commences usually in early childhood, swellings appear on the back, and later on the chest and limbs. In many cases there is symmetrical deformity of the thumb and of the great toe.

**Myositis Fibrosa.**—Slow and progressive infiltration of the muscles similar to that found in Myositis ossificans, but without ossification. Onset is in early life as 9 months. Swellings in the muscles may be observed when they first become affected. The legs become stiff and drawn up and the back rounded. Gradually the flexion of the back and of all four limbs increased until the child can only be moved en bloc.

The following specimens from the Madras Medical College Pathology Museum are of value in the study of this subject.

L. 20. A four-month foetus, finger adherent to the umbilical cord.

L. 21. Congenital hypertrophy of toes.

L. 29. Foetus showing very bad club foot.

L. 33. Foetus showing exomphalos; the legs are directed backwards.

L. 34. Malformed foetus; upper limb bud just visible; only finger with nail is present; only ankle and feet are present; anal dimple present.

L. 36. Hydrocephalic dwarf.

L. 53. Double monster. Thoraco-abdominophagus. Two lower limbs fused; the great toes have fused completely; the second toes are in apposition; 3rd, 4th and 5th toes are separate; the inner margins of the feet are fused.

L. 44. Anencephalic monster; congenital contraction of knee with large fold of skin extending from the middle of the thigh to the middle of the leg. Club foot and club hand are also present.

J. 185. Complete cervical rib.

J. 193. Congenital dislocation hip.

J. 195. Congenital deformity of left hand and forearm from a woman of 70.

A dissected specimen of club hand.

My thanks are due to the Superintendent, General Hospital, for permission to publish these notes and to the staff of Barnard Institute of Radiology for the photos and prints and investigations.

## REFERENCES.

- Dennie Browne.—*British Medical Journal*, May 20, 1936.  
 Middleton.—*British Medical Journal*, September 18, 1937.  
 Burns and Ellis.—“Recent Advances in Orthopaedic Surgery” 1937.  
 Haldane.—*British Medical Journal*, November 23, 1938.  
 Budge, E. A.—*History of Egypt* (B.C. 210 to B.C. 30) (Ptolemy IV to Cleopatra VII)—Vol. XVI, 1902.  
 Murphy.—“Etiology of Congenital Malformations” *Archives of Surgery*, August 1938.  
 MacCallum.—*Text Book of Pathology*, 1938.  
 Cameron, H. C.—*Diseases of Children*, 1927.  
 Tubby.—“Paralysis of Childhood,” 1903.  
 Report on Royles’ Operation by Committee of Neurologists., 1938.  
 Jones and Lovett.—*Orthopaedic Surgery*, 1923.  
 Keith.—“Lecture in the Royal College of Surgeons, London,” 1927.  
 Seymour and Barling.—*Diseases of Children*, 1937.  
 Callum, E. N.—*British Medical Journal*, November 12, 1938.  
 Porton, H.—*British Medical Journal*, November 12, 1938.  
 Brailsford, J. F.—April (Page 265), 1936.  
*Year book of Radiology* (Page 60), 1935.  
 Do. (Page 56), 1937.  
*South End Hospital Reports*, England, 1937.  
 Fraser John.—*Surgery of Childhood*, Vols. I & II, 1926.  
 Putti.—“Quoted in Burns and Ellis Orthopaedic Surgery,” 1937.  
 Brookman.—“Causes of Failure in Treatment of Talipes,” 1933.  
 Lake C. Norman.—“The Foot,” 1938.  
 Kohler: Radiology.

## Abstracts from Current Medical Literature.

## PHYSIOLOGY.

**The Pituitary and Diabetes.** (*British Medical Journal*, Nov. 19, 1938, p. 1048, Leading Article). Ten years ago it was supposed that diabetes was due simply to a deficient secretion of insulin. In 1930 Houssay (*Endocrinology*, 1931, 15, 511) and his collaborators observed that the symptoms of diabetes in depancreatized dogs were relieved by hypophysectomy, and subsequently that injection of crude extracts of anterior pituitary material into such “Houssay dogs” (hypophysectomized-depancreatized animals) caused diabetic symptoms to develop. Since that time the influence of the anterior pituitary on carbohydrate metabolism has been the subject of intensive study. Much of this work has been undertaken in this country by F. G. Young, who has recently reviewed the present state of knowledge (*Lancet*, 1936, 2, 237, 297; *Proc. Roy. Soc. Med.*, 1938, 31, 1305). Before Houssay’s classical observations it was known that the glycogen stores of the liver were derived not only from carbohydrate but also from protein and fat, and that the mobilization of this glycogen to supply a constant blood-sugar level was controlled by a number of factors of which adrenaline was one of the most important. Adrenaline was also responsible for helping to convert tissue glycogen to lactic acid. The hypo-

glycæmic action of insulin was due to its powers of preventing the formation of glycogen in the liver, to its antagonistic effect on the mobilizing function of adrenaline, and to its facilitating the conversion of blood sugar to tissue glycogen. If the supplies of carbohydrate were adequate, the conversion of fat to glycogen was prevented by insulin. In the process of this conversion there was a tendency to liberation of ketone bodies, so that insulin in the presence of glucose diminished the tendency to ketosis.

F. G. Young (*Biochem. J.*, 1938, 32, 513) has shown that administration of crude anterior pituitary extracts to normal dogs gives rise to hyperglycæmia, glycosuria and ketonuria. With small constant doses this diabetogenic effect tends to disappear, but can be made to reappear if the daily dose is increased, and if large doses are given the dogs are rendered permanently diabetic (Young, F. G., *J. Physiol.*, 1938, 92, 15). These animals, however, can survive indefinitely without insulin treatment and can readily manufacture sugar from protein, so that, provided they are supplied with a high diet, their body weight is maintained or even increased. It appears that this diabetogenic effect is due not to inhibition of secretion of insulin but to the raising of the threshold of sensitivity to it (Cope, O.,

and Marks, H. P., *J. Physiol.*, 1934, **83**, 157). Young (*Ibid.*, 1936, **87**, 13P) found that extracts of the lactogenic hormone of the anterior pituitary, prolactin, possess this diabetogenic activity, though he subsequently demonstrated that the "glycotropic factor" is a contaminant of, but not identical with, prolactin. Although crude extracts of the anterior pituitary are "diabetogenic", neither prolactin nor the glycotropic factor will raise the blood-sugar level in intact animals, though they will provoke glycosuria in 'Houssay dogs' (Long, *C. N. H. Medicine*, 1937, **16**, 215). Furthermore, neither prolactin nor the glycotropic factor will induce ketonuria either in the intact (Young, F. G., *Biochem. J.*, 1938, **32**, 524), or in the 'Houssay' animal. So at least three different factors would appear to be required to produce the "diabetogenic" effect in the intact animal; the glycotropic factor, the ketogenic factor, and a factor responsible for inducing glycosuria in the intact animal. Further information as to the mode of action of the glycotropic factor is provided by the observations of Himsworth and Scott (*J. Physiol.*, 1938, **91**, 447) that this substance is equally active in adrenalectomized animals, and that its effect, therefore, is not brought about by increasing the glycogenolytic power of adrenaline. In a histological study of the pancreatic islets in diabetic animals Richardson and Young (*Ibid.*, 1937, **91**, 352, and *Lancet*, 1938, **1**, 1098) observed that whereas in dogs rendered permanently diabetic there is evidence

of degeneration of the Langerhans tissue, in rats receiving crude extracts of anterior pituitary there is an increase in the amount of islet tissue, and in dogs receiving small daily doses active mitosis of the cells is found. This is of significance in view of the observation that such animals tend to become resistant to the diabetogenic effect of small doses, and supports the evidence of the anterior lobe. Yet another aspect of this pituitary activity is the self-limiting mechanism which appears to be a function of all anterior pituitary factors. Young, (*Biochem. J.*, 1938, **32**, 656) has shown that by continuous treatment of monkeys with glycotropic substance it is possible to develop an 'anti-prolactin' in the serum, though this anti-genic substance does not appear to be consistently anti-glycotropic.

The story is by no means complete, but enough has been told to show that the normal animal, and presumably the normal human being, like the "Houssay dog", lives "precariously balanced between hypoglycaemia and diabetes", and that this balance depends on the efficient interaction of the anterior pituitary and the pancreas. It is still too early to apply these discoveries clinically, but we may look forward confidently to a third milestone in the history of the treatment of diabetes which may prove to be not less important than the discovery of insulin by Banting and Best or the introduction by Hagedorn and Scott of the protamine-zinc-insulin compound.

## FROM BAYERS'—BOMBAY.

The German authorities for postgraduate medical instruction have arranged the following international courses for specialists for the summer of 1939.

1. *In Hamburg*.—Dermatological and Venereal Diseases, X-ray Therapy, place: Dermat. Univ. Clinic (26, 6, 1st July 1939). Fee: RM. 60.

2. *In Hamburg*.—Radiology (especially X-ray treatment). Place: Univ. Röntgen Institute. (3, 8th July 1939). Fee: RM 60.

3. *In Vienna*.—Dermatological and venereal diseases, X-ray Therapy. Place: Dermat. Univ. Clinic (26, 6, 1st July 1939). Fee: RM 60.

4. *In Vienna*.—Cosmetics and plastics (Dermatological, Surgical, Otologicals under-sections). Place: Several Clinics of Vienna. (3, 15th July 1939). Fee for the total course: RM 120.

A. Dermatological part (3, 5th July 1939). Fee: RM 30.

B. Surgical part (6, 12th July 1939). Fee: RM 70.

C. Otological part (13, 15th July 1939). Fee: RM 35.

5. *In Vienna*.—Urology. Place: II Surg. Clinic (Univ.) (17, 22nd July 1939). Fee: RM 60.

6. *In Vienna*.—Diseases of the teeth, mouth and jaw. Place: Gen. Hosp. (17, 22nd July 1939). Fee: RM 70.

7. *In Vienna*.—Thoracical Surgery. Place: II. Surg. Univ.

Clinic. (24, 29th July 1939). Fee: RM 70.

8. *In Cologne*.—Abdominal Surgery. Place: Surg. Univ. Clinic. (31, 7, 5th August 1939). Fee: RM 70.

9. *In Bochum and Gelsenkirchen Buer*.—Surgery of accidents and of the limbs including expert opinions on accidents. Place: The Hospitals "Bergmannsheil I and II" (7, 12th August 1939). Fee: RM 70.

10. *In Cologne*.—Roentgenology for Accident Surgery. Place: Univ. X-ray Institute (14, 15th August 1938). Fee: RM 30.

11. *In Cologne*.—Orthopody. Place: Orth. Univ. Clinic (16, 19th August 1939). Fee: RM 50.

12. *In Hohenlychen*.—Plastic Surgery; Treatment by means of Exercises, and Compensatory Athletics. Place: The Sanatorium (21, 23rd August 1939). Fee: RM 35.

13. *In Vienna*.—The Cranium in Roentgenology and Clinic. Place: General Hospital. (31, 7, 5th August 1939). Fee: RM 70.

14. *In Munich*.—Roentgenology for Internists and Surgeons. Place: I. Med. Univ. Clinic (26, 6, 1st July 1939). Fee: RM 60.

15. *In Breslau*.—Diagnostics of the Diseases of the Digestion and the Stomach. Place: Med. Univ. Clinic (26, 2nd June 1939). Fee: RM 35.

16. *In Munich*.—Diseases of the Blood, Nerves and Joints, of

Metabolism. Endocrinology, Vitamines. Place: I and II. Med. Univ. Clinic (3, 8th July 1939). Fee: RM 50.

17. *In Vienna*.—Dietetics. Place: I. Med. Univ. Clinic (10, 15th July 1939). Fee: RM 50.

18. *In Berlin*.—Infectious, Heart, Circulation and Kidney Diseases. Place: Rud. Virchow-Krankenhaus (17, 22nd July 1939). Fee: RM 50.

19. *In Luebeck*.—Allergy. Place: General Hospital (24, 29th July 1939). Fee: RM 50.

20. *In Frankfurt a/M*.—Neurology. Psychiatry, Psychotherapy. Place: Univ. Neurol. Clinic (31, 7, 5th August 1939). Fee: RM 50.

21. *In Berlin*.—Pediatrics. Prophylaxis in Childhood, Nutrition, Diseases connected with Metabolism; Neurology, Psychiatry. Questions connected with Children Difficult to bring up. Hereditary Pathology. Place: Univ. Ped. Clinic, Kaiserin Auguste-Viktoria-Haus, Kaiser-und Kaiserin Friedrich Krankenhaus. (26, 6, 1st July 1939. Fee: RM 50.

22. *In Cologne*.—Pediatrics: Infectious Diseases and Diseases of the Circulation and Kidneys; Allergy, Social Welfare. Place: Ped. Univ. Clinic (3, 8th July 1939). Fee: RM 50.

23. *In Leipzig*.—The Old and Modern Therapeutic Tasks of the Gynaecologist. Place: Gyn. Univ. Clinic (3, 8th July 1939). Fee: RM 70.

24. *In Leipzig*.—Functional Gynaecology. Place: Gyn. Univ. Clinic (10, 15th July 1939). Fee: RM 70.

25. *In Tuebingen*.—Otology, Rhinology, Laryngology. Place: Otol. Univ. Clinic (26, 6, 8th July 1939). Fee: RM 150 (with operation course), without operation course: RM 100.

26. *In Halle*.—Ophthalmology. Place: Univ. Eye-Clinic. (26, 6, 1st July 1939). Fee: RM 75.

All courses will be held in the German language. The number of participants is limited.

Informations and prospectuses through:

*Aerztliches Fortbildungswesen, Berlin N. W. 7., Robert-Kochplatz 7, Kaiserin-Friedrich-Haus.*

All doctors with full German citizenship (Reichsbuerger) as well as doctors of foreign nationality may take part.

Foreign doctors and German doctors resident abroad receive a 60 per cent reduction in fares on the German State Railways, and through the purchase of "Register Marks" with foreign currency doctors resident abroad will make a considerable saving; foreign doctors are advised to consult a bank in their own country before their departure.

#### BACTERIOLOGY.

**Bateriaemia: An address to the Nottingham Medico-Chirurgical Society.** RYLE JOHN A. (*Lancet*

for October 15, 1938). In an address to the Nottingham Medico-Chirurgical Society on 5th October 1938, Prof. Ryle of Cambridge University has given a new classification for bacterial invasions of the human system. He recommends that the terms septicæmia, pyæmia, and sapræmia should be replaced by bacteriæmia which should be sub-divided into septicæmic and non-septicæmic, and bacterial endocarditis. It is not known why endocarditis should form a separate entity. The other two groups pyæmia, and sapræmia are considered the results of an initial bacteriæmia.

Prof. Ryle believes not without reasons that even pneumonia and meningococcal meningitis start with an initial bacteriæmia. The term bacteriæmia does not denote a mere passive circulation of bacteria in the blood. Careful investigation has shown that whenever bacteria have been obtained by culture from the blood there has been associated constitutional disturbance varying from simple malaise to actual pyrexia. Such transient bacteriæmia occurs after tooth extractions, tonsillectomies, during a crop of boils, carbuncles, preceding B. coli infections of the urinary tract. Talking of dental extractions he says "so simple a procedure as a dental extraction can be a dangerous undertaking in persons with valvular abnormalities, but it would also appear that retention of a tooth in an infected socket with a liability to small and repeated natural traumata carries a similar risk. A specific risk of

bad practice of wholesale dental extractions which has long been condemned by physicians is now proclaimed. Apart from the organisms mentioned even the pyogenic streptococci, more commonly associated with a fulminating septicæmia may sometimes cause a relatively benign bacteriæmia." Prof. Ryle quotes an instance to illustrate this.

For obtaining maximum positive results from blood cultures Prof. Ryle recommends that the cultures should be made during the early stages of any fever; which can be effected by a ready collaboration of the laboratory worker and the clinician. The indications for such cultures are for early diagnosis of suspected typhoid fever, "of staphylococcal or streptococcal septicæmia, in any case in which the possibility of a bacterial endocarditis is entertained; in any case presenting rigors and in any sustained or intermittent continued fever for which no adequate local or non-bacterial cause can be discovered. In hospital practice (where the laboratory service permits) routine blood cultures might be employed with advantage to prognosis, treatment and general knowledge in all cases of significant post-operative and puerperal fever and in lobar pneumonia. In cases of proved bacteriæmia a repetition of blood cultivations and colony counts at appropriate intervals may be found to give useful information in regard to the progress of the disease and assist the study of the effects of chemotherapeutic agents."

"My plea is that the physician, the pathologist, and the chemist should in future share their problems with an intimacy which has hitherto been lacking and that the germs of disease should be studied anew in their human environment and so be permitted to become the germs of new ideas".

**Vi. Agglutination in the Diagnosis of Typhoid Fever and the Typhoid Carrier Condition.** S. S. BHATNAGAR (*British Medical Journal*, Dec. 10, 1938, pp. 1195-98). The suggestion for the use of Vi antigen for the serological diagnosis of typhoid fever was the result of the author's observation that in the examination of thousands of sera from both inoculated and uninoculated persons no Vi antibody could be detected, even though Vi strains were included in the prophylactic vaccines used. By a study of 235 strains of *B. typhosus* from various parts of the world the author obtained one strain which contained only Vi antigen and agglutinated only with Vi antibody up to 1 in 1,000 while it did not agglutinate with pure O and pure H antiserum even at a dilution of 1 in 10.

With such a strain as antigen 134 cases of typhoid fever have been studied serologically, of which 56 were inoculated and 78 were uninoculated individuals. From the findings it is clear that Vi agglutination is invariably an evidence of the presence of typhoid bacilli in the system, either in the infective stage or in the carrier state. The

Vi agglutinins disappear after the fever is over unless the live bacilli continue to remain in the body. The necessity for the examination of O agglutinins for diagnosing the existence of typhoid fever in the inoculated does not remain any longer. The Vi agglutinins appear early and in higher concentration and is also specific for the diagnosis of enteric fever. In the uninoculated the Vi agglutinins appear a little later than the first week and do not go up to the same titre as in the inoculated. The titres however range from 1 in 10 to 1 in 100 in the uninoculated and 1 in 25 to 1 in 200 in the inoculated.

Certain technical points in the test are emphasized. Dreyer's tubes are not suitable for Vi agglutination tests. The type of tube with a round bottom, employed in Felix's technique for the differentiation between O and H agglutination, is the most suitable for Vi agglutination. The tubes are about 5 cm. long and have a uniform internal diameter of about 1.25 cm. The difference between the agglutinated bacteria and those that have simply settled down can be easily made out in these tubes since they permit the shaking of the whole serum suspension mixture. The clumped bacilli in Vi agglutination have a tendency to distribute themselves round about the lowest quarter of an inch of the agglutination tube, where they appear as a general haze to the naked eye. When the tube is shaken these agglutinated bacteria become readily

visible as a considerable mass of somatic agglutination.

Permanent suspensions are not recommended. If so required, formalinised suspension (0.5 c.c. of pure formalin to every 80 c.c. of the suspension) or a suspension prepared with mercury perchloride (1 in 1,000 HgCl<sub>2</sub> in normal saline, can be allowed, but the suspensions should be tested every few days against a pure Vi serum of known titre.

**A Curious Case of Typhoid fever** (reported from Italian Authors in the *Bulletin of Hygiene* for March 1937, p. 186.) "A boy 5 years old with fever which began 6 days before, a little diarrhoea, enlarged spleen, palpable liver and general habitude and mental dulness. No mention is made of any rash. With a temperature of 38.4°C the pulse was only 104 per minute. From the general state of the child a tentative diagnosis of typhoid fever was made. Blood culture proved negative; widal on the 9th and again on the 17th day of illness was negative; (no mention made as to the method of widal reaction adopted). On the 29th day 13 days after the temperature became normal, it was positive. Examination of the urine is recorded as negative: [But whether bacteriological examination of the urine or faeces was undertaken is not stated.] On the 13th day of the disease a duodenal tube was passed and from the bile so obtained *B. typhosum*, was isolated and cultivated again on the 28th day, 12 days after the fall of the

temperature—a fact which may have a bearing on prophylaxis and the carrier question."

#### PHARMACOLOGY AND THERAPEUTICS.

**Therapeutic use of Barbiturates.** CLARK, A. J. (*Edin. Med. J.*, 45, December 1938) summarises the chief clinical uses of the barbiturates as follows:—(1) Cerebral sedatives (in epilepsy, sea sickness and the like, (2) hypnotics, (3) narcotics (to lessen the pain of child birth, (4) basal narcotics and (5) anaesthetics. Many of the distinctions drawn between the actions of barbiturates and the actions of other hypnotics depend on the fact that barbiturates, such as barbitone and phenobarbitone produce a more prolonged effect than do most other hypnotics. The potency of barbiturates varies within a relative small range. The duration of action of the hypnotics depend chiefly on the rate at which they are broken down in the body. Barbitone is an exceptional compound because the body is unable to break it down and it is excreted unchanged in the urine. Consequently it is removed from the body extremely slowly. The more complex and less stable barbiturates are broken down by the body probably by the liver, and only small quantities are excreted by the kidneys. The duration of action of barbiturates other than barbitone depends therefore not on their rate of excretion but on the rate of their destruction in the body, and this varies greatly in different cases. Half destruction of phenobarbitone occurs in

6 to 12 hours. The safety of barbiturates depends on the therapeutic range, i.e., the ratio between the dose likely to produce the required action and the maximal dose that is unlikely to produce toxic effects, the chance of unusual undesirable effects and the chance of cumulation. The estimation of the therapeutic range is rendered difficult by the fact that extensive individual variation occurs in the response to barbiturates, as indeed it does in the response to all other drugs. As a general rule, the quick acting barbiturates are safer than the long acting ones, because with the former cumulation is less likely and moreover, any toxic effects, if produced, are of shorter duration. The long acting barbiturates find their chief employment in the use of phenobarbitone in epilepsy and of barbitone and phenobarbitone as hypnotics. It seems probable that the shorter acting barbiturates such as pentobarbitone sodium are preferable to barbitone as hypnotics. Barbiturates with a shorter action than phenobarbitone might be found equally efficacious in epilepsy and would be less liable to produce undesirable side actions such as rashes. Barbiturates appear to be satisfactory agents for the production of pre-operative narcosis provided only a slight degree of narcosis is produced. The production of narcosis deep enough to relieve severe pain appears to be unsatisfactory because of the incidence of delirium. The chief danger of full anaesthesia by barbiturates is respiratory failure. This paraly-

sis is difficult to overcome. The permanence of this undesirable effect is surprising in view of the rapid rate of destruction of the drugs in the body.

**Treatment of Pneumonia with M. & B. 693.** T. F. ANDERSON and R. M. DOWDESWELL (*Lancet*, February 4, 1939) treated 50 cases of pneumonia with M. & B. 693 and compared the results with 50 cases in which were given non-specific treatment. The dosage employed was 2 half-gramme tablets every four hours with an initial dose of 4 tablets. A reduced dose was given to children according to age. Administration was continued for 24 hours after the temperature came to normal, except in a few cases in which there was a slight rise of temperature in the second week. The largest total quantity given to a single patient was 40 g., the average being 18.5 g. No remedy was given in addition to M. & B. 693 except an occasional aperient, sulphur containing aperients were avoided.

There were 8 deaths in the control series, compared with 1 in the treated series. The course of the disease was considerably modified by the drug, and the pyrexial period was reduced in the treated group. The drug appeared to be active against all types of pneumococci.

**Chemotherapy of Gonococcal Vulvo-vaginitis.** D. KATHLEEN BROWN (*Lancet*, February 18, 1939). M. & B. 693, Sulphanilamide, Prontosil and Uleron were tried. The total dose

of M. & B. 693 ranged from 2 to 8 grammes. The plan followed for the majority of the cases has been to give 0.25 gramme four times daily for four days, making a total course of 4 grammes. Local treatment consisted merely in swabbing the vulva with acriflavine 1 in 1,000 in glycerin followed by a dermatol dusting powder. The immediate clinical result was equally good in all cases. The duration of treatment has been cut down to only 4 days for cases receiving courses of M. & B. 693 and to ten days for cases receiving courses of prontosil album. The chief advantage of M. & B. 693 is that there is no necessity whatever for local treatment apart from swabbing the vulva for the first two or three days. It is possible to judge from the outset if the case will respond, as improvement is apparent within a few hours in some cases with M. & B. 693 and always within 2 or 3 days for both M. & B. 693 and sulphanilamide. This treatment is found superior to oestrin treatment in final results.

**Sulphanilamide Cyanosis** (Annotations, *Lancet*, February 18, 1938). The commonest toxic effect of the sulphanilamide, apart from minor ones as nausea and depression, is cyanosis. The mechanism by which this cyanosis is produced is by no means fully understood. There may be three different causes. The first is absorption by the red cells of a coloured derivative of sulphanilamide; the second and third are methaemoglobinæmia and sulphaemoglobinæmia, the former

resulting from the first stage of a process that in the presence of  $H_2S$  may go on to the establishment of the latter. Those patients prove to methaemoglobinæmia are often those with severe infection and high fever. Hartman and others (*J. Clin. Invest.*, 1938, 17, 699) have studied its treatment with methylene blue. This dye greatly accelerates the re-conversion of methaemoglobin to haemoglobin in poisoning by various aniline derivatives. Its effect in methaemoglobinæmia due to sulphanilamide is dramatic, the cyanosis disappearing within half-an-hour when a dose of 1 to 2 mg. of the dye per weight lot of body is given intravenously. But the formation of methaemoglobin is soon resumed. Thus a single dose gives temporary relief but the methaemoglobin level may be kept down by continuous administration of the dye by mouth or prevented from ever rising unduly if methylene blue is given together with sulphanilamide from the start of treatment.

**The Mode of Action of Drugs of the Sulphonamide Group.** J. MCINTOSH and L. E. H. WHITBY (*Lancet*, 25th February 1929). Briefly the various theories of the mode of action of sulphonamide drugs in bacterial infections may be divided into four main groups: (1) that the drugs have a stimulating action on the specific and non-specific body defences; (2) that the drugs neutralise toxic bacterial products; (3) that the drugs act on the bacteria themselves, either as germicides or in some more subtle fashion by interfering with invasive power

and ability to multiply rapidly; and (4) some combination of two or more of these explanations.

**Effect on specific and Non-specific body defences.**—The specific action of M. & B. 693 on pneumococci has enabled more conclusive studies to be made on the question of immune body production. Orthodox methods of immunisation may be compared as to efficiency and speed of production with the immunity created by treatment of infected animals with M. & B. 693. Experiments have shown that the exhibition of this drug is not associated with stimulation of leucocytes, and the blood picture is an inert one which implies neither stimulation nor depression of the marrow. Other observers have found that splenectomy did not prevent the protective action of sulphanilamide in mice infected with streptococci; protection was the same as with normal mice. This shows that the stimulation of the phagocytic activity of reticulo-endothelial cells is not in integral part of the action of sulphanilamide.

In a series of experiments it was shown that mice which survive inoculation with 10,000 lethal doses of pneumococci, having been treated with 30 mg. of M. & B. 693 are, one week later, completely immune to a second inoculation of as much as 1,000,000 lethal doses without further doses. At the time of the second inoculation no sulphanilamide can be demonstrated in the body. This immunity is also not due to any subtle action on

immunity producing mechanism because mice which get a parallel course of M. & B. 693 but receive no inoculation with pneumococci are not immune at the end of the week. The immunity is quantitatively related to the infecting dose. The greater the initial infecting dose the greater the resulting subsequent immunity. This solid immunity to pneumococcus is specific for pneumococcus and specific for type in the same way as when immunity is created on orthodox active lines, despite the fact that M. & B. 693 acts on numerous types of pneumococci. Active immunisation with killed pneumococci provides an immunity parallel to that found in mice saved with M. & B. as above. But mice immunised with killed cocci and given a course of M. & B. 693 are not more effectively immunised. It was also found that M. & B. 693 does not affect the speed with which immunity is produced. Further serum from mice cured of infection with M. & B. 693 showed protective power for other mice created with it when such serum was derived from mice killed about the 5th day.

**Effect on bacterial growth.**—M. & B. 693 given prophylactically or at the time of inoculation does not prevent blood stream invasion, whereas passive or active immunisation by orthodox methods does prevent such invasion. Some observers have found capsular degeneration of pneumococci in a few hours after giving M. & B. 693; but this is an *in vivo*

phenomenon and has only been observed in peritoneal samples; this degeneration may as easily be nothing more than the final process by which the body gets rid of dead pneumococci as be due to a primary action on the organism.

The medium in which the test is made appears to be important as the germicidal activity of these drugs varies and hence the laboratory results sometimes do not run parallel with *in vivo* activity. Thus salphanilamide is active against streptococci *in vivo* but is inactive in peptone-containing broth, whereas the same drug is active against pneumococcus type 1 in peptone-containing broth but is almost inactive *in vivo*. A reasonable interpretation of this is that, in the case of streptococcus when either salphanilamide or M. & B. 693 is present, peptone broth supplies something to the organism which blood lacks, whereas in the case of pneumococcus both blood and broth lack something essential to the organism. It is clear that since peptone inhibits the action of both sulphanilamide and M. & B. 693 on streptococcus but not on pneumococcus the two organisms differ in the way in which the drug acts on them. Sulphonamide drugs may therefore be considered to block the vital food supply of bacteria, both drugs being equally effective in blocking the vital food for streptococcus but M. & B. 693 being decidedly more effective than sulphanilamide in blocking that for pneumococcus. It is hardly conceivable that in an abundant

medium such as an animal's blood stream an actual food factor should be destroyed or fixed, but it is conceivable that the bacterial enzyme of which this food factor is the substrate, should be inactivated. Rough and avirulent organisms, themselves insusceptible to these drugs, have not the exacting food requirements of virulent bacteria, and the failure of the sulphanilamide drugs to affect virus infections could be explained by the feeble enzymatic action which viruses are known to have. It would appear therefore that the mode of action of the sulphanilamide drugs is most probably bound up with the inactivation of bacterial enzymes. The failure of the drugs to check the initial local multiplication and invasion is obviously due to a *lag* in action, and the *lag* also suggest a slow combination or neutralisation by the drug operating on some essential food substance or enzyme.

#### MEDICINE.

**Observations on the Mechanism of Rheumatic Fever.** ALVIN F. COBURN, M.D. (*Lancet*, 31st October 1936, p. 1025). There are three clinical phases in the development of an attack of rheumatic fever. The first is one of acute upper respiratory tract infection, lasting for only a few days. The second phase follows immediately after this infection and is characterised by a complete absence of clinical symptoms and signs. Its duration varies from a few days to perhaps six weeks, but is generally

between one and two weeks. The third phase is the period of rheumatic manifestations. It shows wide variations in intensity and duration.

Clinical observations have dealt almost exclusively with Phase III. Of recent years data have been accumulating on the nature of Phase I, showing the appearance of hæmolytic streptococcus in the upper respiratory passages at this time. Phase II, remains unexplored. It is Coburn's belief that this second phase is crucial in the development of rheumatic activity.

It is well recognised that hæmolytic streptococcal pharyngitis is followed by uncomplicated recovery in most individuals. A small minority, however, develop rheumatic fever shortly after convalescence from this type of infection. Rubin attempts to define wherein such individuals differ from the normal. Both types of subjects appear to be equally susceptible to pharyngitis. The clinical character of the infections and the strains of hæmolytic streptococcus involved have been indistinguishable. In both types of subjects, immune responses vary widely in degree, occasionally failing to appear. When antibodies develop in the normal subject they are not associated with disease, but the development of an immune response in rheumatic subjects is frequently accompanied by the appearance of rheumatic activity. As the disease progresses, the antibody titre rises; but the maximum level of titratable antistreptolysin is not reached until some time after the height of the rheumatic attack. An interpretation of the relationship of the immune response to the development of the rheumatic process is the aim of the present paper. The data consist of observations on the serological events immediately following hæmolytic streptococcal pharyngitis.

**OBSERVATIONS ON THE NATURE OF PHASE I.—(a) Natural history of infectious agent**—Severe attacks of rheumatic fever are generally preceded by mild hæmolytic streptococcal pharyngitis. Despite the transient character of this infection, bacteriological observations have repeatedly shown that the invading organism may persist in the vicinity of the respiratory passages for a period of months after its disappearance from the mucosal surface. It has been possible in many instances to trace the migration of the infecting strain from the mucosal surface to the sub-mucosa and later to tonsils or accessory sinuses. This sequence of events is a general characteristic of hæmolytic streptococcus infections of the upper respiratory tract, and is not peculiar to Phase I of rheumatic fever.

**(b) Antigenic Properties of the Infectious Agent.**—The strains of hæmolytic streptococcus commonly associated with pharyngitis belong to Lancefield's Group A, and are usually of a virulent type. They produce *in vitro* at least two soluble antigenic principles—erythrogenic

toxin and streptolysin—and contain within the bacterial cell at least three other potential antigens—type specific M-substance, nucleoprotein, and perhaps carbohydrate. The liberation of streptococcus antigens in the infected host can be inferred from significant increases in specific antibodies. Most patients in the rheumatic state are Dick-negative, indicating that they have developed neutralising antibodies to the erythrogenic toxin. Increases in antistreptolysin titre and precipitins to M-substance are regularly developed during attacks of acute rheumatism. (In addition to these well-recognised antibodies, antifibrinolysin is found in the blood of patients with acute rheumatism. Observers are agreed that this is a response to hæmolytic streptococcus infection). Most patients show increased skin reactivity to the nucleoprotein of hæmolytic streptococcus, and during severe attacks frequently develop precipitins to this fraction. The information available at the present time does not permit an appraisal of the relative importance of these substances. However, it is known that erythrogenic toxin in scarlet fever can damage the endothelium of the vascular tree. The action of nucleoprotein as an antigen after its liberation from the interior of the bacterial cell seems well established. Too little is known about streptolysin or M-substance to permit an opinion on their immediate effects. It appears that toxin and streptolysin are released at the onset of infection, whereas M-substance and nucleoprotein are liberated

after the disintegration of bacterial cells.

The two antibodies which at the present time can be estimated most accurately are antistreptolysin and precipitins to M-substance. Antistreptolysin in human serum can be titrated quantitatively, is specific for hæmolytic streptococcus infection, and is probably also group-specific. Precipitins to the M-substance of the infecting agent can be detected qualitatively. This antibody is considered type-specific. These two antibodies represent immune responses to both soluble and intracellular bacterial derivatives.

The basic interpretation of a rise in antistreptolysin titre as an indication of recent infection with hæmolytic streptococcus is substantiated by these experiments. Although not yet complete, they suggest that the persistence of a high titre indicates continued antigenic activity of this organism or of the derivatives.

Antistreptolysin titres in children under three years of age are characteristically low and do not rise following hæmolytic streptococcus infections. These infections are normally handled by infants without the development of circulating antibodies, and rheumatic fever is rare at this age. Out of approximately 2,030 rheumatic attacks Coburn has observed only ten in children under three. These ten children reacted in all an abnormal way

for their age, in that they developed high antistreptolysin titres, ranging from 250 to 2,500 units. Their anti-body-producing mechanism and their capacity to develop rheumatic fever—both matured precociously. This suggests that the maturity of the immune mechanism is pre-requisite to the development of rheumatism.

2. The duration of Phase II. shows considerable varieties that appears to coincide with the time required for the appearance of the antistreptolysin response by the rheumatic subject.

3. In a group of rheumatic subjects infected with a single strain of hæmolytic streptococcus those that developed an antistreptolysin response developed acute rheumatism, while those who failed to make this response escaped an attack.

4. A rheumatic subject who contracts a series of hæmolytic streptococcus infections develops acute rheumatism only when the infection is followed by a rise in antistreptolysin titre. In the absence of an antistreptolysin response, there is no rheumatic attack.

5. Two extreme clinical types of rheumatic fever are paralleled

by two widely variant types of antibody response. In attacks characterised by acute onset, a period of severe illness, and by relatively rapid recovery, the titre reaches maximum relatively early—within a month of the onset of Phase III. In attacks with insidious onset, where repeated ten-day cycles of progressive severity culminate in severe carditis months later, the titre rises gradually, reacting its maximum height late in the illness.

6. Exacerbations of symptoms occurring during subsiding rheumatism are often preceded by a sudden transient fall in antistreptolysin titre. They are followed by a rise which may surpass the previous level. This finding suggests that something depresses the titre momentarily just before the appearance of symptoms.

The time relation between antistreptolysin titre and rheumatic activity as judged by symptoms and blood sedimentation-rates based on a series of observations made on 100 unselected hospital admissions with rheumatic carditis is summarised below :

| CLINICAL STAGE.                  | Sedimentation-rate. | Antistreptolysin titre.      |
|----------------------------------|---------------------|------------------------------|
| Onset of symptoms                | ... Rising          | ... Rising.                  |
| Height of attack                 | ... Maximum         | ... Still rising             |
| Beginning subsidence of symptoms | ... Maximum         | ... Still rising or Maximum. |
| Continued subsidence of symptoms | ... Falling         | ... Maximum.                 |
| Disappearance of symptoms...     | ... Falling         | ... Maximum or falling.      |
| Rheumatic process quiescent.     | NORMAL              | ... Falling of normal.*      |

\*Depending upon duration of quiescence.

In summary, the initial rise in titre corresponded quite closely to the onset of symptoms. However, in no case did the titre reach its maximum at the same time as the symptoms and the sedimentation-rate, but it continued to rise even after the latter had begun to subside. Since the antibody titre rise follows rather than precedes the symptoms, there must be a still earlier factor which relates to both, and which presumably comes into operation during Phase II.

Detailed studies have been made of the immunological responses to hæmolytic streptococcus throat infections in both normal and rheumatic patients. The individuals chosen for this investigation included the following: children with scarlet fever, young adults with pharyngitis, and quiescent rheumatic subjects who contracted pharyngitis while under observation. Serial determinations were made in parallel of the following: blood sedimentation-rate, antistreptolysin, anti-M-precipitin and serum complement. (Complement is reported as the smallest volume of patient's (fresh) serum which caused complete hæmolysis of a standard suspension of sensitised sheep cells. Normal values ranged from 0.02 to 0.34 c.c. of serum). Each patient was kept under close clinical observation for at least 60 days from the onset of infection. The combined evidence suggests that a delay in the immune response to hæmolytic streptococcus may be characteristic of the rheumatic subject.

The rheumatic subject who develops an attack handles the products of hæmolytic streptococcus in a peculiar way. Such a concept harmonises well with the prolonged antigenicity of this organism during rheumatic attacks as evidenced by the persistence of high antistreptolysin titre levels for months after infection. In addition to the apparent delay in the immune response of the rheumatic subject, there may also be a delay in the final elimination of hæmolytic streptococcus products from the body. In conclusion, these observations suggest the hypothesis that the rheumatic state is characterised by an abnormal method of disposing of hæmolytic streptococcus products. The mechanism whereby such an abnormal immune response may induce disease is unknown. Further information on the nature of this abnormality may make possible experimental approach to the mechanism.

**The Size of the Heart in Asthma and Emphysema.** (F. L. RUBIN, Liverpool. (*Lancet*, 11th November 1936, 1091—3). A number of cases of bronchial asthma with and without emphysema were examined radiologically with a view to determining the size of the heart.

The heart in the majority of cases of bronchial asthma is smaller than normal for the age, height, and weight of the patient.

If the size of the heart in an asthmatic subject is normal for the individual's body proportions,

the heart is likely to be pathologically enlarged.

Emphysema may give rise to many of the symptoms and signs of cardiac failure though the heart itself be normal. The normality of the heart in respect to its size can best be judged radiologically; particularly is this true in the presence of emphysema.

Severe emphysema may exist for years without associated cardiac enlargement.

When cardiac enlargement supervenes on old-standing emphysema this enlargement is usually general and shared by both ventricles.

In the absence of associated cardiovascular disease, a selective or preponderating enlargement of the right ventricle in emphysema is an uncommon finding.

The X-ray evidence for these findings is given and supporting electrocardiographic and post-mortem evidence is quoted.

The effect of anoxæmia on the heart muscle might possibly explain the general cardiac enlargement that may be found in advanced emphysema. But the absence of a selective enlargement of the right ventricle in emphysema of varying degrees of severity would be difficult to explain if it were agreed that the blood flow from the right ventricle is impeded in its passage through the emphysematous lung. There is, however, a good deal of experimental evidence to

show that there is, in fact, no effective obstruction to the flow of blood through emphysematous lungs in spite of the obliteration of much of the capillary bed—unless the condition is far advanced. Parkinson has recently cast doubt upon this evidence though he agrees that emphysema alone rarely leads to cardiac failure. No attempt is made here to enter into this controversial question, but the evidence is quoted and fully discussed in the work of Kountz and Alexander. The Valsalva experiment, however, might be mentioned, since it simulates conditions found in emphysema and because it lends itself readily to direct observation on the X-ray screen the effect on the size of the heart of attempted forced expiration against the closed glottis.

It was observed during the Valsalva experiment that if the patient strained against the closed glottis, thus distending the lungs, the heart decreased in size and at the same time the intrapleural and venous pressures rose. During normal inspiration, with depression of the diaphragm and increase in the negative pressure in the pleural cavity, the flow of blood into the right heart is accelerated and there is a concomitant reduction in the venous pressure. But in emphysema the diaphragm is already depressed in the inspiratory position and can descend little or no further on inspiration and the pressure in the thorax approaches positive values. The return of blood to the heart is therefore impeded—hence the

increase in venous pressure which is generally to be found in emphysema. This suggests that with lung distension the right heart, instead of overfilling because of any possible obstruction in the pulmonary circulation, may actually be spared owing to retardation of the blood flow entering it. This, the reduction in the size of the heart observed during the Valsalva experiment seems to be directly due to the retardation of the venous flow into the thorax. This reduction in heart size (which is striking in degree) can be seen on the X-ray screen in almost any normal or asthmatic subject who attempts expiration against the closed glottis and if the factors causing it obtain in established emphysema, as they do in the temporary lung distension during the Valsalva experiment, a selective enlargement of the right ventricle in emphysema would not be expected to take place. The evidence submitted in this paper indicates that such an enlargement is indeed an uncommon finding.

Alexander, Lutén, and Kountz remark that the reduction in the size of the heart seen during the Valsalva experiment probably also occurs during the attack of Asthma. Rubin has been able to confirm this and has observed the diminution in the heart size on the fluoroscopic screen during the expiratory distress of an asthmatic paroxysm—this diminution being obvious in spite of the elevation of the diaphragm which is also observed during an attack. It is no doubt associated with

the diminished cardiac output and lowered blood pressure which many observers have noted during an attack of asthma.

*Size of the heart in asthma without emphysema.*—Passing on to another aspect of the subject one must briefly consider the size of the heart in asthma without emphysema. An apparently small or "ptotic" heart is often seen in persons of asthenic constitution. On inspection of a radiogram of the chest (taken standing at the end of a comfortable inspiration) in almost any asthmatic subject, the apparent smallness of the heart is obvious. This may in small measure be due to the configuration of the thorax and to the somewhat low position of the diaphragm generally to be found in asthmatics. It has already been pointed out that any considerable depression of the diaphragm tends to elongate the heart and possibly causes it to rotate slightly round its vertical axis; the longitudinal axis of the heart approaches more nearly the vertical; its transverse diameter decreases and, at the same time, the heart becomes more centrally placed in the chest. These factors may result in an apparent diminution in the size of the heart by radiography. But the smallness of the narrow vertical heart of the asthmatic is not only apparent but real. If a teleradiogram be taken with the patient prone and at the end of a full expiration, the diaphragm will be seen to have risen considerably. The axis of the heart becomes, as a result, more horizontal and its

transverse diameter increases. But the heart shadow remains obviously smaller than the normal heart shadow of a non-asthmatic subject of similar body-weight and proportions. In the description of the post-mortem findings in a case of fatal asthma, Rackemann remarks that the heart "appeared to be smaller than normal for the size of the woman." The small heart of the asthmatic is the subject of papers by Gotzel and Kienbock and by von Hoesslin, who states it is due to simple hypoplasia.

#### ENDOCRINOLOGY.

**Breast Growth by local application of oestrogenic ointment.** C. M. MAC BRYDE, (*J.A.M.A.* March 18, 1939, pp. 1045-1048).—An ointment of hydrous wool fat and petrolatum containing 5,000 I. U. per gram of oestradiol or oestradiol benzoate was applied directly to the breast region over a circular area approximately 10 cm. in diameter, with the nipple as the centre. Each day 5 g. containing 25,000 I. U. was applied by the patient, to the breast region on one side, rubbed in for five minutes, and allowed to remain on over-night. The breast of the other side was used as a control and received the same amount of ointment base, without the oestrogen, and the same amount of massage. Definite breast growth of considerable degree was produced by the oestrogenic substance absorbed through the skin directly into the breast tissue. Evidence of absorption by the oestrogen into the systemic circulation was

found in the change of the vaginal mucosa, by enlargement of the uterus, by relief of the patient's hypogonadal symptoms and by slight effects on the opposite breast. The ointments, unit for unit, were more effective in producing breast growth than injections of oestradiol benzoate or of ketohydroxyoestrin. Ointments containing oestone were less effective, unit for unit than those containing oestradiol. Oestrogens can therefore be absorbed through the skin of the human female directly into the breast tissue and by this route can produce their characteristic stimulation of mammary growth. It is, however, not recommended that this method be adopted in general practice until further studies can be done and the limitations and possible dangers of the cutaneous application of concentrated oestrogens can be defined.

**Oestrogenic properties of Stilboestrol.** P. M. F. BISHOP, M. BOYCOTT and S. ZUCKERMAN. (*Lancet*, 7th January 1939). Stilboestrol administered orally imitates the effects of the natural oestrogens by:—

1. Producing 'oestrin withdrawal bleeding.'
2. Producing an intermenstrual type of endometrium both in the human female and in the monkey.
3. Inducing growth of the hypoplastic uterus.
4. Relieving the symptoms of the menopausal syndrome.

5. Converting a 'menopausal' into an 'oestrous' type of vaginal smear.

6. Restoring the normal appearance of the vulva and vagina when they have become atrophic as the result of the oestrogen deficiency of the climacteric.

7. Inducing painful swelling of the breasts.

8. Causing proliferation and activation of the epithelium of the mammary glands.

9. Relieving the pain of dysmenorrhœa.

Its oestrogenic activity when given by injection corresponds with that of oestrone.

#### GENERAL

**Medical advances in Soviet Russia** (*Abstracted*) (*B. M. J.*, 1938 Dec. 24, 1316). At a meeting arranged by the Society for Cultural Relations with the USSR, held at the Royal Society of Arts, London, on 8-12-38, Major-General Sir Cuthbert Sprawson, who paid a visit to Soviet Russia in the summer of 1938, gave an account of his experiences there, particularly with reference to medical education and to the campaign against tuberculosis. . . .

**Medical Education.**— . . . one thing i.e., common between Russia and India (was) . . . that both had a dual standard for medical education. . . . (The inferior class was a relic of the old army days, abolished in the rest of Europe, in the process of abolition in Russia but held in check by the acute shortage of practitioners) . . .

. . . in Leningrad . . . there were 3,000 students, more than half of them women . . . an attached hospital of 1,200 beds, and access to another nearly as large, but . . . not . . . enough for the teaching of 3,000 students . . . four (students) shared a single microscope . . . each student was expected to take ten cases (of confinement) before qualification. In the Soviet Union there were 72 institutes for medical undergraduates . . .

**The Curriculum and Specialities.**—The time spent on the curriculum was shortened (by two years) by earlier specialization in public health and hygiene . . . Of 25,000 medical students in the Union last year, 4,000 had chosen paediatrics, 3,200 public health and the remainder general medicine . . . it was hoped . . . a six-year course (might later) be instituted. The chief concern at the moment was to increase the number of qualified practitioners. In 1914 there were 25,000 graduate doctors, now there were 107,000 but these in a population of 170 millions gave only one doctor to rather fewer than 1,600 people. The Government was aiming at one doctor per 1,000 of population.

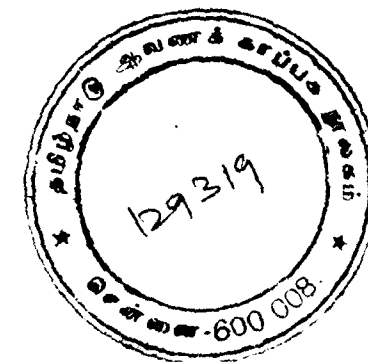
In Russia there was only here and there any private practice; on the whole it was a State Service. During his first year every doctor had to go where he or she was sent, and the best students were sent to the most out-of-the-way places, on the supposition that these people would be the most self-reliant. At the end of the year they

could go within limits, where they pleased, and there was no difficulty in getting them to go to the rural areas, for in the less desirable places the pay was higher, they had more holidays and privileges, and they were allowed to keep a car—and also a cow. There was excellent post-graduate training, and every doctor was supposed to have a refresher course of from three to six months every three years; . . .

*Russia's Anti-tuberculosis Campaign.*— . . . The remarkable thing was that a notable decline in tuberculosis mortality had coincided with an increased industrialization and urbanization. The population of Moscow before the war was 1½ millions; it was

now 3½ millions. In 1913 the tuberculosis mortality in Moscow was 22.6 per 10,000 it was now between 10 and 12. . . . As part of their third five-year plan the Soviet Government had set itself the stupendous task of halving the mortality of a chronic disease, but such surprising success had been made of it so far that one could not say it was impossible. The number of physicians employed in the sanatoria and tuberculosis dispensaries were 27,000, which meant that one doctor in every four in Russia was a tuberculosis specialist. Special tuberculosis teaching was given to all under graduates, and post-graduates courses in the subject were given to 500 practitioners every year.

## Service Notes



1. **Government Order on Restriction of Practice.**—The Executive Committee has already circularised members regarding this important matter. Their replies are awaited.

2. **Honours.**—We congratulate Rao Bahadur Dr. M. R. Guruswamy Mudaliar, B.A., M.D., on the honour conferred on him. As he has not yet left "active" service and the Government General Hospital still has the honour of having him as the Consulting Physician, we dare say higher honours are still to come.

3. **Academic Distinctions.**—To Dr. F. D'Netto, M.B.B.S., who has been awarded the *Diploma in Anaesthetics* of the Royal College of Surgeons in England, and Dr. N. Vaidyanathan who has just qualified M.D. (Madras) we offer our felicitations. We are proud of such colleagues.

4. **Obituary.**—Three tragic deaths during the course of a fortnight, among members of our service is a sad indication of the responsibilities and worries of our profession. We greatly regret to record the deaths of Capt. P. T. Zacharias, Capt. D. K. Narayana Rao and Dr. T. S. Somasundara Iyer, during the month of April 1939. The first loss was

that of Dr. T. S. Somasundara Iyer, who represents the bulk of the members of our service—giving of their best in love and service to the sick and the needy wherever their lot is cast. To his widow and his nine children our hearts go out in sympathy.

Capt. D. K. Narayana Rao, was a self-made man having risen from the ranks of *hospital assistant*. He took study leave and qualified M.B. (Calcutta) in 1918. He saw active service in Egypt and Palestine in the I.M.S., and on return did his duties as a Civil Assistant Surgeon in various places with marked ability and efficiency. In addition to his professional skill, he was a keen social reformer and a genial soul. He leaves behind him his wife and three sons, the eldest of whom is a house surgeon in the Madras General Hospital. In his death many of us bemoan the loss of a personal friend.

Capt. P. T. Zacharias, who also did active service during the last Great War, was a very unostentatious worker and a Christian gentleman in the truest sense of the word. He leaves behind him his wife and eight children, one of whom is a medical student. We offer our heartfelt condolences to them in their great sorrow.

J. C. D.

## Notices.

**Unification of Pharmacopœia.**—The work of International Standardisation in various health activities undertaken by the League of Nations has been carried one step further by the extension of the field to unification of pharmacopœia.

The possible unification of pharmacopœia was explored by an International Conference which met in Brussels in 1925. This resulted in a Convention creating an International Secretariat for this definite purpose under the Belgian Government. A further step was taken in 1937 when, in arrangement with the Belgian Government, and in liaison with the International Pharmaceutical Federation, the Health Organisation of the League set up a Technical Commission of Pharmacopœial Experts with Dr. C. H. Hampshire, Secretary, British Pharmacopœia Commission, as the Chairman. This Commission met in Geneva in 1938 and prepared a preliminary programme of studies, including the selection of suitable drugs for examination.

The Commission further considered and adopted standard forms of monograph for use in preparing the drafts, and decided to prepare general descriptions of reagents and analytical procedures, and statements of other general principles for the unification of monographs. The preparation of a report on maximum doses and on the possibility of defining average

doses was entrusted to two members of the Commission.

This monograph will now be considered between 10th and 16th of May, this year, at the sitting of the Technical Commission of the League in Geneva. During these sittings, the final form will be discussed and approved. Thereafter, it will be forwarded to the Permanent Secretariat in Brussels for circulation amongst the signatory countries of the Agreement with a view to their ultimate adoption and final incorporation into a limited international pharmacopœia. (*From League of Nations Secretariat, Indian Branch, New Delhi.*)

### Cameron Prize for Prof. Domagk.

At a meeting of the Court of Edinburgh University the Senatus reported that the Cameron Prize for 1939 had been awarded to Dr. Gerhard Domagk, Institute for Experimental Pathology and Bacteriology, I. G. Farbenindustrie, Elberfeld, Germany, in recognition of his discoveries—the well known Prontosil—which initiated the treatment of diseases of bacterial origin by compounds belonging to the sulphonamide group.

The Cameron Prize is awarded to a person who, in the opinion of the Senatus has in the five years immediately preceding the award made any highly important and valuable addition to practical therapeutics.

WHEN YOUR PATIENT REQUIRES  
**LIVER AND HAEMOGLOBIN**  
SPECIFY  
**HEMO-HEPALIX**  
The Original and Genuine Product of Highest Potency  
*A Powerful Restorative in*  
**Anæmia, General Debility, Weakness, Etc.**  
Specially indicated in the Anæmias of Pregnancy  
*Available from all Chemists and from*  
**WILFRED PEREIRA LTD.**  
QUALIFIED CHEMISTS  
**Madras and Branches.**



## HANDY HOME ENEMA

A Product of unusual effectiveness and convenience for relieving constipation.

A Glycerine Enema in a handy single-application syringe.

### Special Features.

Highest grade glycerine is used; guaranteed to keep indefinitely without loss of effectiveness.

Receptacle is inflammable; can be burnt after use—an important point especially in cases of contagious diseases.

Receptacle itself serves as enema syringe, simplifying use even in inexperienced hands. Grease tip ensures an easy and harmless entry.

Finger-tip pressure on bulb gives even and thorough distribution of the glycerine.

**A Boon to Doctors, Nurses and Mothers.**

*For Stock please apply to*

**GOLDWIN & CO.,**

*Manufacturers' Representatives,*

7, Singanna Naick Street, :: :: G. T., MADRAS.

## EDITORIAL NOTICE.

The Madras Medical Journal is issued quarterly, in January, April, July and October about 20th of the month. All Editorial communications, reports, books for review and exchange should ordinarily reach the Editor, The Madras Medical Journal, Dept. of Pharmacology, Medical College, Madras, one month prior to the date of issue of the Journal, preferably earlier. Original articles, clinical lectures, case reports, abstracts, Medical Society addresses are invited. Contributors of original articles will be supplied gratis with twenty reprints of papers, if applications for the same are received by the Editor along with the contributions.

## BUSINESS NOTICE.

### Subscription Rates.

To Members of the Madras Medical Service on payment of an Annual Membership fee of Rs. Five only—Free.

To non-Members including Medical Practitioners and others Rs. Three per annum, post free.

To *bona-fide* Medical Students—Rs. Two per annum post free.

Foreign 7 sh. 6d., post free.

### Rates of Advertisement.

|                               | One Page. | Half Page. | Quarter Page |
|-------------------------------|-----------|------------|--------------|
|                               | Rs.       | Rs.        | Rs.          |
| Single insertion              | 20        | 12         | 7            |
| Three insertions              | 40        | 24         | 14           |
| 4 insertions                  | 50        | 30         | 20           |
| 4 insertions (inside reading) | 60        | ...        | ...          |

Discount of 33½ per cent will be given if advertisements are inserted for 3 complete years.

All advertisement charges and subscription are payable in advance. Letters relating to the publication, sale and advertisement department should be addressed to:—

**Dr. J. C. DAVID,**

Joint Editor, The Madras Medical Journal,

'Kedleston' Ormes Road, Kilpauk, Madras.

Copies of the Journal can be obtained at twelve annas each from Messrs. Gordon & Co., Ltd., Printers, 768-770, Triplicane, Madras, or at the Editor's Office, Medical College, Madras. Changes of address and complaints of non-receipt of Journals should be immediately communicated to the Secretary, to the above address. Matter for advertisement should reach the Editorial Secretary, at least ten days before the date of issue of the Journal.

## THE MADRAS MEDICAL JOURNAL.

Vol. XIX.

JULY 1939.

No. 3.

## CONTENTS.

|                                                                                                                                                                          | PAGE |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. MYELOID LEUKÆMIA—A PRELIMINARY NOTE ON THE INCIDENCE, TYPES OF CASES, AND THE EFFECT OF RADIUM TREATMENT ON THE COURSE OF THE DISEASE.<br>By D. V. S. Reddy, M.B.B.S. | 169  |
| 2. LOBAR PNEUMONIA—A CLINICAL STUDY<br>By G. V. Satyanarayana Murti, M.D.                                                                                                | 182  |
| 3. SOME FACTS ABOUT THORACIC SURGERY<br>By R. Mahadevan, M.S. (Mad.), F.R.C.S. (Eng. & Edin.)                                                                            | 186  |
| 4. CLINICAL MEMORANDA.                                                                                                                                                   |      |
| (a) REPORT ON A CASE OF MULTIPLE BONY LESIONS OF TERTIARY YAWS.<br>By S. Balasubrahmaniam, M.B.B.S.                                                                      | 197  |
| (b) LYMPHANGIOMA CHEEK—TREATED WITH INJECTIONS OF SCLEROSING FLUID.<br>By C. Raghavachary, F.R.C.S.E.                                                                    | 200  |
| (c) THREE CASES OF PROLAPSE RECTUM TREATED BY LOCKHART MUMMERY'S RECTOPEXY.<br>By C. Raghavachary, F.R.C.S.E.                                                            | 200  |
| (d) A CASE OF OBSTRUCTIVE APPENDICITIS.<br>By C. Raghavachary, F.R.C.S.E.                                                                                                | 201  |
| (e) A CASE OF ACTINOMYCOSIS OF LIVER.<br>By C. Raghavachary, F.R.C.S.E.                                                                                                  | 202  |
| (f) A CASE OF LUNG ABSCESS                                                                                                                                               | 203  |
| (g) A CASE OF CARDIOSPASM                                                                                                                                                | 204  |
| 5. MEDICAL RESEARCH IN INDIA—EPIDEMIC DROPSY THEORY—STUDIES IN CHOLERA—PROBLEM OF RURAL MALARIA                                                                          | 207  |
| 6. ABSTRACTS FROM CURRENT MEDICAL LITERATURE                                                                                                                             | 211  |
| 7. SERVICE NOTES                                                                                                                                                         | 234  |

The  
**Madras Medical Journal.**

The Journal of the Madras Medical Association.

PUBLISHED QUARTERLY.

|           |            |        |
|-----------|------------|--------|
| Vol. XIX. | JULY 1939. | No. 3. |
|-----------|------------|--------|

**Myeloid Leukaemia.**

**A PRELIMINARY NOTE ON THE INCIDENCE, TYPES OF  
CASES, AND THE EFFECT OF RADIUM TREATMENT  
ON THE COURSE OF THE DISEASE.**

BY D. V. S. REDDY, M.B.B.S.,

*King George Hospital, Vizagapatam.*

Leukæmia is regarded as one of the most uncommon diseases of South India. There is not even a column or heading for leukæmia in the statement D (the standard form for returns, showing diseases of patients treated in the medical institutions of the Madras Presidency) while provision is made for the collection of statistics, not only of anæmias but also of cases of scurvy and rickets. Except for an occasional reference to cases of splenomedullary leukæmia, even the annual reports of the premier institution of this Presidency

give figures only for all "blood diseases" put together, with no separate statistics for myeloid leukæmias. Hence, any attempt to generalise on the incidence of splenomedullary leukæmia in South India is altogether impossible at present.

**Incidence at Vizagapatam.**

A general impression of the approximate incidence around Vizagapatam may, however, be gathered from an examination of the available records of the medical wards of the King George Hospital.

TABLE I.

| Year.                  | Men. | Women. | Total No. of Cases. | Total admissions on the medical side. |
|------------------------|------|--------|---------------------|---------------------------------------|
| 1927                   | 2    | —      | 2                   | 1,150                                 |
| 1928                   | 4    | —      | 4                   | 1,636                                 |
| 1929                   | 1    | 2      | 3                   | 1,622                                 |
| 1930                   | —    | 2      | 2                   | 1,845                                 |
| 1931                   | 2    | 1      | 3                   | 2,437                                 |
| 1932                   | 5    | 5      | 10                  | 1,275                                 |
| 1933                   | 5    | 1      | 6                   | 1,773                                 |
| 1934                   | 4    | 2      | 6                   | 1,532                                 |
| 1935                   | 4    | 1      | 5                   | 1,763                                 |
| 1936                   | 7    | 4      | 11                  | 1,764                                 |
| 1937                   | 7    | 1      | 8                   | 2,011                                 |
| 1938                   | 5    | —      | 5                   | 2,127                                 |
| Total for 12 years ... | 46   | 19     | 65                  | 21,935                                |

A word may be added in explanation of the table. Eleven patients suffering from leukæmia sought admission on more than one occasion, sometimes more than once in the course of the same year but generally during different years, as the symptoms caused increasing discomfort and anxiety to the patient. In compiling these figures, all admissions of the same patient in the same calendar year are grouped together as one admission while the admissions during different years are counted as separate admissions. The actual number of persons diagnosed and treated as leukæmias, during the 12 years period was 55. As the

total admissions on the medical side approximate to 22,000 the percentage of incidence of splenomedullary leukæmia in hospital practice may be roughly given as 0.25 to 0.3 per cent of the total admissions on the medical side. Perhaps it may be even less than this percentage as cases are also sent to medical wards from other departments where they are first seen and suspected to be myeloid leukæmia.

During the same period (1927-1938) lymphatic leukæmia was even rarer. There were only seven cases of the lymphatic type, six among males and one among females.

TABLE II.  
Age at First Admission.

| Age groups.                  | Men. | Women. | Total. |
|------------------------------|------|--------|--------|
| Below 9 years ...            | 1    | —      | 1      |
| Between 10 and 19 years. ... | 2    | 2      | 4      |
| " 20 " 29 " ...              | 14   | 2      | 16     |
| " 30 " 39 " ...              | 17   | 7      | 24     |
| " 40 " 49 " ...              | 4    | 2      | 6      |
| Fifty years and above        | 3    | 1      | 4      |
|                              | 41   | 14     | 55     |

Sex

TABLE IV.

Duration of the presenting Symptoms in Forty Cases.

| Age period        | No. of Cases |
|-------------------|--------------|
| Less than 15 days | 1 (No. 34).  |
| 1 to 3 months.    | 7            |
| 4 to 6 "          | 14           |
| 7 to 12 "         | 4            |
| 13 to 18 "        | 8            |
| 11 to 36 "        | 2            |
| Over three years. | 3            |
| Over four years.  | 1 (No. 19).  |

Though the figures 41 and 14 for males and females respectively suggest that the ratio is roughly 3 : 1 there are many other points to be borne in mind in this connection. Firstly, the total attendance of the females on the medical side is considerably less than that of males, secondly the number of admissions of females as inpatients is only one-third of the admissions on male side.

Predominating Symptoms.

TABLE III.

An Analysis of the Predominant Presenting Complaint in the Fifty-five Cases of Myeloid Leukæmia.

|                               |          |
|-------------------------------|----------|
| Tumour abdomen                | 41 cases |
| Breathlessness                | 4 "      |
| Pain and heaviness in abdomen | 4 "      |
| Fever                         | 4 "      |
| Dysentery                     | 1 case   |
| Weakness                      | 1 "      |

Five patients gave definite history of fever for varying intervals, before the first appearance of the tumour. Four other patients complained of fever concurrently with the tumour. One patient sought admission for fever but also complained of breathlessness. while another patient gave, as a subsidiary symptom, dysentery.

A larger percentage of cases gave on their first admission, a history of having suffered from the presenting symptoms, usually for four to six months. Only one case reported within 15 days of the appearance of the symptom. Three patients stated that they had the tumour in the abdomen for three years. Only one patient said the duration of his complaint was four years. In a significant number of cases, the appearance of the tumour in the abdomen was preceded or accompanied by attacks of fever with chills and rigors. The earliest case, however, gave as the main symptoms, fever and breathlessness for 15 days only but had the spleen was enlarged 3" from the costal margin in midclavicular line. Correct data with regard to the duration and course of the diseases can be gathered only from the few patients, who came to the hospital during successive years.

Effect of Radium Treatment on the Course of the Disease.

Out of the 35 cases, that were admitted into the hospital only once, two died on the day of

admission. Case No. 18 was admitted in a grave condition and died in a few hours, while case No. 32 admitted with fits expired within two hours, without regaining consciousness. An appreciable number were discharged relieved, even after simple hospitalisation, oral administration of Arsenic and X-ray exposures.

Of the 12 cases, that were in the hospital only once and were treated with radium, a large majority were considerably improved both clinically and haematologically, while a few cases were observed to have derived only slight benefit. No case in this group died during the stay in the hospital nor was any case discharged in a grave condition. Practically all these patients walked out of the hospital but their subsequent history is not available.

Of the other eight cases, treated once or more and followed up for varying periods, two died in the hospital, one a few months after the application of radium and another nearly one year after radium treatment, both probably due to intercurrent infections.

Of the rest, two patients died within a month after discharge from hospital. One of them had lived for nearly five years from the date of his first coming to the hospital while the other patient lived for nearly three years, after reporting at the hospital.

There is ground for believing that two cases (No. 1 and No. 2) must have died, as they would have turned up at the hospital

for relief, if they were still alive. One of them was under observation and treatment for six years (1931 to 1936).

Of the remaining two, one patient, who came to the hospital first in 1937, returned for the radium treatment in February 1939, and was considerably improved and discharged. It may be definitely stated that he is living and able to get on with his routine work as a result of the two applications of radium.

It may therefore be concluded that in suitable cases, seen sufficiently early, radium application will be helpful in relieving the symptoms in the first few years of the disease and may prolong the life of patient by one to three years. In the acute varieties and in cases of more than two to three years' duration, the benefit would seem to be slight and temporary.

Attention to general health and protection of the patient from intercurrent infections, seem to be of paramount importance, even during and after the courses of radium treatment. Since human ingenuity has not succeeded in finding an infallible weapon to root out this disease, it behoves the profession to make the life of the afflicted less miserable to himself and perhaps more useful to society and to attempt to extend the life of the individual by two or three years, both in the interests of the individual and the country.

Though it would be more instructive to peruse the complete

### Myeloid Leukæmia

case sheets of these leukæmia patients, such an attempt has to be abandoned for want of space. Only the briefest summary consisting of the most salient points will be included in the following synopsis of cases:—

#### GROUP I

(Cases diagnosed as Spleno-Medullary Leukæmia but not treated with Radium).

1. Y., Hindu, Male, 28. Admitted for swelling of abdomen for one year. History of having suffered from fever for two years previously. Spleen enlarged considerably, projecting 2" to the right beyond the middle line and nearly to 1" below the umbilicus. W. B. C. 306,000. Myelocytes 60 per cent. Treatment with liq. arsenicalis and X-ray exposures. Condition at the time of discharge:— Spleen reduced 2"; W. B. C. 280,000. Myelocytes 50 per cent.

2. R., Hindu, Male, 30. Swelling of abdomen, five months. Spleen enlarged to 1" beyond middle line and to 1" below umbilicus. W. B. C. 459,500. Treatment same as above.

3. P., Hindu, Male, 32. Tumour abdomen. Spleen reaching down to Poupart's ligament. W. B. C. count was not done. But the film showed myeloblasts and myelocytes in large numbers. Also megaloblasts. Patient was also having fever and was discharged at request.

4. P., Hindu, Male, 30. Tumour abdomen for nine months. Spleen enlarged to 6" below the costal

margin in the midclavicular line. Film showed the presence of abnormally large number of premature white cells.

5. V., Hindu, Male, 20. Swelling on the left side for one year. History of fever for a fortnight, about a year previously. Spleen projecting  $\frac{1}{2}$ " beyond the middle line. W. B. C. 384,200. Myelocytes 42 per cent. Treatment: Liq. arsenicalis and X rays.

6. V., Hindu, Male, 50. Swelling of abdomen for one year. Spleen enlarged 5" below the costal margin in midclavicular line. Blood film showed abnormally large number of premature white cells, characteristic of myeloid leukæmia.

7. Hindu, Female, 50. Swelling of abdomen, eight months. History of fever for about a year before the swelling was noticed. The fever came on alternate days, with chills and rigors. Spleen enlarged down to the Poupart's ligament. W. B. C. 347,500; film showed typical myeloid picture. Treatment X-rays.

8. S., Hindu, Female, 28. Tumour abdomen, four months; had fever with chills for a month about two years previously. Spleen projecting 6" below the costal margin in midclavicular line. W. B. C. 394,400.

9. P., Hindu, Female, 25. Tumour in abdomen, two months. History of fever with chills for two months. Spleen enlarged to a level  $1\frac{1}{2}$ " below umbilicus. W. B. C. 353,125. Blood picture typical of

myeloid leukaemia. Treatment with Liquoris Arsenicalis. Discharged at request.

10. K., Hindu, Female, 14. Swelling of abdomen, three years; also fever for two months. Spleen fills whole of abdomen on the left side and projects 4" to the right of midline and as far as 2" above symphysis pubis. W. B. C. count 300,000.

11. S., Hindu, Female, 45. Swelling of abdomen, six months. Spleen extending 3" beyond midline and 3" below umbilicus. W. B. C. 180,000. Treatment nil.

12. Ch., Male, 50. Tumour abdomen, three years; also fever. Spleen enlarged to 2" to the right of middle line and to 1" below umbilicus 7" from costal margin in midclavicular line. W. B. C. 412,500. Treatment nil.

13. T. S., Hindu, Male, 82. Tumour abdomen, two months. Spleen enlarged to 2" to the right of middle line and to 1" below umbilicus. W. B. C. 112,400. Myelocytes 56 per cent.

14. M., Hindu, Male, 20. Complaint: Swelling of abdomen for five months. Spleen enlarged to 6" below the costal margin in the midclavicular line and to 1½" right of the middle line. W. B. C. 121,250; myelocytes 32 per cent. Patient was having fever and was discharged at request.

15. S., Hindu, Female, 30. Enlarged spleen and fever, one year. Spleen markedly enlarged crosses the middle line and extends downwards into the left iliac fossa. W.B.C. 238,000.

16. A., Hindu, Female, 30. Swelling of the left side of the abdomen. Spleen enlarged markedly. W.B.C. 50,000. (Admitted in July, 1932, with a history that she had been admitted in the hospital two months earlier and treated with radium. But the previous case sheet cannot be traced.)

17. P., Hindu, Female, 40. Spleen occupied the whole of the left side 9" in the midclavicular line. W.B.C. 136,000; myelocytes 50 per cent. Discharged otherwise.

18. L., Hindu, Male, 43. Admitted in 1933 in a grave condition; spleen much enlarged. Blood film characteristic of myeloid leukaemia. Patient died a few hours after admission.

19. V., Hindu, Male, 25. Was admitted in February 1933 for frequency of motions. Duration one week. Routine examination discovered that spleen was enlarged up to anterior iliac spine and W.B.C. count was 447,000. Patient was discharged when he was relieved of his diarrhoea. He came again in April, this time for swelling of abdomen for four years, the spleen was of the same size as before and the W.B.C. count was 351,000. In July of the same year, he again sought admission. Physical findings same as before. W.B.C. 420,000. He was discharged at request.

20. B., Hindu, Male, 33. Breathlessness and swelling for five months. Spleen enlarged up to inguinal ligament W.B.C. 298,730. Discharged otherwise.

21. B.C.R., Hindu, Male child, 8. Complaint: Hard mass in the left side of the chest for six months. Spleen was enlarged markedly; lower pole reaching as far as 4" above symphysis pubis. W.B.C. 423,000; myelocytes 38.8 per cent.

22. Male, M.M. S., 25. Swelling of abdomen, six months. Spleen enlarged 2" to the right of midline and 4" below the level of umbilicus. W.B.C. 201,800.

23. A., Hindu, Female, 35. Swelling of abdomen, six months. Spleen enlarged as far as the level of the iliac crest. W. B. C. counts increased. (Actual figures not recorded.)

24. S., Hindu, Male, 30. Tumour abdomen, six months. Spleen enlarged to 1" to the right of umbilicus and reaching to a level 1" above the inguinal ligament. W.B.C. 290,400; myelocytes 30 per cent.

25. N. V., Hindu, Male, 40. Pain and heaviness in abdomen for two years. Spleen enlarged up to a level of 3" from inguinal ligament. W.B.C. 107,400; myelocytes 21 per cent.

26. R., Hindu, Male, 50. Swelling of abdomen, four months. Spleen enlarged 4" from the costal margin in midclavicular line. W.B.C. 80,000.

27. Ch., Hindu, Male, 30. Swelling of the hypochondrium, 11 months. Spleen enlarged to 1" to the right of umbilicus and 2" below the umbilicus. W.B.C. 130,000.

28. G.S., Hindu, Male, 35. Mass in abdomen, five months. Spleen enlarged markedly. W.B.C. 110,000.

29. K.P., Hindu, Male, 12. Fever and swelling of abdomen for 8 months. Spleen reaches to the level of the crest of the ileum. W.B.C. 450,000.

30. J., Hindu, Male, 45. Weakness for three months. Spleen enlarged to 1" below costal margin in midclavicular line. W.B.C. 17,800. But blood film showed definite increase of myelocytes.

31. M. M., Mohamedan, Male, 25. Swelling of abdomen, six months. Spleen occupied the whole of the left side of the abdomen, extending into the iliac fossa. W.B.C. 70,000.

32. K. S., Hindu, Male, 20. Breathlessness; came first in July, 1937. Spleen enlarged 6" in midclavicular line; W.B.C. 185,000. Was advised to come later for radium treatment. Readmitted in November. Spleen enlarged markedly downwards as far as a point 1" from symphysis pubis. W.B.C. count 201,875; myelocytes 53 per cent. The patient developed fits soon after admission and died.

33. D.P., Hindu, Male, 40. Came into hospital on two occasions in 1938. First for tumour abdomen of three months' duration. Spleen was enlarged to a level 1" below the umbilicus. W.B.C. 260,000. Second time, the complaint was given as pain in the left hypochondrium for six months. He gave a history of fever with chills

for one year before the appearance of the mass. Spleen was enlarged  $\frac{1}{2}$ " to the right of midline and  $5\frac{1}{2}$ " in midclavicular line. W.B.C. 166,000.

34. M. A., Hindu, Male, 32. Fever and breathlessness for 15 days. Spleen enlarged 3" from costal margin in midclavicular line. W.B.C. 70,000; myelocytes 55 per cent.

35. S. A., Hindu, Male, 27. Tumour in abdomen for two years. Spleen extended as far as a point 1" above symphysis pubis. W.B.C. 130,000.

#### GROUP II.

(Cases treated with only one application of radium but whose subsequent history and progress is not known.)

1. B., Hindu, Male, 52. Admitted in 1932 for tumour abdomen; duration two months. Spleen markedly enlarged, reaching up to middle line and as far down as anterior superior iliac spine. W.B.C. 175,000; myelocytes 47 per cent. Treated with radium, 26 mgms. in a pad applied over the splenic area. Total mgm. hours 1,872. No details are available about the result of treatment.

2. M., Hindu, Female, 30. Admitted in 1932 for breathlessness and pain in the abdomen. Spleen enlarged 8" from the costal margin in midclavicular line. W.B.C. 123,000. Treated with radium 35 mgm. Total mgm. hours 3,120. W.B.C. count came down only slightly, i.e., 112,000.

3. R., Hindu, Male, 30. Admitted in 1932 for swelling of the abdomen; duration four months. Spleen enlarged as far down as superior iliac spine. W.B.C. count. 240,000. Radium 26 mgm. applied in a pad. Total mgm. hours 5,278. Result of treatment not available.

4. S., Hindu, Female, 30. Admitted and discharged in the early part of 1932. Readmitted later for radium treatment. Spleen enlarged  $6\frac{1}{2}$ " in midclavicular line. W.B.C. 366,000. 36 mgm. of radium. Total mgm. hours 4,320.

5. S., Hindu, Male, 25. Complaint: fever with rigors and dysentery for four months. Spleen enlarged to  $\frac{1}{2}$ " below the level of umbilicus in the midclavicular line. W.B.C. 154,000. myelocytes 50 per cent. Treated with 25 mgm. of radium. Total mgm. hours 4,800. After the treatment, spleen was reduced in size by about  $\frac{1}{2}$ " and the W.B.C. came down to 63,750.

6. P. P., Hindu, Female, 33. Pain in the abdomen for one year. Spleen enlarged projecting  $2\frac{1}{2}$ " to the right of midline and as far as 2" from iliac crest. W.B.C. 320,000. 26 mgm. of radium applied. Total mgm. hours 4,992. After treatment, there was no diminution in the size of spleen but the W.B.C. count was reduced to 35,940.

7. V. R., Hindu, Male, 26. Fever for three months. Spleen markedly enlarged. W.B.C. 135,000. 40 mgm. of radium applied. Total mgm. hours 7,680. As a result of treatment, the spleen

was not reduced in size but the W.B.C. count was diminished to 10,600.

8. A. L., Mahomedan, Male, 35. Swelling of abdomen for one year. Spleen enlarged 7" below costal margin in midclavicular line. W.B.C. 313,000. 36 mgm. of radium applied in a pad. Total mgm. hours 5,184. After treatment, spleen was definitely reduced in size and W.B.C. count was 47,000.

9. E., Hindu, Female, 30. Swelling of abdomen for one year. Spleen was enlarged up to a point 1" from anterior iliac spine. W.B.C. 662,000. 45 mgm. of radium applied. Total mgm. hours 6,720. Result of treatment was that while the spleen was reduced only slightly, the W.B.C. count went down to 123,125.

10. N., Hindu, Female, 35. Swelling of abdomen for nearly one year. Spleen enlarged 9" from costal margin in midclavicular line. W.B.C. 199,000. 45 mgm. of radium applied. Total mgm. hours 5,265. Spleen was not much altered in size but W.B.C. count fell to 98,000 and later reached 22,000.

11. B.S., Hindu, Male, 35. Heaviness in abdomen and tumour; spleen enlarged  $6\frac{1}{2}$ " from costal margin in midclavicular line and extending beyond midline for  $1\frac{1}{2}$ ". W.B.C. 55,350; myelocytes 34 per cent. After treatment, W.B.C. count was 14,600.

12. S.A., Hindu, Male, 35. Swelling of abdomen for three years. Spleen enlarged 7" in midclavi-

cular line. W.B.C. 160,000. 40 mgm. of radium applied. Total mgm. hours 2,760; after treatment spleen reduced by 1" and W.B.C. count fell to 19,000.

#### GROUP III.

(Cases of Myeloid Leukæmia, treated with Radium application once or more, and subsequently kept under observation or followed up, for varying intervals of time.)

THULASAMMA, Hindu, Female, 12. Brought to the hospital for the first time on 4th December 1931 for swelling of the abdomen for six months. Spleen was enlarged  $6\frac{1}{2}$ " from the costal margin in the midclavicular line. W.B.C. count 505,000. 30 mgm. of radium was applied. Total mgm. hours 4,900. After treatment the spleen was reduced in size  $3\frac{1}{2}$ " in the midclavicular line and W.B.C. count came down to 11,000. General condition was good.

Admitted a second time on 20th February 1934 with history of tumour in the abdomen for three years. Patient reported that after the radium treatment in 1931, she was almost all right for about two years. Spleen enlarged 6" in the midclavicular line. W.B.C. 372,000. Radium 40 mgm. Total mgm. hours 1,720. After treatment, W.B.C. count was 61,400.

Admitted on 27th April 1936. Tumour abdomen for six years. Spleen markedly enlarged 10" in the midclavicular line. W.B.C. 201,250. Myelocytes 36 mgm. of

radium applied. Total mgm. hours, 5,184. Result of treatment: spleen not much reduced. But W.B.C. came down to 10,300.

Admitted fourth time in October 1936. History: Tumour in the abdomen for five years. Spleen enlarged down to anterior iliac spine. W.B.C. 296,600. Patient was treated with injections of arsenic (Hypercytol) W.B.C. came down to 115,000 but there was no alteration in the size of the spleen.

2. VENKANNA, Hindu, Male, 25. Admitted first in June 1932 with the complaint of breathlessness after meals during the previous six months. Spleen enlarged about 6" in the midclavicular line below the costal margin and right border projecting to the right of the umbilicus. W.B.C. count 440,000. Myelocytes 34 per cent. 36 mgm. of radium was applied. Total mgm. hours 6,812. Spleen was reduced 1" in the vertical and  $1\frac{1}{4}$ " in the horizontal axis. W.B.C. count came down to 12,500.

Patient came again in February 1933. He gave a statement that he felt better for nearly six months after the first application. This time the complaint given was tumour in the abdomen since one year. Spleen was enlarged about 4" below the costal margin in the midclavicular line. W.B.C. count was 97,200. 35 mgm. of radium was applied in three short sittings, in the course of a week. Total mgm. hours 4,130 (77+840+2,520). The W.B.C. count came down to 36,560.

The third and the last occasion the patient was seen in the hospital was August-September 1933. The complaint was having weakness and breathlessness for one year and eight months. Spleen was enlarged to  $\frac{1}{2}$ " below the level of umbilicus and 1" to the left of it. W.B.C. count 78,125. Myelocytes 37 per cent. 40 mgm. of radium was applied. Total mgm. hours 2,880. This time application of radium did not result in any appreciable reduction of the size of the spleen. But the W.B.C. count was reduced to 38,750. After every one of these radium treatments the patient felt relieved and better in health.

3. VEERA REDDY, Hindu, Male, 33. First admitted on 9th August 1932. Patient came for swelling of the scrotum and abdomen. Spleen was enlarged down to the level of the umbilicus. W.B.C. count 356,700. Myelocytes 35 per cent. 40 mgm. of radium applied. Total mgm. hours 4,800. Spleen was reduced about 1" in the midclavicular line. W.B.C. count came down to 16,500.

Second admission on 11th December 1934. The complaint was fever for six months and swelling pain in abdomen for four years. He also stated that, for nearly over a year after the radium treatment, he was much better. About six months previous to the date of second admission, he began to have fever and the spleen also increased in size. The spleen was enlarged up to the level of the umbilicus and was just crossing the middle line.

W.B.C. count 116,200. Blood film showed B.T. parasites. Patient was treated with quinine and was cured. He went away on 22nd January 1935 without staying for further treatment.

Patient came for the third time on 7th March 1935. This time the complaint was tumour in abdomen. Spleen was enlarged 5" in midclavicular line. W.B.C. count was 222,500. 40 mgm. of radium applied. Total mgm. hours 4,560. W.B.C. count after treatment was reduced to 42,500.

For the fourth time he sought admission in April 1937 with the complaint of swelling of the left side of the abdomen. The patient had consolidation of lung of the left side. Spleen was enlarged to 7" beyond the costal margin in the midclavicular line and 1" to the right of the middle line of the abdomen. W.B.C. count 244,600. 41 mgm. of radium were applied. Total mgm. hours 6,248. After the treatment spleen was reduced only  $\frac{1}{2}$ " in the midclavicular line. But the W.B.C. count was definitely decreased to 58,800. But the general condition of the patient was getting progressively worse. Patient refused to stay in the hospital and was discharged in June (first week). Three months later in reply to our follow up post card intimation was sent that the patient had died a few days after he was discharged from the hospital.

4. SATYAVATI, Hindu, Female, 33. Admitted first on 25th May 1935 with a history of

swelling of abdomen. Spleen enlarged 7" in the midclavicular line below the costal margin. W.B.C. 242,800. 43 mgm. of radium applied. Total mgm. hours 5,160. After this treatment there was only a slight reduction in the size of spleen. W.B.C. count came down to 46,250. Patient felt relieved and was discharged.

She sought admission again next year (June 1936). This time complaint was recorded as swelling of abdomen for one year. Spleen was enlarged 4" below the costal margin in the midclavicular line. W.B.C. count. 64,000. 45 mgm. of radium was applied for short while. Total mgm. hours 790. Patient gradually felt improved in health.

In 1937 she again sought admission. Her health was very poor. She had a rapid pulse and was extremely weak. Spleen was 6 $\frac{1}{2}$ " in the midclavicular line below the costal margin and projected  $\frac{1}{2}$ " to the right of the middle line. W.B.C. count was 72,000. 30 mgm. of radium was applied. Total mgm. hours 2,805. The W.B.C. count came down to 31,000 after the radium application. Spleen was not altered in size. Her general condition gradually became worse and worse and she died about the close of 1937.

V. KURMAYYA, Hindu, Male, 35. Admitted first in January 1936 for tumour abdomen for eight months. Spleen enlarged to a point  $\frac{1}{2}$ " from the anterior superior iliac spine and  $8\frac{1}{2}$ " from costal margin in midclavicular

line, with the right border extending  $\frac{1}{2}$ " beyond midline. W.B.C. count was 240,000. Patient was treated with liquor arsenic and sent away.

He came again in June, the same year. Size of the spleen 8" below costal margin in mid-clavicular line. W.B.C. count 350,000. 45 mgm. of radium were applied in two sittings. First 45 mgm. of radium was applied. Total mgm. hours 4,680. At the second sitting 40 mgm. applied. Total mgm. hours 2,866. Total of the two sittings 7,546 mgm. hours. W.B.C. came down to 65,000. Patient was then given injections of hypercytol. W.B.C. count was still further decreased to 40,000.

He came to the hospital again on 1st September 1936 and was discharged on 15th September 1936 after a course of injections of hypercytol. This time on admission the patient had spleen enlarged 6" in the midclavicular line and W.B.C. was 36,560.

He came again on 30th October 1936. Spleen was enlarged as before. W.B.C. count was 30,200. He was given a course of hypercytol injections. But there was no decrease in the size of spleen or reduction in W.B.C. count. The blood film however showed a marked increase in the polymorpho and a considerable reduction in myelocytes and the general condition of the patient was quite good.

He came again on 16th May 1937. Spleen still 9 $\frac{1}{2}$ " below costal margin in midclavicular

line. W. B. C. 200,000. 44 mgm. of radium was applied. Total mgm. hours 6,336. After treatment, spleen was 6 $\frac{1}{2}$ " in the mid-clavicular line and W.B.C. 37,600. He was discharged on 28th June 1937 and was in good health at that time.

Readmitted in July 1937. Spleen same size as before. W.B.C. 62,000. Myelocytes 27 per cent. Patient was treated with arsenic by mouth and was discharged in a satisfactory state of health on 13th August 1937. The patient has not reported again at the hospital.

6. V. SITARAMIAH, Hindu, Male, 35. Admitted for the first time into hospital on 2nd July 1936 for swelling of the abdomen for 11 months. Spleen enlarged about 5" in the mid-clavicular line. W.B.C. 240,000. 40 mgm. of radium applied. Total mgm. hours 4,800. As a result of radium treatment, W.B.C. came down to 71,600.

Admitted second time on 29th July 1936. Was given injection of hypercytol. W.B.C. count on admission 33,640. In a fortnight W.B.C. count reached 10,200. Spleen shrank in size and was noted to be only 1" below costal margin. Patient was discharged at request on 24th August 1936.

Was readmitted on 26th August 1936 in an unconscious state with a temperature of 103° for one day. Blood pressure 105/45. Pneumonic consolidation of right lung. Blood film showed no malarial parasite. Patient

continued to be in the same unconscious state and died next day.

7. PURUSHOTHAM, admitted on 15th August 1936 with pain in the abdomen for one month. Spleen 8" in midclavicular line. W.B.C. 320,000. 35 mgm. of radium applied. Total mgm. hours 5,014. After radium spleen was only 5" beyond costal margin in midclavicular line and W.B.C. count was 78,000.

Admitted again in 1938, with tumour abdomen and bacillary dysentery. The spleen extended as far as the iliac crest. W.B.C. 649,000. Patient was treated for dysentery. But his condition became gradually worse. Discharged at request of the patient and relatives. He died a few days later.

8. SIMHADRI, Hindu. Male, 35. Admitted on 3rd September 1937 for heaviness and

tumour in abdomen for three years. History of fever two months about four years earlier. Spleen enlarged 6 $\frac{1}{2}$ " beyond costal margin in midclavicular line and 1 $\frac{1}{2}$ " to the right of middle line. 41 mgm. of radium applied. Total mgm. hours 5,822. After treatment W.B.C. came down to 14,680 and spleen reduced in size to 4 $\frac{1}{2}$  in midclavicular line and the medial border 2" to the left of middle line.

Second admission on 10th February 1939. Spleen enlarged nearly 7" in midclavicular line almost reaching iliac crest. W.B.C. 119,250. Myelocytes 41 per cent. 40 mgm. of radium applied for 2,760. After treatment, the W.B.C. came down to 40,000 and later to 12,500. Spleen gradually decreased in size and at the time of discharge on 3rd April 1939 was only extending 2 $\frac{1}{2}$ " from costal margin in midclavicular line.

## Lobar Pneumonia—A Clinical Study

By G. V. SATYANARAYANA MURTI, M.D.,

Medical Registrar, King George Hospital, Vizagapatam.

Great strides have been made in our knowledge of the pathology, prognosis and treatment of pneumonia in recent years. The barriers between pneumonia and bronchopneumonia have been broken down and the importance of the infective organism in assessing the prognosis and not the extent of the involvement of the lung has been stressed. This has led to an intensive study of the causal organism with the result that the various types of pneumococci and their respective virulence have been established. The comparatively restricted use of serum in the treatment of pneumonia—there being an anti-serum potent enough to be therapeutically useful against Type I only—has led to intense research for a drug which will have a chemotherapeutic action on all the types of pneumococci. This search has resulted in the discovery of M. & B. 693. The results obtained by the use of this drug have been so pronounced in selected cases, that there is a danger of its being used indiscriminately in the treatment of pneumonia to the neglect of other proved methods of treatment. In the light of these recent researches a clinical study of pneumonia comprising a large series of cases treated by the older method is thought to be opportune to evaluate the success or failure

of the old lines of treatment and to stress the value of the new drugs and the indications of their use. With this object in view an analysis of 106 cases of pneumonia treated in the medical wards of King George Hospital is attempted in this article.

**Incidence.**—During the three years 1935, 1936 and 1937, 106 cases of lobar pneumonia were diagnosed on the medical side of the King George Hospital, Vizagapatam, in a total number of admissions of 5,528. This gives us an incidence rate of 1.92 per cent, a rate far below any clinic in a cold climate.

**Seasonal Incidence.**—The months of March and December claim the highest rate of incidence, 15 per cent of the total number of cases occurring in each of these months. A study of the seasonal variation of the incidence of pneumonia will throw some light on mortality.

**Age and Sex Incidence in Relation to Mortality.**—In these 106 cases, there were 87 men, 16 women and three children. During the first decade there were three cases, in the second decade 18 men and one woman, in the third decade 35 men and seven women, in the fourth decade 14 men and three women, and in the fifth decade 20 men and

## Lobar Pneumonia—A Clinical Study

183

five women. Thus the incidence was the greatest in the third decade being over 40 per cent in both the sexes. The mortality rate was nil in the first two decades while it is 24 per cent, 20 per cent, 15 per cent, and 28 per cent in the third, fourth fifth decades and subsequently.

**Mortality in Relation to the extent of Lung Involvement.**—In 57 or 54 per cent of the cases the right lung was involved with a mortality of 21 per cent, but allowing for five moribund cases the mortality rate was 12 per cent.

In 29 or 27 per cent of the cases the left lung was involved with a mortality of 17 per cent, but allowing for two moribund cases the mortality rate was 13.5 per cent.

In 20 or 19 per cent of the cases both the lungs were involved with a mortality of 70 per cent, but allowing for six moribund cases the mortality rate was 40 per cent.

Thus when only one side was involved the mortality was about 12 per cent while, when both the lungs were involved, the mortality rate was over threefold.

**Mortality in Relation to the Day of Illness on Admission.**—31 died out of the 106 admissions, giving a gross mortality rate of 29.2 per cent. However 13 cases were admitted moribund and were dead within 48 hours after admission and gave no chance whatsoever for the treatment. Discounting these moribund cases the corrected mortality was 19.4

per cent which compares favourably with the mortality rate of 24 per cent at Salford, England.

The relation of mortality to the day of illness on admission is more interesting and merits our close scrutiny. Excluding the moribund cases the analysis is as follows:—

During the first three days only 11 cases or 11.8 per cent reported for admission and of them one died giving a mortality rate of 9 per cent, and even in this one case the causative organism was streptococcus hæmolyticus.

On the fourth day of illness 14 cases or 15 per cent reported with a mortality rate of 14 per cent.

On the fifth day of illness six cases or 6.4 per cent reported with a mortality rate of 33 per cent.

On the sixth day of illness seven cases or 7.5 per cent reported with a mortality rate of 43 per cent.

On the seventh day of illness 20 cases or 21 per cent reported with a mortality rate of 15 per cent.

On the eighth day of illness 11 per cent reported with a mortality rate of 40 per cent.

After ten days from the commencement of the illness, due presumably for complications, 25 cases or 27 per cent reported with a mortality of 12 per cent.

*Discussion.*

In discussing the problem of pneumonia it must be emphasized at the outset that the treatment of pneumonia in South India does not present the same formidable problems as in the cold climates and so the treatment here must follow different lines. The routine treatment followed in this hospital is as follows:—Complete rest. The patient is not allowed to do anything for himself. Diet consists mostly of milk and glucose A. & D. in large quantities. After the preliminary examination and diagnosis attention is paid to the condition of the heart and not to the state of the lung. The condition of the heart is judged by the daily blood pressure reading, pulse rate and auscultation of the mitral first sound and the pulmonary second sound. Any rise of the pulse rate over the systolic blood pressure in millimetres is taken as an indication of commencing cardiac decompensation and it is treated by intra-muscular injections of cardiazol or coramine in preference to digitalis and oral administration of 2 oz. of brandy with glucose during the 24 hours. A watch is kept on the sleep. Restlessness or insomnia is treated with Bromide and chloral hydras. Pyrexia is controlled by hydrotherapy. In young and the old cataplasma or antiphlogistine is applied six-hourly to the affected part. In case of any respiratory embarrassment continuous oxygen inhalation is ordered.

In the treatment of any cases of pneumonia nature is on our side and provided the treatment is

undertaken on the first day with rest and proper nursing the chances of recovery are nearly cent per cent. This is well brought out by the above study. Out of the 11 cases which came under treatment during the first three days only one died and this was supposed to be a case of streptococcal pneumonia. The mortality rate steadily mounts up as the hospitalisation is postponed. Each day's delay makes the success more remote.

The second important factor influencing the prognosis and death rate brought about by this study is the extent of involvement of the lungs. Whatever might be the causative organism, extensive involvement of the lung has got a grave prognostic significance.

Another factor influencing the prognosis and mortality is the age of the patient. During the first two decades, the mortality has been practically nil while as the age advances the mortality rate increases.

The last factor that unfavourably affects the course of the disease is the presence of cerebral complications—delirium, insomnia etc. These are particularly unfavourable as they cut at the very basis of the treatment—rest, conservation of the energy of the heart. The presence of any constitutional diseases like chronic nephritis, diabetes or cirrhosis of the liver, is also unfavourable.

The ordinary line of treatment outlined above is inefficient in the treatment of pneumonias with

*Conclusion.*

It is concluded from the above study that—

1. In all uncomplicated cases the routine treatment hitherto followed is effective.
2. Early hospitalisation plays the most important role in the subsequent course and the results of the disease.

3. Serum treatment owing to its cost and limitations in its use is not likely to supplant the routine treatment.

4. Chemotherapeutic drugs afford hitherto unavailable assistance in the treatment of pneumonias with complications or complicating other diseases.

I thank Dr. P. Kutumbiah, Professor of Medicine, for his encouragement and advice.

complications or complicating other diseases. Hitherto the physician was helpless in the treatment of these cases. It is in these cases that the new drug is very useful and in the opinion of this writer these drugs must be reserved to the treatment of these cases.

Owing to the difficulty of typing the pneumococci, the limited utility and the cost of the anti-serum, serum treatment is not likely to be of much help in the treatment of these cases, whereas the chemotherapeutic drugs like M. & B. 693, though costly, are more useful in all types and so they form the only available line of treatment in these complicated cases. In the limited number of cases in which they have been tried they have been of immense help.

**AN ODE TO THE ENDOCRINES!**

Oh Phryne, Aspasia, Mellisande,  
Helen of Troy, and Sally Rand  
Dante's Beatrice, and Petrarch's Laura  
Await thee, Oh Curse, thou dreaded Horror!

For there's estrone, progesterone, estradiol,  
Thyroid dessicated, and ovary whole,  
Prolan B. and amiotin,  
Theelin in Oil and antuitrin.

For dysmenorrhoea  
I make my plea  
Oh Doctor, Doctor, dear  
I beg of you on bended knee,  
Those awful cramps to ease.

For there's estrone, progesterone, estradiol!  
Thyroid dessicated, and ovary whole,  
Prolan B. and amiotin,  
Theelin in Oil and antuitrin.

But, doctor dear,  
Is it a sin  
To use the lowly aspirin  
Or Lydia Pinkham's pinkest pills  
To relieve recurrent ills?

For there's estrone, progesterone, estradiol,  
Thyroid dessicated, and ovary whole,  
Prolan B. and amiotin,  
Theelin in Oil and antuitrin.—(J.A.M.A.)

## Some Facts about Thoracic Surgery.\*

By R. MAHADEVAN, M.S. (Mad.), F.R.C.S. (Eng. and Edin.),

*Surgical Registrar, Medical College, Vizagapatam.*

It is a matter of common knowledge even to the layman that pulmonary tuberculosis carries many a young and useful life off in its prime. Not only this disease but almost every conceivable chest disease is so common in our country that surgery of the chest merits our detailed study. Anti-tuberculosis campaign is in the forefront to-day and surgery of the chest has great possibilities in diminishing the ravages of pulmonary tuberculosis. To give an idea of the enormity of the diseases of the chest let me quote the figures of King George Hospital, Vizagapatam.

|                                          |                 |               |
|------------------------------------------|-----------------|---------------|
| Cases of Pulmonary tuberculosis in 1938: | Inpatient...    | 200           |
|                                          | Outpatient      | 830           |
|                                          | <b>Total...</b> | <b>1,030.</b> |

Abscess lung: 42 cases in 4½ years.

Bronchiectasis: 70 in 5 years.

Foreign body: 30 to 40 cases every year.

When we realise that this figure possibly represents only a fraction of the actual incidence of the disease in a portion of this

district, an area which is within easy reach of this hospital, we get an idea of the large incidence and an idea of the mortality and morbidity that must be attributable directly to these diseases.

Surgery of the chest is a comparatively recently developed branch of the art of surgery. The introduction of intratracheal anaesthesia has facilitated operations on the thoracic cage and viscera immensely. With proper understanding of the mechanism of the heart and lungs many of the dreaded dangers of entry into the thorax have been overcome. It is important to realise in this connection that the capacity of the pleura to deal with an infection is far inferior to that of the peritoneum. It is quite feasible to remove from within the abdomen a grossly infected organ, *e.g.*, the appendix and even if there has been obvious spread of infection around, one can mop up the pus and close the peritoneal cavity expecting the peritoneum to successfully deal with the rest of the infection? That the peritoneum does this and in the end escapes quite unhurt is within the knowledge

of all of us. On the other hand to do a lobectomy or pneumonectomy, say, for bronchiectasis and to close the wound without free drainage of the cavity left, is asking for trouble and courting disaster.

For the successful accomplishment of chest surgery team work is necessary. Every member of the team must have had the necessary special training. Among the other "minimum requirements are a properly equipped operating theatre, a specially designed operating table, diathermy apparatus, suction pump, special anaesthetic apparatus and a bed continuous suction apparatus" (1). An efficient blood transfusion service is an immense advantage. I can say with certainty that many of the severe operations of the chest that I witnessed in Great Britain though beautifully and skilfully performed by masters in the art would have ended in failures but for the additional advantage they have in their possessing a splendidly organised blood transfusion service—the work of the Red Cross Society. The difficulties we have are not however insuperable. Considering the enormity of good and useful work that can be turned out we do hope that the day will not be far when efficient chest surgical clinics are established in our country.

Now let me say a few words on some of the special features pertaining to the diagnosis of diseases of the chest.

1. *History.*—The importance of a very carefully taken history

cannot be minimised. One may have to go back several years in the history of the patient and ask for apparently trivial details. A mere choking over food years before might have resulted in aspirating food particles and been the starting point for a lung abscess or a chronic bronchiectasis. Previous operations as removal of adenoids and tonsils and dental extractions, etc., must be inquired into. An unaccounted tooth after dental extraction may be accounted for years later by bronchoscopy and finding the missing tooth long after it has caused grave damage.

2. The routine procedure of careful inspection, palpation, percussion and auscultation must never be omitted. The temptation to depend on skiagrams and other auxiliary aids at the cost of these primary methods of examination must be rigorously resisted. The following case is of great interest in that it shows how serious mistakes can arise by neglect of these principles. A patient who sustained a gunshot wound went about from doctor to doctor with his skiagram showing the bullet in the chest. Several operations had been done unsuccessfully by different surgeons. Finally he consulted a specialist who I have heard repeatedly stress on avoiding the temptation to see the skiagrams till the careful examination of the patient is over. Thus while he was palpating the patient, to his great astonishment and delight he felt the bullet close under the skin in the back and it was removed in a few minutes under local anaesthesia. The

\* Abstract of a paper read before the Vizagapatam Branch of the Indian Medical Association.

skigram the patient had, gave an apparent appearance of the bullet being close to the vertebra and neglect to palpate the patient before had resulted in unnecessary operations. Similarly opinions on skiagrams should never be given without examination of the patient. I know of a case where a skigram was sent with the report "Bronchiectasis—lower lobe" and the surgeon concerned was asked whether he would undertake a lobectomy. The surgeon naturally refused to reply till he saw the patient. On examination it transpired that the patient was quite healthy and further investigation showed that the lipiodol was in the stomach having been swallowed.

**3. Special Diagnostic Methods.** These are several, and perhaps it is in place to mention "*examination of sputum*" first. Examination of the sputum for tubercle bacilli must be repeatedly done in all chronic chest cases however remote seems the possibility of the condition being tuberculous. I know of a patient who came all the way from South Africa to London with the idea of undergoing lobectomy for a diagnosed bronchiectasis. However, on examination of the sputum tubercle bacilli were found. In fairness to the doctor who had sent the case it must be said several previous sputum examinations had been done and found negative. In London also several examinations had to be done before it was found. To have done a lobectomy in this patient would have very likely resulted in a disaster.

**Blood Examination.**—Red and white cell count, hæmoglobin percentage, blood grouping, etc., are of help not only in diagnosis but also in preoperative preparation indicating the necessity for blood transfusion and similar procedures. Wassermann reaction may have to be done where necessary, especially in obscure cases. A compliment fixation test for hydatid may have to be done where the possibility is thought of, and in obscure cases.

**Urine Examination.**—Presence of albumin in the urine is not uncommon in cases of chronic suppuration as empyema, and indicates amyloid degeneration and the necessity for a very careful and prolonged preoperative preparation.

Estimation of *vital capacity* of lung is necessary in every case.

**Skiagraphy.**—A. P. and lateral views, oblique views and pictures in standing or other particular postures may be required. There are several techniques of introducing lipiodol and taking skiagrams but the point to remember is that in conditions like bronchiectasis the whole bronchial tree of the affected side must be skiagraphed. About 9 c.c. of lipiodol is sufficient for this purpose. If this precaution is neglected and only the lower lobe bronchus is filled the presence of bronchiectasis in the other lobes that not infrequently coexist may be missed. This may result in doing lower lobe lobectomy without relief of symptoms.

**Tomography**, by which specified areas can be distinctly skiagraphed is a very great advantage.

**Kymography** helps to distinguish pulsatile from non-pulsatile swellings. This is done by photographing with a quickly moving X-ray film. Pulsatile swellings throw wavy shadows and this helps to distinguish aneurysms, etc., from other swellings.

**Screening** has great advantages and must not be omitted if possible. For example many swellings may throw a shadow substernally in superior mediastinum but if the shadow moves with deglutition it is a substernal goitre.

**Endoscopy** has very great field of usefulness not only in diagnosis but also in therapeutics as removal of foreign bodies, localisation of infection by seeing through which bronchus pus exudes, etc., endoscopy plays such an important part in the diagnosis and treatment of chest conditions that every thoracic surgeon must be able to do his own endoscopic examinations.

Let us pass on now to considering a few points on *preoperative preparation*. Among the important necessities may be mentioned:—

1. Removal of septic foci, *e.g.*, septic tonsils and adenoids;
2. Rest in bed, increased fluids, glucose, blood transfusion where necessary. There is toxic myocarditis in many cases of prolonged suppuration as empyema, bronchiectasis, etc.;

3. Bronchoscopic aspiration and postural drainage where necessary;

4. There is one thing to which I want to draw special attention, *viz.*, the value of proper breathing exercises. If the vital capacity of the patient is low it is obvious that he can stand no operation of consequence especially when the operation is in the chest. By proper breathing exercises it is possible to increase the vital capacity very markedly. I have seen cases with such poor vital capacity as 500 c.c. or thereabouts improve to 1,500 c.c. or over in the course of a few days. In this connection let me digress a bit and show what important part breathing exercises play in this branch. I have seen in the Brompton Hospital cases of asthma, emphysema, etc., deriving remarkable benefit from breathing exercises. Some cases of asthma never had an attack after putting them through these exercises though they had tried previously all known remedies for asthma without success. The great advantage derived and the rapid closing of big chronic empyema cavities by these exercises must be seen to be believed. Further, after thoracoplasties and other mutilating operations, the deformity of the chest is avoided or at least minimised a great deal by these exercises. Indeed there is so little deformity in a good many of these cases that if the patient had a shirt on, an on-looker cannot easily say which is the operated side. It is the common belief of most of us that it is not possible to inflate and deflate voluntarily a particular portion of

either lung. This is wrong. By a very little training it is possible to do so, expanding and contracting one lung only or even a lobe only for the matter of that. This important fact is not so well known as it ought to be even to medical men. In Brompton Hospital the breathing and remedial exercises are conducted twice a week for the outpatients and as often as necessary for the inpatients under the guidance of an able sister in charge.

Now for a few words about *anæsthesia*. "Before administering *anæsthesia*, if there is any sputum its reduction by postural drainage for some days prior to operation is invaluable. Premedication should be light, so as not to abolish cough reflex entirely (e.g.,  $\frac{1}{2}$  gr. omnopon and  $\frac{1}{50}$  gr. scopalamine  $\frac{1}{2}$  hour before operation)." (2)

A number of operations can be carried out under local and regional *anæsthesia*. In selected cases thoracoplasty, pneumonectomy, lobectomy, etc., have been done under spinal *anæsthesia* by special methods. Many cases still have to be done under general *anæsthesia*;  $N_2O$  and  $O_2$  is still the most frequently used. Cyclopropane can be given with a proportion of 80 to 85 per cent  $O_2$  as against  $N_2O$  and  $O_2$ , where oxygen is about 20 per cent only. Cyclopropane is very costly and is not yet in use in this country as far as I am aware. It has explosive properties and so has to be used with a machine of the closed circuit type with a  $CO_2$  absorbing apparatus.

### The Madras Medical Journal

To come now to discuss briefly the various diseases and operations required, I propose to deal with them in more or less the frequency with which they are likely to be met with in this country.

1. *Surgery of Pulmonary Tuberculosis*.—In the modern management of tuberculosis, sanatoria play an important part. While they do have their place the temptation to spend large sums on building sanatoria at the cost of other equally important or more important measures should be avoided. It seems in one instance out of a total of £80,000 about £70,000 was spent in building a sanatorium and the remaining £10,000 was so inadequate for other measures that it became a failure. This mistake must be avoided in the planning of anti-tuberculosis measures in our country.

The results of unaided sanatorium treatment are very bad, especially if the case is one that has advanced to any degree. The benefit of various surgical measures depends as in tuberculosis of any other organ on the highly important influence of pulmonary rest; closing down of cavities by various measures abolishes space where septic matter can collect and be absorbed.

The various surgical measures are collectively included under the term "collapse therapy".

If "collapse therapy" is properly done the expectation of life

### Some Facts about Thoracic Surgery

is increased considerably, thrice or even more as great as when not done. The results have been so very encouraging that during recent years there has been a tremendously rapid increase in the use of collapse therapy all the world over. One of the most striking results of efficient collapse of cavities is the early disappearance of the tubercle bacilli from the sputum in a high proportion of cases even in many of the cases that subsequently die of the disease. From the point of view of preventive medicine also therefore the surgical treatment of pulmonary tuberculosis has a very high value.

In America from 50 to 80 per cent of patients with the adult type of pulmonary tuberculosis admitted to sanatoria are found to be suitable for collapse therapy of one sort or another. I understand that at least in this country only in 5 to 10 per cent of patients can artificial pneumothorax be successfully induced. This shows the necessity for induction of collapse therapy by the various other methods in a vast proportion of cases. It has been found also that when collapse therapy is indicated, the earlier it is done the better the results. This emphasises the importance of early and correct diagnosis.

The commonest conditions contra-indicating surgery are:

(1) Rapidly progressive bilateral lesions.

(2) Lesions that are known to be steadily healing.

(3) A failing or inadequate cardiac or respiratory functional reserve.

(4) Important tuberculous or non-tuberculous extra-pulmonary disease.

(5) A hopelessly poor general condition of the patient.

Of the several measures of collapse therapy, the following may be mentioned:—

(1) Artificial pneumothorax.

(2) Division of adhesions—(a) by closed methods, (b) by open methods.

(3) Phrenic nerve paralysis, temporary or permanent.

(4) Extra-pleural pneumothorax.

(5) Various types of thoracoplastics including the latest advance propounded by Carl Semb whereby the apex of the lung can be well collapsed down and kept collapsed.

Some of the measures as pneumothorax, phrenic paralysis, etc., may find application in bilateral disease also. The various measures need not be entered into in detail here.

(2) *Empyemas*.—Pleural empyema is a very common condition indeed. I am not far from the truth if I say that in spite of its being so, it is rarely diagnosed as early in the disease as it ought to be. The causes for this failure are many, one of the chief being the pathetic

belief in the classical text-book descriptions. It is necessary to realise that it is quite possible to hear on auscultation breath sounds and yet the pleura contain large amount of pus. The sound heard is due to entry and exit of air in and out of a bronchus lying close under the effusion surrounded by a consolidated piece of lung tissue. It is not often realised that in the absence of gas in the pleura there is no horizontal fluid level which, some seem to think, is an invariable necessity in a skiagram. Furthermore if the purulent collection is small in quantity and the skiagram is taken with the patient lying down the film of pus is so thin that it may cast no shadow. Whenever possible a skiagram with the patient sitting is essential.

It is natural to suppose that putting in a needle and aspirating pus will settle the question. This is not quite true. As empyema is so common and as the cure if detected and treated properly in the early stages is complete, convalescence short, and dangers of chronic empyema very much less, I may be excused if I go into detail over this simple procedure of aspiration for diagnostic purposes. The procedure is absolutely painless if all the layers from the skin down to parietal pleura are carefully infiltrated with novocaine. If pus is not drawn when confidently expected it may be because (1) the needle is blocked, or (2) if the needle is not carefully washed free from spirit, the first few drops of pus coagulate and block the lumen or (3) the

needle is very narrow and pus thick, or (4) if the needle is blunt, instead of piercing a film of fibrin it may just push it in front of it and the tip of the needle may not enter the layer of pus. It is always best to have a needle with an additional side opening so that, even if the terminal opening is blocked by fibrin, pus will escape through the side orifice. Above all it is important to remember that, even if pus is not drawn and only foul smelling gas is drawn, it must be noted as such and not entered as a negative finding. Air or gas in pleura is abnormal and shows that there is some underlying pathological condition.

In the treatment of empyema the dangers of immediate open thoracotomy in the synpneumonic type, where the streptococcus is often the infecting organism, are well known. Repeated aspiration, intercostal drainage and later on open thoracotomy are measures only too well known. Prontosil group of drugs in streptococcal infections has deservedly become popular. But one rough and ready method by which it can be decided as to when it is safe to do open thoracotomy is not sufficiently well known. If daily the pus aspirated is allowed to stand in a test tube in the early stages the solid deposit at the bottom is little and the column of fluid above is much more. Later on the solid deposit becomes more and more and, when it is roughly 8/10 to 9/10 of the whole column, it is quite safe to do open thoracotomy.

The best way to prevent chronic empyemata is to diagnose acute empyemata early and institute early efficient drainage. Early removal of drainage tube is a common cause for chronicity. The position of the inner end of the drainage tube must be checked by frequent skiagraphy. Otherwise it may be too high or too low with reference to the fluid level interfering with proper drainage. To check the position barium impregnated rubber tubes which throw a definite shadow on X-ray are utilised in the Brompton Hospital. The forgotten drainage tube is not an infrequent cause and I have more than once seen at least 2 tubes in empyema cavities. Tuberculous infection is a common cause of chronicity, and what is more, even when the original infection was non-tuberculous above 10 per cent become tuberculous later on.

As to when to remove drainage tubes is best judged by noting size of the cavity by lipiodol X-ray at regular intervals. When it is about 5 c.c. or less it is safe to remove the tube; the cavity can be measured at periodic intervals by running in a solution and watching its progress.

In the treatment of chronic empyema the first step is re-establishment of very free dependent drainage. This must be persisted in for a sufficiently long time before severer measures are thought of. So long as there is evidence that the cavity is lessening in size one is justified in persisting with this comparatively simple method.

*Abscess of the lung.*—There is reason to think that these are more common than is usually thought, and the diagnosis has been missed in many cases. The causes of abscesses lung are several. Thus, some may be the result of pneumonias and broncho-pneumonias, some may be the result of aspiration of foreign bodies, some may complicate sub-diaphragmatic abscess, pyæmic infections, operations on septic foci elsewhere, etc. A few may be the result of trauma. But the common type of case seen in our hospital has been the insidious type with gradual onset, with malaise, fever, cough, pain in the chest, and bringing up foul sputum. Majority of the cases have been adult males. In these cases no obvious cause has been known. It has been suggested (Roberts) that it is due to aspiration of sordes from septic teeth, in people who have the habit of snoring. In cases where tuberculosis is thought of and sputum repeatedly shows no tubercle bacilli, the possibility of lung abscess must be remembered. Diagnosis can be confirmed by radiography and finding a shadow in the area of lung substance proper. The presence or absence of fluid level depends on various factors as communication with a bronchus, whether the patient has coughed up some of the pus, etc. While absence of fluid level does not exclude abscess presence of it in a shadow in the lung substance, confirms it.

Before operation the exact localisation of the abscess with the help of clinical signs and

X-rays in A. P. and lateral views or stereoscopic pictures is essential. In operating on a lung abscess to prevent it bursting into the pleural cavity and thus causing partial or total empyema in a patient already gravely ill with lung abscess, the operation is almost done in two stages. The first stage aims at obliterating the pleural space over the area of lung to be traversed. This is done by resecting the ribs over the area and forcing the parietal pleura down to the visceral pleura by an iodine gauze pack. After three or four days the pack is removed, the abscess incised, the overlying lung freely excised to effect free drainage.

*Bronchiectasis.*—Here again there is reason to think the condition is more common than is at present diagnosed. Many of these cases pass off as tuberculosis. Absence of tubercle bacilli in sputum must make one think of doing a lipiodol X-ray which will reveal the condition.

Lobectomy has become a frequent proceeding for bronchiectasis and pneumonectomy if not frequently performed is at least becoming more common, where the whole of one lung is affected. Many of the dangers of removing the lung in one stage have been overcome and as far as I am aware Mr Roberts and Mr. Tudor Edwards of the Brompton Hospital were the first to successfully do pneumonectomy in one stage.

In injuries of the chest the following facts are worthy of

mention from the point of view of every day practice.

(1) "Where one is in doubt as to whether there is any internal bleeding, apart from the usual signs, the rapid estimation of blood hæmoglobin may adduce clear and confirmative evidence."

(2) If dyspnoea increases and especially if cyanosis is also present with or without evidence of hæmorrhage think of pneumothorax. There will be tympanitic resonance on percussion over the injured area and it is a simple matter to relieve the condition by putting a needle into the pleural cavity. If the needle is connected by a tube and let under water air will be seen to escape; in valvular pneumothorax air will continue to escape from the pleura through the apparatus and this is an indication to leave the needle *in situ*.

(3) While surgical emphysema rarely requires active treatment, mediastinal emphysema is a very dangerous condition. It is most likely if the trachea or the main bronchi are injured. The air collecting in the mediastinum exerts pressure on the mediastinal veins, obstruct them and interfere with filling of the right heart. The air as a rule escapes to the subcutaneous tissues through the superior thoracic aperture and relief may be obtained by the use of subcutaneous needle or a low collar incision in the jugular notch. This procedure for such a dangerous condition is so simple and being an emergency measure every general practitioner must

be able to diagnose and deal with it.

(4) As regards treatment of hæmothorax a reference to various text-books will show different statements varying from immediate aspiration to leaving alone the effusion. To me the following view seems the best: "In uninfected cases of hæmothorax aspirate from the pleural cavity sufficient to relieve symptoms. Excessive withdrawal of blood may induce further bleeding. Where symptoms are not urgent the blood should be left for a few days and aspirated gradually over several days until the pleura is empty and the lung fully expanded." (3)

"The presence of infection of course alters matters. Early and repeated aspiration is necessary. It is dangerous to employ however open drainage before the formation of frank pus" (4).

*Foreign bodies.*—About 40 cases occur every year in the King George Hospital, Vizagapatam. Removal by bronchoscopy and œsophagoscopy have been successful in most. These methods—endoscopic methods—have been perfected by Chevalier-Jackson. In his clinic over 2,000 consecutive cases of foreign bodies in the respiratory passages or œsophagus have been successfully dealt with by endoscopic methods alone without resort to any cutting operation. This shows the possibilities of the field and endoscopy itself has become a speciality and people go over to Chevalier-Jackson's clinic to get trained.

A very brief mention of the various other aspects of thoracic surgery will reveal some very interesting possibilities. To take for example, conditions associated with adherent pericardium:—

(1) In some cases the pericardial space is obliterated and the heart imprisoned by adherent parietal pericardium (constrictive pericarditis or Pick's disease). There are signs of cardiac failure without enlargement of the heart. X-rays may show calcified pericardium. Pericardiectomy after resecting 4th, 5th and 6th costal cartilages and inter-costal bundles gives very good results.

(2) When parietal pericardium is adherent to chest wall, it causes embarrassment of cardiac action. Freeing the adherent pericardium—cardiolysis—by resecting 2nd to 7th costal cartilages and an inch of 4th and 5th ribs gives marked relief.

(3) In enlarged heart, especially in children, associated with heart failure and pre-cordial bulging, if medical treatment gives no relief, resection of the ribs and cartilages as in (2) above, permits the heart to bulge forward and takes away the resistance of the chest wall. The cardiac embarrassment is then lessened. Results have been excellent in some cases.

Again in surgery of Angina the recent operation of O'Shaunessy is worth mentioning. Revascularisation of the heart by

stitching omentum to the pericardium bringing omentum through an opening in diaphragm—omentopexy—on the principle of Thalma-Morrison's operation for cirrhosis of the liver has given some very good results in selected cases.

In this very sketchy review of certain aspects of Thoracic Surgery the aim has been to show the possibilities in this field of surgery to stimulate interest in it. I hope it will serve this purpose.

## REFERENCES.

- (1) "The Place of Surgery in the Treatment of Pulmonary Tuberculosis" by J. E. H. Roberts (*Journal of Royal Institute of Public Health and Hygiene*, November 1938).
- (2) "Anaesthesia in Thoracic Surgery"—(*British Medical Journal*, January 1939).
- (3) "Injuries to the Chest" (*British Medical Journal*, November 26, 1938).
- (4) "The Collapse Therapy of Pulmonary Tuberculosis" by J. Alexander.

## SULPHANILAMIDE AND THE DOCTOR

The Doctor now sits in his big office chair,  
With his feet on the top of the table;  
His brow is all furrowed with deep lines  
of care,  
(Just picture him there, if you're able)—  
His office is filled, but with big empty chairs,  
And his office force all now are idle,  
While the sound of a snore from the office  
next-door,  
Makes a pain in his head and his middle.  
Just a few years ago, he was quite on the go  
And his phone was eternally ringing;  
His patients, when sick, always wanted him  
quick,  
And to others his praises were singing;  
But to-day there's a lull in his work, and the  
dull  
Weary hours are becoming depressing.  
With no work now to do, he is terribly blue.  
And his predicament is distressing,  
No more Mastoids to do when his office is  
through,  
No Tonsils to pluck from their housing,

No sinus to drain for relief of the pain,  
No ears coming in for a dousing,  
No boils now to lance, while the victim will  
dance;  
No appendices to remove,  
No more reason to hope that the old  
Cystoscope  
Will a friend muchly needed now prove.  
No gall-bladders to drain, no disease of the  
brain  
From absorption of toxins malicious;  
No more chills in the night, many parents  
to 'fright,  
And no more infection so vicious.  
We revolve in our mind the reason to find  
For the loss of all means for a living,  
And the reason we see can nothing else be  
But Sulphanilamide we are giving—  
So with nothing to do, and the prospect so  
blue  
We can only sit down and discuss  
NOT what have we done with this product,  
BUT—WHAT HAS IT DONE WITH US?  
—J. A. M. A.

## Clinical Memoranda

REPORT ON A CASE OF MULTIPLE BONY LESIONS OF  
TERTIARY YAWS

S. BALASUBRAMANIAM, M. B., B. S.,

General Hospital, Madras.

**Name.**—Subramaniam, age 26 years. Heart, lung and nervous system nil abnormal. Pulse 82; Resp. 24; B. P. 100/65.

**Admitted on** 25th January in Canning Ward under Dr. N. Magesh Rao.

**Complaint.**—Multiple lumps on the forehead, face and chest.

**History.**—Native of a village in Trichinopoly District. Father died six years ago at his 50th year. Mother alive; one brother. Gives a history of having had some extensive skin eruption when he was about the age of 10 and that it disappeared after some time with native treatment. His brother also suffered from a similar condition. Fever of one month's duration at his 13th year. The present complaint started five months ago with a lump on the forehead and pain in the elbow. The other lumps appeared subsequently: that on the face only five days ago and is painful.

**Physical Examination.**—A puny ill nourished individual; skin dry and scaly in places; spots of pigmentation here and there.

**Local Condition.**—(a) Three circumscribed swellings slightly more or less than the size of a marble over the forehead—two about the midline and one just above the outer angle of the left eye; no pain or tenderness; skin moveable and free; two of these lumps are bony hard and immobile. The third has a cystic feel and has slight mobility beneath the skin.

(b) A rather diffuse, painful, tender swelling, soft and fluctuating and skin over it being warm, red and shiny, over the right malar region.

(c) A lump over the sternum (diameter of  $1" \times \frac{1}{2}"$ ) of hard consistency at the periphery with softening in the centre; slightly tender; no pain.

(d) Right elbow kept in a position of flexion of a little over 90°; painful and tender; movements absolutely limited.

**X-Ray Findings—Skull.**—Circumscribed punched out areas of

bone seen over the frontal and parietal bone, not only over the sites corresponding to the palpable lumps, but also at other sites. At no area is there any appearance of new bone formation.

*Face.*—A similar area of bone destruction on the maxilla.

*Sternum.*—Not well brought out in the picture.

*Ribs.*—A spindle shaped well demarcated area of bone destruction over the right 8th rib.

*Vertebra.*—The appearance here, in marked contrast to changes elsewhere and enumerated above, is one of sclerosis. The picture shows a well marked area of new bone formation on the even interior aspect of body.

*Right Elbow.*—The articular ends show evidence of destruction of bone and joint cavity is narrowed.

These striking radiographic findings suggesting, as they do, a number of conditions in the differential diagnosis, the following investigations were made.

*Urine.*—(24 hours specimen). 40 oz. passed in 24 hours. Sp. Gr. 1012, sugar *nil*; albumin *nil*; alkaline.

*Deposit.*—Four phosphatic crystals; nil else abnormal. No Bence Jones protein urea.

#### *Blood Chemistry.*—

Blood sugar 0.063 %  
Blood calcium 14 mgms. %

Blood phosphorus 3.936 mgms. %  
" protein 41.44 mgms. %  
" Cholesterol 104 mgms. %  
" Phosphatase 2.964 units.

#### *Hæmatology.*—

R. B. C. 4.41 mill.  
Hb. 92 %  
W. B. C. 18,400 per cm.

#### *Differential Count.*—

Myelocytes 1 %  
Polymorph 76 %  
Lymphocytes 10 %  
Eosinophiles 11.5 %  
Pyophiles 1.5 %

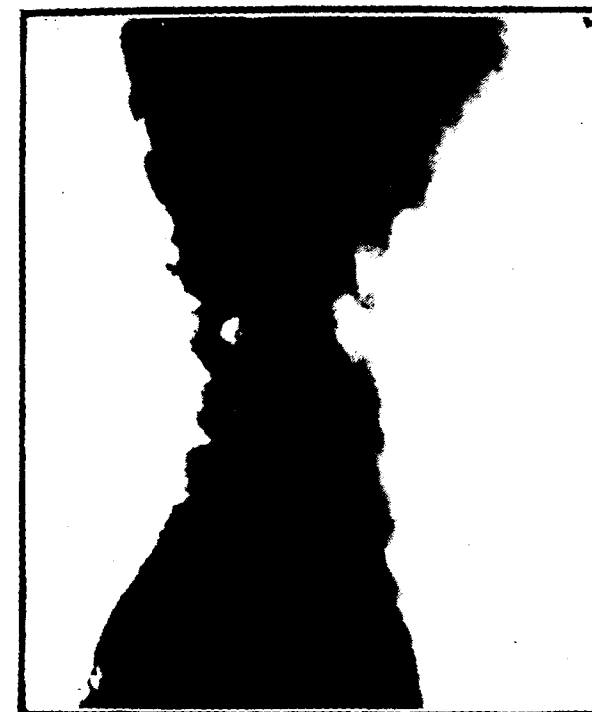
*Kahn and Wassermann.*—Positive. The swelling in the right malar region was aspirated when the skin over it was about to give way, and thick curdy pus aspirated. It was sent for pathological examination and was reported on as only a collection of pus cells. No acid fast organisms were seen in smear and culture of the specimen was reported as sterile. Guinea pig has been inoculated.

#### *Differential Diagnosis.*—

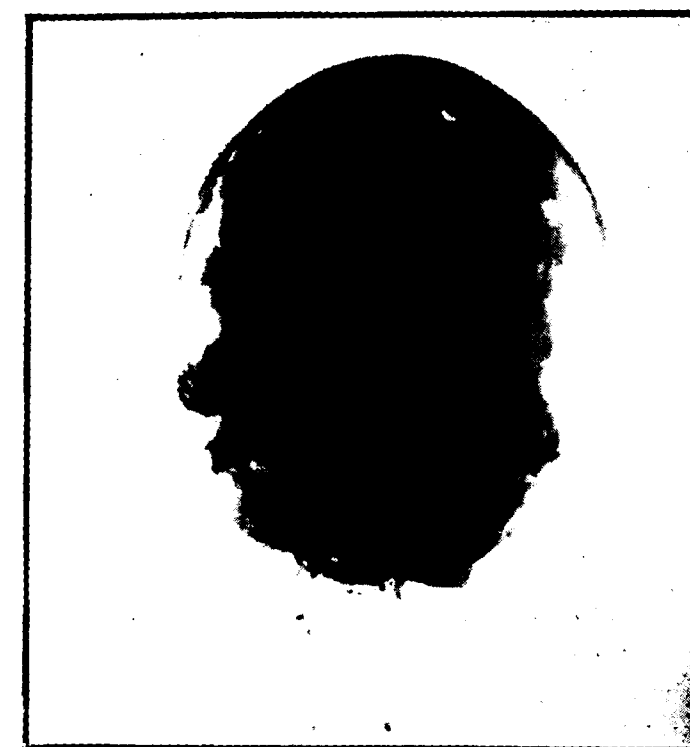
##### (1) *Sub-periosteal tuberculosis.*

(FOR) Age. Distribution of lesions poor general health. (AGAINST.) Wide spread skeletal foci with little constitutional disturbance. Areas of bone destruction being so definitely punched out. The vertebral bone change of sclerosis. Reaction to treatment.

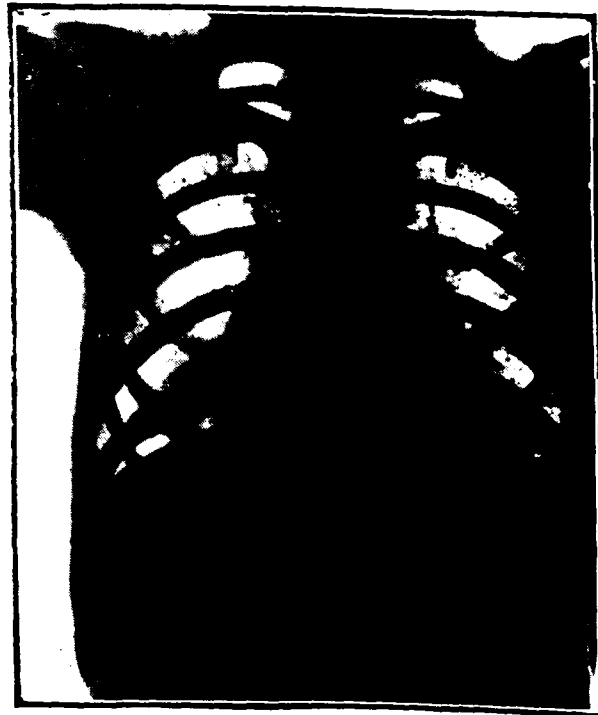
##### (2) *Multiple Gummatous Osteoperiostitis.*— Except that



Note area of destruction body of 1st L. V.



Note three circular areas of bone destruction frontal region.



Note spindle shaped area of rarefaction 7th Rt. Rib.

sclerosis characteristic of syphilitic bone changes is so little evident but for the vertebral lesion, the other features of the case support this diagnosis, but the patient denies any history of exposure or primary sore and in spite of the unreliability of such history, in this particular case there seems to be no reason not to rely on his statement.

(3) *Secondary Sarcomatosis or Carcinomatosis*.—(AGAINST) No discoverable primary growth in prostate, thyroid or kidney. The pleomorphism of the lesions.

(4) *Multiple Myelomatosis*.—(FOR) Distribution of lesions and radioscopic appearances. (AGAINST) Age. Myelomatosis being common in 40 to 60 years. No Bence Jones protein in urine. No anæmia or enlarged spleen.

(5) *Schuller Christian Disease*.—Rare condition more commonly in children but may occur in adults. The distribution and X-ray appearances resemble those seen in this disease. (AGAINST) No diabetes Insipidus, jaundice or gingivitis or exophthalmos. Aspirated contents of the swelling on the face didn't show the characteristic foamy cells. Pleomorphism of the lesions their rapid evolution and reaction to treatment. Blood cholesterol far below even the normal.

(6) *Osteitis Fibrosa Generalisata*.—The individual X-ray appearance in the skull show a resemblance but no other point in favour. Absence of lesions in long bones absence of any degree of pain or constitutional disturbance, the pleomorphism of the

lesions and the softening and supuration of one resulting in a characteristic ulcer are all against.

(7) *Tertiary Yaws*.—I showed the case to Dr. R. V. Rajam and he was opinion that this is a case of tertiary yaws and that the bony changes seen in this case were not dissimilar to some other cases that have been treated in his department as yaws. The positive Wassermann with the believed history of absence of the exposure or venereal infection the history of rash in his early years—and a similar condition in his brother also—and its later disappearance, the wide spread extent and nature of the skeletal lesions with little if any constitutional disturbance and a favourable reaction so far to specific treatment all seem to favour this diagnosis. I shall report the further progress of the case after the completion of the course of treatment.

This case presents certain interesting features. Such wide spread bony lesions in yaws do not seem to have been met with. The literature on the subject makes a very scrappy reference to the tertiary bone lesions and the long bones only are mentioned as possible types of involvement. No case seen by Dr. R. V. Rajam in his clinic, I understand, has shown lesions in the skull and facial bones as seen in this case. The distribution of the lesions in the skeleton is of interest, bearing a close resemblance, as it does to that seen in skeletal lipoid granulomatosis myelomatosis and secondary malignant deposits.

### LYMPHANGIOMA CHEEK—TREATED WITH INJECTIONS OF SCLEROSING FLUID

REPORTED BY C. RAGHAVACHARI, F.R.C.S.E.,  
*General Hospital, Madras.*

Muthia, aged 20, was admitted on 18th November 1938 in Munro Ward for a soft swelling over the right parotid region, extending from the anterior border of sternomastoid to as far as the infra-orbital margin. The size of the swelling was that of an orange. The swelling came on gradually. Swelling was bilocular. The locules were freely communicating. Swelling was not tense. The swellings were partially emptiable into each other. Apart from this pressure on both swellings brought about partial emptying of the swelling. There was no warmth, thrill or discoloration over the swelling. Swelling was fluctuant and

transilluminating. On aspiration a clear fluid was drawn.

*Treatment.*—The swelling was emptied almost completely by aspiration. Sclerosing fluid quinine urethane about 2 c.c. was injected into the swelling.

The swelling slowly refilled but there was evidence of a little consolidating fibrosis in the periphery.

Injections of sclerosing fluid after aspiration was repeated later on three occasions at intervals of a month, another month and lastly a week.

*Result.*—The swelling completely disappeared.

### THREE CASES OF PROLAPSE RECTUM TREATED BY LOCKHART MUMMERY'S RECTOPEXY

REPORTED BY C. RAGHAVACHARY, F.R.C.S.E.,  
*General Hospital, Madras.*

Gopalan, aged 21, was admitted on 6th June 1939 with a prolapse rectum, projection 3" long, of six years' duration. Case was one of complete prolapse rectum.

*Treatment.*—Pre-operative: Purgative on day of admission—a week before operation. Patient kept on light diet, which would not produce residue after the operation.

One day before operation enemas were given. Rectum

was washed out just before being taken to the theatre.

*Operation on 12th June 1939.*—An incision 2½ to 3" long running transversely midway between the tip of the coccyx and the posterior anal margin was done. Incision deepened and levator ani was cut. By blunt gauze dissection, the space on the side and between the rectum opened up. The blunt dissection and opening up of space was carried upwards as far as the promontory of the

sacrum. Lengths of vaseline gauze was packed into this cavity rather tightly.

*Post-operative regime.*—The patient was constipated for a week.

Post-operative complication in the form of retentions of urine had to be met with by Doryl injection and catheterisation for three days.

*19th June 1939.*—Patient was given castor oil which was followed after two hours by an olive oil enema. Patient was put on table, anaesthetised and the plugging was removed. Cavity replugged.

Patient was again constipated.

*24th June 1939.*—Purge and olive oil enema—followed by redressing this time without anaesthesia.

The same regime of constipation. Purge and enema, followed by replacement of plug was carried out, the intervals being made shorter.

The dressings were on 28th June 1939, 1st July 1939, 3rd July 1939, etc.

Finally the bowels were moving ever day and the case was dressed everyday.

The cavity, no doubt, took a lot of time to heal up from the bottom by granulation tissue.

Patient was discharged on 13th July 1939 completely healed up. There was no return of prolapse.

*Two other cases.*—Suhavanam aged 17, who had a prolapse of 10 years' duration. Prolapse 4" long was treated by the same method successfully.

The period of hospitalisation was about the same, a month and more.

Munuswamy, aged 45, was another case treated on the same lines. He had a complication in the form of injury to the rectum, but this did not interfere with the progress of the case. The case healed up in about the same time.

This method offers a simple method of dealing with the condition, though the period of hospitalisation is long and the post-operative course a little tedious and inconvenient.

### A CASE OF OBSTRUCTIVE APPENDICITIS.

REPORTED BY C. RAGHAVACHARI, F.R.C.S.E.,

*General Hospital Madras.*

Muhammad Hussain, aged 35, was admitted on 25th July 1939, with pain in the abdomen of four days' duration. The patient gave a history of attacks of pain of a mild nature, coming on now and

again, for last two months. The present attack started with diffuse pain, four days before admission. There was no vomiting; no nausea either. Pain settled down in the right iliac

fossa. On admission his general condition was good. Pulse 74; Respn. 24; Temperature normal. There was no rigidity anywhere. Deep palpation revealed slight tenderness in the right iliac fossa. It was also noticed that something of the size of an adult finger slipped under the examining hand in the right iliac fossa. P. R. revealed nothing abnormal.

Leucocyte count 14,400. Appendicectomy was done by the special Fascia cutting method by Col. Mahadevan. Distal part of appendix was tense and bulbous threatening to burst. There was no local peritonitis of any sort. The serous surface was unaffected. Appendix slit open, showed, two constrictions proximal to the swollen appendix. There were no concretions. The distal part of the appendix was acutely inflamed and contained pus.

The patient had an uneventful recovery.

The features of this case are:  
(1) The want of the classical signs of appendicitis, and (2) the

complete lack of peritoneal reaction making palpation of the appendix possible through the abdominal wall. It is to be noted if this appendix should have burst, peritoneum being unprepared, the case would have ended up with general peritonitis. There have been a number of cases presenting this picture in Col. Mahadevan's Wards. A collective review will be published later.

The object of this case report is to stress on the only too common, Wilkie type of obstructive appendicitis which presents none of the features of typical textbook appendicitis.

Cases come in with history of diffuse pain vaguely localising to the right iliac fossa. The pain is colicky in nature. Usually there is no temperature; no increased pulse rate. There is no rigidity. Slight tenderness elicited in right iliac fossa, if the appendix is not, pelvic or retrogression. These cases must be recognised as ones more potent of mischief than the inflammatory types and must be operated on at once.

### A CASE OF ACTINOMYCOSIS OF LIVER

REPORTED BY C. RAGHAVACHARI, F.R.C.S.E.,

*General Hospital, Madras.*

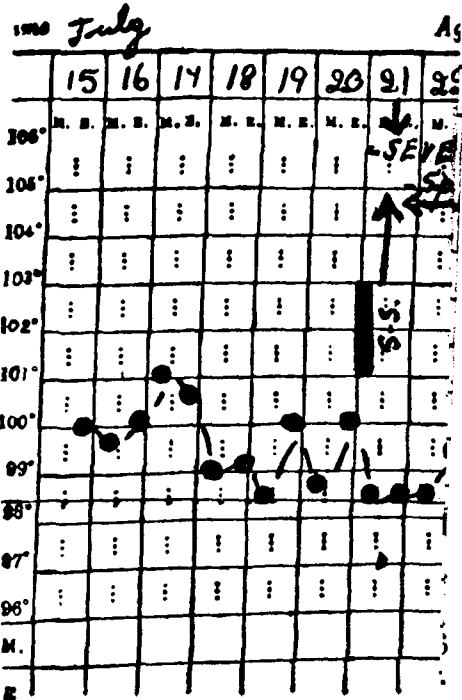
Govindudu, aged 26, admitted on 24th February 1939 for a swelling in the epigastrium and right hypochondrium, thinning out the skin. The swelling was connected with the liver. The swelling was, according to the patient, coming up and present for the last three months. Onset 3½ months ago with fever

and rigor of 20 days' duration and blood and mucus in stools. Screening was done. Diaphragm of that side was raised and the liver appeared to be enlarged. returned as culture negative, but revealed typical Actinomyces ray fungus. There was no swelling in the right iliac fossa: no enlargement of cæcum.

LUNG ABSCESS.



I. Taken on 2nd August 1938 when the patient had severe pain and high temperature but could not bring out any sputum. The picture shows the abscess.  
II. Taken on 10th August 1938 after the patient began to cough up a good deal of foul smelling sputum and his temperature and pain were on the decrease. The picture shows the abscess cavity with the fluid level.  
III. Taken on 28th November 1938 when the patient had put on weight. He was free from fever and pain in the chest and troublesome cough for over a month. The lung field, formerly the site of the abscess, is now almost normal in appearance.



Started suddenly with high fever and pain in the left side of the chest, three days ago and was restless.

Respiratory system.—Diminished movement and loss of resonance in the left axilla and left base, diminished air entry and vocal resonance. A few crepita-

having been taken the previous night. Free HCl, organic acid, blood, starch, chloride, mucus and bile were absent in all the specimens. Starch would appear to have disappeared due to continued action of the salivary diastase, in the absence of free HCl. At the end of 2½ hours 92 c.c. of the gruel was left in the stomach. The findings are suggestive of atonic dilatation of stomach.

(5) *X-ray report.*—Barium meal is seen in the dilated oesophagus even after 26 hours.

*Treatment adopted.*—Diet.—He was put on liquid diet. Small feeds at frequent intervals were advised.

*Drugs.*—Tr. Belladonna 20 min. a day.

After three days he was screened with barium in the oesophagus. The barium was seen to fill the oesophageal dilatation with only a little barium in the stomach. He was given 1/50th grain of atropine and screened half-an-hour later. Even then, no appreciable amount of

barium has trickled into the stomach.

He was given daily injections of Eupaco 1 c.c. Then the patient subjectively felt a sense of relief in the chest one hour after the injection. Thereafter Eupaco was given one hour prior to his meal and he was screened with a barium meal at intervals of 45 minutes, one hour and one hour fifteen minutes after the injection. It was found that the major portion of the barium got into the stomach after one hour and after 1½ hour the oesophagus was completely empty of the barium.

The injections of Eupaco were continued and the patient was discharged on 14th November 1938 having been relieved of his complaint. He reported himself two weeks after discharge and was found to have considerably improved in general health and increased in weight by four pounds.

*Eupaco* is a proprietary preparation of Merck's containing Papaverine, Atropine, and Phenyl Ethyl Barbituric acid.

"The provision of hospitals and maternity homes is not an end in itself. More important still is the human element that works them. Stately buildings and up-to-date appliances are of no avail if the human touch is wanting. I am sure we shall always find in our medical and nursing staffs what is called the

missionary spirit, the untiring effort, to give of their best towards the relief of suffering," said Sir Mirza M. Ismail, Dewan of Mysore, laying the foundation stone of the Appaiya Nayudu Maternity Home at Malleswaram in August 1939.

—(Madras Mail.)

## Medical Research in India

### EPIDEMIC DROPSY THEORY—STUDIES IN CHOLERA— PROBLEM OF RURAL MALARIA

The following Press Communique has been issued :—

New light has been thrown on the etiology of epidemic dropsy, a disease widely prevalent in Bengal and parts of Assam, Bihar and Orissa—in north-eastern India generally—while recent outbreaks have also occurred in places as far west as Benares and Cawnpore, according to the latest Annual Report of the Indian Research Fund Association just published. Details are given in the Report of numerous researches carried out under the auspices of the Association.

The cause of epidemic dropsy has for long been the subject of intensive research in the School of Tropical Medicine, Calcutta, and the All-India Institute of Hygiene and Public Health, Calcutta. Recent work at both the institutions has tended to emphasise the association of mustard oil with the propagation of the disease, a theory which is not new but which had been replaced for a time by two others, namely, those of contact infection from patient to patient and of infection carried through rice damaged by unfavourable conditions of storage.

#### ARGEMONE—THE OFFENDING FACTOR?

The studies suggest that the offending factor is the seed of a plant, *Argemone mexicana*, which appears to be widely distributed and to be often present as a wild growth in mustard plant fields. Its seeds are harvested along with mustard seeds and argemone oil is also expressed along with mustard oil without the manufacturers being aware of such adulteration.

Human experiments have indicated that mustard oil adulterated with argemone oil to the extent of five to ten per cent produces a condition closely resembling that of epidemic dropsy, while laboratory work has shown that samples of injurious mustard oil associated with outbreaks of the disease give the same chemical reactions as a mixture of mustard and argemone oils.

Evidence has thus been obtained for the hypothesis that the causative factor of epidemic dropsy is the presence of argemone oil in the mustard oil, used

in the affected areas for cooking. In all probability, there is no intentional mixing of the two oils by the manufacturers or vendors of mustard oil. Researches on the various problems raised by this discovery is being actively pursued, and it is hoped that in the near future prompt and effective action will be possible for the prevention of the disease.

#### INTERNATIONAL APPRECIATION.

Though the cholera organism was discovered as far back as 1884, many points still remain obscure in regard to its actual manifestations in different places, and at different times. While in some areas, such as the Punjab and the North-West Province, cholera appears only at intervals of a few years, in certain parts of Bengal it starts almost regularly at specific seasons every year. An investigation into the causes is complicated by the fact that, apart from the true organism responsible for the disease, numerous other allied organisms exist in water supplies. A differentiation of the characteristics of the true cholera germs from its allied organisms and the formulation of a method of separating out the former when present along with large numbers of the latter are, therefore, essential.

Considerable success has of late been achieved in these two directions in India, and the researches carried out have received warm appreciation from the International Public Health Office at Paris. In the light of

the new knowledge, a field investigation is now being undertaken in Bengal, and it is hoped that the results of this enquiry will enable preventive measures to be taken with greater success.

#### STUDIES IN MALARIA.

Malaria investigations, both in the laboratory and the field, have proceeded apace under the auspices of the Malaria Institute of India, which is financed by the Indian Research Fund Association. In the Wynaad, Madras, and in the Terai in the United Provinces, research units have been making field studies and similar investigations are proposed for Orissa along the margin of the Chilka Lake. In Delhi, also, anti-malarial operations were supervised by the Malaria Institute. In addition, expert advice is given to the Provincial Public Health Departments in respect of anti-malarial schemes.

Studies have been made on the problem of rural malaria, which is of great importance, as nearly 90 per cent of the total population in India live in villages and costly methods of malaria control are difficult of application. In Delhi province the usefulness of spraying dwellings with insectides has been tried and this method appears to provide a hopeful line of advance for dealing with rural malaria.

Researches have also been carried out on synthetic drugs like atebrin and plasmoquin, the use of which in malaria is becoming common, and as far as

has been ascertained by experimental work on animals, these drugs have not been found to have any adverse effect on the course of pregnancy.

#### ANTI-PLAGUE SERUM.

In the Haffkin Institute, Bombay, investigations were continued as to the best conditions under which anti-plague vaccine of high protective value could be manufactured. An anti-plague serum has also been produced for the treatment of patients. The serum has had a limited trial during an outbreak of plague in Bihar, and the results so far recorded suggest that its use reduces mortality.

Cyanogas fumigation for keeping down the rat population has been tried as an anti-plague measure in the Cumbum Valley, Madras, and the conclusion reached that fumigation every quarter consistently for a few years may reasonably be expected to eradicate the disease. Experiments are also being continued to determine the concentrations and periods of exposure which give the most satisfactory results in the disinfection of grain bags arriving from plague-infected areas.

#### LEPROSY SURVEY.

A statistical survey of leprosy has been carried out in a group of 42 villages. While the gross incidence of the disease was found to be 4.4 per cent in the total population, only 1.8 per cent among the patients were of the severe lepromatous type. The majority of the infections appear to have been contracted early in life. Males showed a higher incidence than females and the

disease manifested itself in a severer form among the former. Nearly 80 per cent of the cases gave a history of contact with leprosy patients, the infection being communicated in a third of the cases by near relatives, in another third by distant relations, and in the remaining third either by unrelated or by unknown persons. The severe lepromatous form of the disease transmitted infection more quickly than the relatively milder nerve type.

A study of nearly 3,000 patients in Calcutta showed that during the months, February to September, the disease became aggravated by active inflammation setting in. The cause for this change is not clearly understood yet, but, if it can be prevented, the prospect of cure will be improved.

A study has also been made of the influence of skimmed milk as a supplement to the diet of leprosy patients, and it has been found that its administration seems to hasten the recovery of the lepromatous type.

#### TUBERCULOSIS INVESTIGATIONS.

Tuberculosis investigations covered a wide range and included a detailed survey in a jute mill, 23 miles from Calcutta, employing 5,000 labourers, a study of children in tuberculous homes and an enquiry into the incidence of the infection among medical students and nurses in Lahore. There is a general recognition that the disease is spreading among urban and rural populations owing to industrialisation and rapidly increasing transport facilities and the need

is being felt of defining the extent of infection in different areas and for determining the social, economic, industrial and other factors responsible for its incidence.

The survey of tuberculous homes revealed that tuberculosis was an important cause of morbidity and mortality among infants and children, a fact not noticeable from public health returns.

The enquiry at Lahore showed that of 434 medical students examined, 53 per cent had tuberculosis infection at some time or other and that amongst fourth and fifth year students, the percentages were as high as 70 per cent and 80 per cent respectively. This does not, of course, mean that they were active cases of tuberculosis. In the large majority the infection had been overcome by the natural resistance of the body. In fact, only 4.5 per cent showed physical signs of having suffered from active tuberculosis.

#### IMPROVING NUTRITIONAL STANDARD.

In the field of nutrition, simultaneously with basic research, the programme of study has been made more practical by relating laboratory investigations to the immediate necessity for improving the nutritional standard of the people under present economic conditions. As instances may be mentioned the discovery of a cheap substitute in red palm oil for cod-liver oil to make up the deficiency of vitamin A in the diet so widely prevalent in India and the demonstration that the use of calcium lactate, at a cost of half to one anna per month per child, improves his

health and sense of well-being. Special attention has been paid to diets largely composed of tapioca, such as are extensively consumed in certain parts of South India, and it has been shown that the most important defect in such diets is the deficiency of protein.

A study is being made of the effect of the use of highly milled rice on nutrition. It is recognized that as the use of home-pounded rice is rapidly disappearing, a solution of the problem of ensuring consumption of rice in its most nutritive form must be sought along other lines.

#### STUDIES ON RICE

Comparative studies on rice and maize have shown that rice is richer than maize in nicotinic acid, which prevents the disease called pellagra. This may explain why rice eaters rarely develop the disease.

Simultaneously with surveys of the diet and state of nutrition in different parts of India, feeding experiments in schools, boarding houses and other institutions, study of the methods of detecting malnutrition and collaboration with agricultural authorities, medical men from the provinces and States have been trained to carry the campaign for better nutrition into different parts of India and systematic education of the people in matters of nutrition.

Knowledge of the elementary principles of nutrition is rapidly spreading and the nutrition research laboratories themselves have not been sparing in their efforts to disseminate amongst the lay public what research has yielded to the scientist.

## Abstracts from Current Medical Literature.

**Sulphanilamide in the air—A warning:** F. P. MACKIE (*B.M.J.*, 15th July 1939). This class of drugs when given in full doses or in conditions of idiosyncrasy is liable to interfere with oxygen exchange by the production of methæmoglobin or sulphæmoglobin in the circulating blood. A pilot was seen recently suffering from symptoms of severe anoxæmia as a result of flying at the moderate altitude of about 13,000 feet. It was found that he had been taking full doses of sulphanilamide for septic tonsillitis just previous to flying. Similar cases have been noted in America and in the British Air Force. A full dose of one of these drugs taken shortly before flying is said to lower an aviator's "ceiling" by about 5,000 feet. Persons intending to fly as passengers, or, more particularly, as members of an aircraft crew should be warned of the danger of taking these drugs within a few days of flying. A few days will suffice to ensure elimination of the drug from the system.

**Sulphanilamide—A study of its mode of action:** C. S. KEEFER and L. A. RANTZ (*Arch. Int. Med.*, Vol. 63, No. 5, May 1939). From a study of the mode of action of sulphanilamide *in vitro* and *in vivo*, the following facts emerge:

1. When sulphanilamide was added to whole defibrinated blood

so that the concentration was 7 mg. or more per 100 c.c. there was definite bacteriostasis, and in some instances a definite bactericidal effect was demonstrated.

2. A bactericidal effect could not be demonstrated when the drug was added to plasma, though bacteriostasis was present in plasma containing sulphanilamide. This bacteriostasis was less striking in plasma than it was in whole blood.

3. The samples of blood which showed a bactericidal effect with the drug were those containing some natural antibodies. It is suggested, therefore, that the drug may enhance the bactericidal effect of whole blood provided natural antibodies are present.

4. In the cases in which it was not possible to demonstrate a bactericidal effect, a bacteriostatic effect was shown. When the number of organisms was small there was almost complete bacteriostasis; when the inoculum was larger the rate of multiplication was slower, and the number of organisms at the end of 24 hours was less than in the controls.

5. It appears that antibodies are important in destroying hæmolytic streptococci *in vitro* even in the presence of sulphanilamide.

6. The principal action of sulphanilamide *in vitro* is to slow the growth of the organisms. It has no direct bactericidal effect on any serologic type of hæmolytic streptococci.

**Mydriasis with conjunctival applications of adrenaline:** L. WEEKERS, P. JOIRIS and F. BONHOMME (*Arch. Ophthal., Paris*, III 97 to 108). A 2 per cent solution of adrenaline is mydriatic on conjunctival instillation, and non-irritant if made isotonic and iso-electric with tear fluid as by addition of 0.3 per cent chloretone and 0.3 per cent NaHSO<sub>3</sub> to H<sub>2</sub>BO<sub>3</sub> solution. Mydriasis is strong and accommodation is unaffected.

**On the Spirocheticidal Action of the Arsphenamines on Spirocheta Pallida in vitro:** H. EAGLE (*Jl. Pharm. and Exp. Therap.*, 64, 1938, p. 164) found that Arsphenamine, neoarsphenamine and mapharsan are capable of immobilising *S. pallida* in emulsions of rabbit chancres *in vitro* and of rendering them non-infectious to rabbits. Under the experimental conditions used, these arsenicals are therefore probably spirocheticidal.

The rate at which the immobilisation proceeds and the minimal effective concentrations of the arsenical depend on numerous variables. Thus, activity increases with increasing temperature and is markedly inhibited by the addition of tissue or tissue derivatives, perhaps because these combine with the arsenical. Inhibition by serum is relatively slight. The action is demonstrably affected by the anaerobiasis in the Brown anaerobe jar.

#### The Madras Medical Journal

Under appropriate experimental conditions, arsphenamine, silver arsphenamine and neoarsphenamine have a definite spirocheticidal effect *in vitro* within 8 hours in as high as a 1:250,000 dilution; and 'arsenoxide' is antispirechetical in dilutions of at least one million. It is of interest that these concentrations are of the same order of magnitude as those attained *in vivo* after the therapeutic administration of these drugs. The extent which oxidation products of arsphenamines are responsible for the *in vitro* effects here described is clearly of primary importance and is being studied.

**The Treponemicidal Activity of Arsphenamine and Neoarsphenamine in vitro with special reference to citrated blood and a suggested method for the prevention of transfusion syphilis:** C. C. KAST, C. W. PETERSON, J. A. KOLMER (*Am. J. of Syphilis, Gonorrh. and Venereal Dis.*, March 1939). Arsphenamine Na produced total or marked loss of motility of virulent *Treponema pallidum in vitro* in dilutions as high as 1:40,960 in saline and 1:20,480 in serum after an exposure of 15 minutes at room temperature; after an exposure of 30 to 60 minutes, total or marked immobilisation occurred in solutions as high as 1:163,840 in both saline and serum.

Neoarsphenamine produced total or marked loss of motility in dilutions as high as 1:20,480 in saline and 1:5,120 in serum in 15 minutes and in dilutions as high as 1:163,840 in both saline and serum after an exposure of 30

#### Abstracts from Current Medical Literature

to 60 minutes at room temperature.

Final dilutions of arsphenamine Na as high as 1:20,480 in citrated blood were completely treponemicidal in rabbit inoculation tests (testicular) and neoarsphenamine in dilutions as high as 1:40,960 after an exposure of 15 minutes at room temperature. By intravenous inoculation of rabbits, arsphenamine Na was found completely treponemicidal in dilutions as high as 1:40,960 and neoarsphenamine as high as 1:20,480 (higher dilutions not being tested) after an exposure of 15 minutes at room temperature. No toxic effects were seen in rats following the intravenous injection of 0.5 to 2.0 c.c. of a 1:2,560 solution of arsphenamine Na in citrated human blood per 100 g. of body weight and apparently no toxic effects followed the intravenous injection of similar amounts of a 1:1,210 solution of neoarsphenamine in citrated human blood. Human beings have been transfused with 300 c.c. of 1:1,000 to 1:3,000 solution of neoarsphenamine in citrated blood and with 300 to 400 c.c. of 1:10,000 solutions of disodium arsphenamine and neoarsphenamine in citrated blood with no toxic or ill effects due to the compounds.

Neoarsphenamine is therefore advised as a safeguard against transfusion syphilis whenever the status of the donor in relation to syphilis is unknown. All that is necessary is to dissolve 0.1 g. in 10 c.c. of sterile distilled water and add 1 c.c. (0.01 g. of the compound) to each 100 c.c. of citrated

blood, yielding thus a 1:10,000 solution. After mixing and standing at room temperature for 15 minutes, it is ready for intravenous injection. If a 1:5,000 dilution is to be given, it may be prepared by adding 2 c.c. of the solution of neoarsphenamine to each 100 c.c. of blood.

**The Spirocheticidal activity of the Arsphenamines in vitro:** EDITORIAL (*Amer. J. Syph. Gon. and Ven. Dis.*, March 1939). When the trivalent arsenicals effective in the treatment of syphilis were first developed 30 years ago, attempts to demonstrate their spirocheticidal activity *in vitro* were unsuccessful. The negative results of early investigators have been unquestioningly accepted for the ensuing three decades. And the statement that the arsphenamines inert *in vitro* were active *in vivo* only after oxidation has been repeated numberless times since. The determination of therapeutic activity has been a tedious time consuming task involving the use of experimental animals infected with trypanosomiasis or syphilis. Trypanocidal testing in mice or rats involves days or weeks of work and its value has been repeatedly questioned as not comparable with testing in experimental rabbit syphilis which require months. While pharmaceutical houses preparing the arsphenamines perform their own toxicity tests on each new lot of drug and while toxicity is checked by compulsory testing at the National Institute of Health, neither the manufacturers nor the federal Government have been

able to afford the time or expense involved in checking each lot for therapeutic activity. This lack has led especially in the case of neoarsphenamine to the public release of some lot of drugs of low therapeutic potency.

Every now and then in medicine it pays to pause and take stock, to re-examine the validity of statements previously accepted as proved facts. It occurred to Eagle to question the supposed inertness *in vitro* of the arsphenamines; and in a preliminary communication (1938) he with Mendelsohn reported that the arsphenamines and the arsenoxide (mapharsan) when mixed in the test tube with an emulsion of treponemes obtained from rabbit testicular syphilomas immobilised the organisms within 8 hours in dilutions of at least 1:250,000 for arsphenamine and neoarsphenamine and 1 in 1,000,000 for arsenoxide. That the immobilised treponemes were actually killed was proved by their non-infectivity to rabbits by testicular inoculation and subsequent lymph node transfer.

Eagle's studies have been amplified by a subsequent communication (1938) in which some of the factors affecting *in vitro* spirocheticidal activity are discussed in detail.

The role of the oxidative products of the arsphenamines in their spirocheticidal action *in vitro* and the chemical mechanism of that action are still under investigation. Rapid confirmation of Eagle's major premise

#### *The Madras Medical Journal*

that these drugs kill spirochetes *in vitro* has been furnished by Kast, Peterson and Kolmer (1939).

Bismuth compounds like the arsenicals have also been found by Eagle to be directly spirocheticidal (1938). This finding makes it unnecessary to assume with Levaditti that the therapeutic action of Bi depends on its combination with tissue components to form a hypothetical spirocheticidal agent which Levaditti has termed 'Bismoxyl'.

It need hardly be pointed out that Eagle's discovery paves the way for many important theoretical and practical studies. This is particularly true if it should prove that anti-spirochetal activity as tested *in vitro* shows a satisfactory correlation with therapeutic activity as determined in syphilitic rabbits. A few important implications which appear at first sight are:

1. The possibility of obtaining accurate information in place of hypothesis as to the mode of action of trivalent and pentavalent arsenical drugs and heavy metals in the treatment of syphilis; and perhaps with such accurate knowledge improved methods of their clinical application.

2. A rapid short cut to information as to therapeutic activity of new drugs and therefore a renewed impetus to the so badly needed further study of the chemotherapy of syphilis.

3. The inexpensive *in vitro* testing for therapeutic activity

of each new lot of the arsphenamines by the manufacturers themselves, checked, as is already their toxicity, by the N.I. of Health, thus ensuring to physicians and patients drugs of known potency.

4. Protection against the accidental transmission of syphilis by transfusion as Kast *et al* suggest.

Doubtless other application of the method will shortly appear.

**Treatment of Pemphigus with Concentrated Viosterol:** E. B. TAUBER and G. E. CLARKE (*Arch. Dermat. and Syphilology*, 40, 1, July 1939). Nine cases of pemphigus in which massive doses of concentrated viosterol had been given are reported. In all but one case great alleviation of symptoms and either partial or total disappearance of the cutaneous lesions were noted. Three patients died after having received viosterol from 1 to 3 years. The cause of death in all three cases apparently was not related directly with the eruption. Necropsy showed no apparent calcium deposits in any of the organs examined microscopically. Examination of the blood during administration of massive doses of concentrated viosterol have not shown any material change in the calcium and the phosphorus content or their ratio. Massive doses of vitamin D afford a simple and effective means of controlling the cutaneous lesions of pemphigus, even though these lesions reappear with all their former severity if a maintenance dose of vitamin D is not continued

during periods of observation. Reactions have been mild and could be controlled by stopping the medication and concomitant administration of small doses of yeast. It was found that after recovery from these reactions the patient could build up a tolerance to a very large dose of vitamin D without further difficulty. The doses herein mentioned averaged from 100,000 to 500,000 units of vitamin D daily.

**Treatment of Ulcerative Colitis:** BANNICK, BROWN and FOSTER (*Jl. Am. Med. Assn.*, 1938, Aug. 27, p. 770) started with sulphanilamide in the first case of their series, but the appearance of a severe toxic reaction on the 4th day of this therapy compelled the withdrawal of the drug. The patient, however, improved appreciably, although there was a recurrence after 5 weeks. This time also sulphanilamide was tried, but owing to prompt occurrence of toxic manifestations further attempt to use sulphanilamide was given up. It was decided, therefore, to try 'neoprontosil'. The result was striking. Within a week, the patient was having only 1-2 stools which were well formed, and the blood had practically disappeared. Since that time improvement has been maintained following repeated courses of 'neoprontosil'. Owing to this success and the complete absence of any toxic reactions, 'neoprontosil' was used from the very beginning in the treatment of the remaining 11 cases.

Most of the patients received from 3.25-5 g. 'neoprontosil'

daily, distributed over 10-15 days. The same course was repeated several times with intervals of a week or two between the courses. The authors point out that 'neoprontosil' possesses a characteristic which makes it a drug of choice in the treatment of such conditions as chronic ulcerative colitis wherein prolonged therapy is indicated, and severe toxic reactions with sulphanilamide may have serious consequences.

**Euphyllin in Asthma:** G. T. BROWN (*St. Louis Jour. of Aller.* 1938, 1064) says that the intravenous use of euphyllin (theophylline ethylenediamine) has proved not only definitely beneficial, but at times actually lifesaving in status epilepticus or intractable asthma.

When using euphyllin for the first time, it is best to give only 0.24 gm. in 10 c.c. of distilled water, normal saline, or dextrose solution. The solution should always be injected slowly, to prevent unpleasant reactions.

Theophyllin orally is also of value in the symptomatic treatment of mild or moderately severe attacks of bronchial asthma. The average dose is 2 gr. theophyllin, combined with  $\frac{3}{4}$  gr. natural or synthetic ephedrine, and  $\frac{1}{4}$  gr. phenobarbital. This dose may be repeated every 4 to 8 hours as required for relief.

**A New Carbohydrate for Prevention of Nutritional Anæmia in Infants—A Preliminary Report:** C. L. WILBAR (*Am. J. of Dis. of Children*, July 1939, p. 45). Nutritional anæmia among infants and young children is a definite entity and

is found to a considerable degree among the children of the sugar plantations of Hawaii. A mean value for hæmoglobin of 62 per cent and a mean red cell count of 5,700,000 were found in a study of 242 plantation children examined in 1936. Children of better economic levels showed hæmoglobin levels and red cell counts approximating the normal. A new form of carbohydrate for use in formulas for infant feeding is described, made by concentrating the juice of the sugarcane. Briefly, the juice is concentrated by boiling in a copper pan and clarified by settling and decanting after heating and by filtering through Buchner funnels with the aid of filter-cel which is a diatomaceous earth found in California. The preparation contains sufficient iron and copper to prevent nutritional anæmia in young infants. After a year's use of the new type of carbohydrate, children aged from 3 days to 3 years (168 children) showed a mean value for hæmoglobin of 74 per cent. The following year the mean value for hæmoglobin of 171 children in this age group was 80 per cent. The group mainly affected by the new carbohydrate, the infants under 1 year of age, showed an increase in hæmoglobin after using the new type of syrup from 59 per cent to 74 per cent to 79 per cent.

Chemical analyses show that 1 to 3 mg. of iron is present in 100 c.c. of cane syrup. This iron is soluble and nearly all in the ferrous state and so is totally available to the body. This iron

plus the iron in the baby's milk meets the iron intake requirements. The amount of copper present in the cane syrup is approximately 0.2 mg. per 100 g. This amount plus the copper in the milk approximate the figures required as intake for children for catalysing iron for the formation of hæmoglobin. It is suggested that in most cases it is more advisable to give iron as a preventive of nutritional anæmia among infants in the form of a readily available food than in the form of medication.

**The use of Prostigmine Methylsulphate in the prevention of Post-operative Intestinal Atony and Urinary Bladder Retention:** P. A. MARDEN and E. G. WILLIAMSON (*Surg., Gynec. and Obstet.*, July 1939) used prostigmine in a series of 253 operative cases, of which 250 were studied for intestinal distention and 247 for urinary bladder retention. These cases were sub-divided into three groups: (a) those receiving prostigmine before and after operation, (b) those receiving prostigmine before operation only and (c) those receiving the drug after operation only. In groups a and b, when possible, 3 injections were given at convenient intervals over the period of 18 hours immediately preceding operation. In groups a and c the administration was started within 4 hours of the patient's return from surgery and continued at 4 or 6 hour intervals for a total of 4 to 6 doses, or more if distention or retention appeared imminent. A soft rubber tube was inserted into the rectum routinely for a

period of one half to one hour after each injection of prostigmine. The investigations were begun using 1:2,000 solution of prostigmine in 1 c.c. doses. Later a 1:4,000 solution was used.

In groups a and b combined where the drug was given before operation, the incidence of intestinal distention was reduced to 5.7 per cent. In group c, where prostigmine was given only after operation the incidence of distention was 14.4 per cent. No ill effects resulted from continued use after end to end anastomoses and other types of gastro-intestinal surgery. It was particularly noted at the time of operation how much better the tone of the bowel was in those patients who had received the drug prophylactically. In the urinary retention series, those receiving prostigmine before operation required catheterisation in but 3.9 per cent of cases, while 6.9 per cent of those receiving the drug only after operation had to be catheterised. When 1 c.c. of 1:2,000 prostigmine was given every hour for three injections in addition to the regular routine, most gratifying response was noticed. No patient showed any undesirable side action.

**The Use of Anthelmintics:** JANET TRAVELL initiating a discussion on the subject at a Conference of the members of the staff of the Departments of Pharmacology and of Medicine of the Cornell University Medical College (*J. A. M. A.*, July 29, 1939) remarked that occasionally a single dose of carbon tetrachloride

may prove fatal. A dose of this drug is from 3 to 4 c.c. Among the factors which may contribute to a fatal outcome after therapeutic dosage first comes *low calcium reserve*. Dogs maintained on a low calcium diet die after very much smaller doses of carbon tetrachloride than when maintained on a high calcium diet. The mechanism of the antagonism between calcium and carbon tetrachloride is not clear, but it has been shown that in dogs the administration of calcium prevents and relieves the symptoms of poisoning and also the signs of disturbed carbohydrate metabolism, causing a restoration of the normal blood sugar level and a lowering of the accumulated blood lactic acid. Calcium does not prevent the rise in blood guanidine, which is seen in carbon tetrachloride poisoning but is antagonistic to the toxic effects of guanidine. Calcium has no influence on the pathologic changes in the liver, the damage being the same whether the animal is given calcium and survives or whether it is not given calcium and dies. It seems that calcium administration merely tides the patient over until regeneration of liver cells can take place, which is fairly rapid and complete. The blood calcium is not materially lowered in carbon tetrachloride poisoning but it is believed that there may be a reduction in ionised blood calcium. The amount of calcium required for this antidotal action is not known exactly. However, when dogs maintained on a low calcium diet are given a fatal dose of  $\text{CCl}_4$ , the dose of calcium

which has secured survival would be for a man, on an equivalent weight basis, about 1 g. of Ca a day by vein, or about 100 cc. of a 10 per cent solution of calcium gluconate, together with 5 or 6 g. of Ca a day by mouth. For intravenous injection the Ca salt may be conveniently added to a larger volume of dextrose solution thus assuring it is injected slowly.

The habitual consumption of *alcohol* is another important factor, even when no alcohol is consumed with the drug. Alcohol given simultaneously increases the absorption and toxicity of  $\text{CCl}_4$ . Both substances injure the liver. It has been known, in dogs, that a small oral dose of alcohol, which by itself causes no demonstrable liver damage, sensitised the liver to the toxic action of  $\text{CCl}_4$ . It is apparently well established that most of the individuals who have died after small doses of  $\text{CCl}_4$  were chronic alcoholic addicts, presumably with pre-existing liver disease. *Chronic alcoholism* is in man a definite contra-indication to the use of  $\text{CCl}_4$ .

*Meat eating* is another factor which has been shown experimentally to cause an acute exacerbation of the symptoms of  $\text{CCl}_4$  poisoning and a sharp rise in blood guanidine. *Low glycogen reserve*, or *starvation* appears to decrease tolerance to the drug. *Oils and fats* taken simultaneously promote absorption.

Regarding the effect of oils on the toxicity of the anthelmintic

drugs in general, carbon tetrachloride, tetrachlor ethylene, and the other halogenated hydrocarbons are the only group of anthelmintics the toxicity of which is known to be increased by the simultaneous administration of organic oils or fats. The toxicity of thymol is not increased by the concurrent administration of oils. Hall has shown that oils reduce the toxicity of aspidium, and the same is true for hexyl resorcinol and for oil of chenapodium.

*Tetrachlorethylene* is much less toxic than  $\text{CCl}_4$ . Calcium deficiency does not increase its toxicity. But it is less effective as a vermifuge.

As for oil of *chenapodium*, the margin of safety is not large. If olive oil is given with the oil of chenapodium to starved cats the oral m. l. d. is reduced.

W. G. SMILLIE recommended the use of oil of chenapodium 0.5 c.c. with a tablespoon of castor oil to a child with ascaris.

Death caused by oil of chenapodium is a terrible death. It has special affinity to nervous tissue and the convulsions may last for 36 to 48 hours, while you must sit by and see the child finally die. This is an awful experience. For effectiveness, oil of chenapodium is in a class by itself. A dose of 1.5 c.c. is perfect. 90 to 95 per cent of the ascaris is removed but it is dangerous.

*Hexyl resorcinol* is much the safest. It will remove 90 per

cent of ascaris in a single administration without any danger to the host. It will remove 75 to 85 per cent of hookworms in a single administration. But it is expensive. Hexyl resorcinol, given in a single gram dose early in the morning on an empty stomach, followed within an hour to an hour and a half by a saline purge, with no food taken until noon, is by far the most satisfactory method of anthelmintic therapy we have at present. A burning sensation occurs in the mouth if the capsules are chewed.

T. T. MACKIE believed that carbon tetrachloride is superior to aspidium in the treatment of cestodes. If aspidium is given some recommend following the last dose up with 2 c.c. of spirit of turpentine. This is followed by a saline purge and two hours later by a large soap suds enema to ensure complete evacuation of the colonic contents.

**Life Expectation of Human Spermatozoa:** B. BELONOSCHKIN (*Munch. Med. Wchschr.* 1939, 845-850). The life expectation of human spermatozoa suspended in 0.9 per cent NaCl solution at 37°C. is 12 hours; it is 1½ hours after artificial insemination, in the vagina. Spermatozoa placed in the cervix are mobile up to 48 hours; in the uterus up to 24 hours. Spermatozoa were found in the uterus 3 minutes after coitus. Spermatozoa take 1 hour in the absence of orgasm to reach the uterine cavity. No spermatozoa were found in

Fallopian tubes 2½ days after coitus. (*Brit. Chem. Phys. Abst.*)

**The Question—Ulcer or Carcinoma?** V. C. HUNT (*Surgery, Gynaecology and Obstetrics*, July 1939). Granting that under medical treatment many patients with uncomplicated gastric ulcer are relieved of their symptoms and that there is a disappearance of roentgenological evidence of the ulcer, it is likewise well known that certain gastric ulcers complicated in one way or another do not respond satisfactorily to medical management. This is particularly true of an ulcer situated on the posterior gastric wall and which through protective perforation has invaded the pancreas. It is not the gastric ulcer, complicated by perforation, continued bleeding or recurrent massive hæmorrhage or persistent gastric retention in which much indifference of opinion exists as to what the management shall be. Practically all internists and surgeons with particular interest in gastric lesions recognize these complications as more or less distinct indications for surgical intervention. It is the crater lesions with none of these complications in which there is lack of unanimity of opinion as to what the appropriate treatment shall be. In many of these cases the question arises—what is the true nature of the lesion—benign ulcer or carcinoma?

The relationship of carcinoma to gastric ulcer is a matter which requires due consideration in many gastric lesions. The im-

# *The Madras Medical Journal*

portance of this relationship lies not so conspicuously in the question of the frequency with which malignant degeneration in a benign gastric ulcer occurs. Sufficient evidence is at hand to indicate that such a change may and does occur often enough to be reckoned with in certain cases in which chronicity has been established and response to medical management has not been complete. A more absorbing problem in the ulcer-carcinoma relationship is that of the difficulty not infrequently encountered in differentiating a benign ulcer from a carcinomatous ulcer or an early ulcerating carcinoma. In many instances the clinical, roentgenological, and gastroscopic findings in a gastric lesion leave considerable doubt as to just what the true nature of the lesion may be. Every surgeon of experience with gastric lesions has, on occasions with the abdomen open and with the lesion in his hand, felt uncertain as to whether it was a benign one or neoplastic. The benignancy or malignancy of the lesion can often be determined only by the competent pathologist.

The size and location of the lesion as depicted roentgenologically are of importance in differentiating the benign ulcer from the malignant lesion. While lesions with a crater of less than 2.5 centimetres in diameter are not all benign, and not all lesions of a greater diameter are malignant, nevertheless, the probability of malignancy in the latter lesions increases proportionately to an

## *Abstracts from Current Medical Literature*

increase in the diameter of the crater. Lesions of the greater curvature and of the anterior gastric wall are nearly always malignant. In lesions so situated few if any liberties are allowable so far as observations and medical management are concerned.

Appropriate to this discussion and pertinent to the problem of diagnosis, the therapeutic test merits due consideration. As an aid in differentiating a benign ulcer from a malignant lesion is not always a reliable one. Temporary clinical improvement has often been noted following dietary and other forms of medical management of ulcer when instituted in a patient harbouring a gastric carcinoma, and roentgenological and gastroscopic studies at repeated short intervals are subject to error in interpretation even by competent observers in these respective fields. The value of the test as a differential aid is dependent upon the selection of cases for its employment and upon the competency of interpretation of the observations at frequent intervals. It has been the experience of every gastric surgeon upon surgical exploration of patients in whom a medical regimen has continued following faulty interpretation of the original therapeutic test as an aid in the differential diagnosis of certain gastric lesions has been definitely established, but adherence to the fundamental principles which includes adequate interim treatment, careful observation and competent

interpretation, is necessary for reliance.

Lack of improvement in the clinical and roentgenological manifestations following careful medical treatment and competent observation over a period of several weeks not only suggests that the lesion is not responding but also justifies uncertainty regarding the true nature of the lesion. Surgical intervention must be considered in cases in which such uncertainty exists, and the urgency for surgical treatment is great when the evidence predominates in favour of a malignant lesion.

Unquestionably the ulcer-carcinoma problem bears a direct relationship to the operability of gastric carcinoma. Strange as it may seem, the operability and curability of carcinoma of the stomach in general has shown little if any increase during the past 25 years. To-day clinical inoperability is manifested in at least 50 per cent of the patients who harbour a malignant lesion of the stomach; and in at least half of those patients, in whom by clinical and roentgenological studies operability seems probable, surgical exploration discloses wide extension of the disease in the stomach or to extragastric structures, precluding partial or total gastrectomy. In the remainder of the cases gastric resection is possible either as an operation curative in purpose or to provide palliation. Few surgeons have the opportunity through early recognition of the disease to perform gastric

resection in 20 per cent of the people who harbour carcinoma of the stomach.

The gastric lesion is a medico-roentgenologic-surgical problem. Whatever the many factors may be which contribute to the present status of the operability of malignant lesions of the stomach, the physician and internist occupy strategic positions in their relationships with patients. Only through evoking the aid of the competent roentgenologist may the physician most conclusively differentiate the functional from the organic gastric disturbance. Only through careful interpretation of clinical and roentgenological evidence and through early surgical intervention in all cases in which doubt exists as the true nature of the lesion may the doubt be obviated and the curability of gastric carcinoma enhanced.

**Vitamin K:** H. P. SMITH, S. E. ZIFFREN, C. A. OWEN and G. R. HOFFMAN (*J. A. M. A.*, July 29, 1923) state that it is now well known that the bleeding tendency so often seen in patients having a biliary fistula or obstructive jaundice is due to abnormal lowering of the plasma prothrombin level and that in most cases the bleeding tendency may be relieved by vitamin K therapy.

Vitamin K is present in large amounts in certain green vegetables such as alfalfa, spinach, etc. The vitamin is a colourless compound however. It can be produced by bacterial action and

is therefore present in lower portion of the gut, even when the animal is fed on a diet free from this vitamin. Absorption from the lower part of the intestine does occur in the mammals and so in mammals vitamin K deficiency is rarely seen. It has been possible to extract the vitamin in the form of a highly potent oil. But its chemical composition is unknown. It has not yet been determined whether vitamin K enters chemically into the formation of prothrombin or if the vitamin merely keeps certain tissues in a normal healthy state of activity essential for the formation of prothrombin. A vitamin K deficiency occurs when absorption of this particular compound from the gut is interrupted. Faulty absorption occurs when bile is excluded from the intestine. Bile has long been known to aid the absorption of fats. Vitamin K is a compound having the solubility properties of fats and without bile or bile salts it cannot be absorbed. In obstructive jaundice or in patients with biliary fistulas the intestine receives no bile and hence the absorption of vitamin K is interrupted. After a few weeks or months the plasma prothrombin level falls and a tendency to bleed develops.

Treatment consists in feeding bile or bile salts, along with a large amount of this vitamin to augment the natural supply. Recent work has shown that the liver concerned with the manufacture of prothrombin. When the liver is partially excised or is injured by poisons, infection or

tumour growth, the level of plasma prothrombin falls. In these cases there is no vitamin deficiency and feeding with vitamin K does not cure the condition.

Vitamin K deficiency is to be suspected in all cases in which there are biliary fistulas or obstructive jaundice. The degree of deficiency tends to be greatest in cases of long duration but is sometimes marked when obstruction is of recent origin.

Much is still to be learnt about the amount of vitamin K to be administered. Some vitamin K is formed by intestinal bacteria and some is present normally in the diet; hence the daily feeding of bile prevents the fall in prothrombin level incident to biliary fistula. Feeding bile also restores the prothrombin level to normal. However recovery is slow unless the diet is artificially enriched with the vitamin. Bile or bile salts must be fed along with the vitamin to aid in the absorption of the latter from the intestine. It is customary to feed daily at least an ounce of bile or its equivalent in the form of dried bile or bile salt.

It need hardly be mentioned that vitamin K is useless in the treatment of hæmophilia or thrombocytopenic purpura.

**Surgery and the Basic Sciences—The application of recent contributions in Basic Medical Sciences to Surgical practice:** A. C. IVY, M.D., AND J. S. GRAY, Ph.D., (*International Abstract of Surgery*, July 1939).

**Vitamin K and Obstructive Jaundice.**—A long series of researches in basic medical sciences has in the past year apparently culminated in the solution of one of the most perplexing of clinical problems:—the explanation and methods for the control of the hæmorrhagic diathesis of jaundice. This series of researches began in 1929 when Dam placed chicks on a synthetic diet containing only cod liver oil as a source of the fat soluble vitamins in order to conduct experiments on the cholesterol metabolism. It was noted that the chicks developed a syndrome characterised by severe subcutaneous and intramuscular hæmorrhages and erosions of the lining of the gizzard. Although these symptoms suggested a deficiency of vitamin C, Dam was unable to control them by the administration of lemon juice. MacFarlane, Graham and Richardson observed a similar hæmorrhagic condition in chicks reared on an ether-extracted diet. Blood from these animals was observed to remain uncoagulated when allowed to stand over night. Holst and Halbrook made the same observation, but suspected a vitamin C deficiency, since the condition responded to the inclusion of cabbage in the diet. In 1934 Dam and Schonheyder reported that cereals contained adequate amounts of a curative substance. Their finding that ascorbic acid and cod liver oil failed to influence the hæmorrhagic tendency definitely eliminated vitamin A, D, and C. In addition to gross spontaneous hæmorrhages the deficient chicks failed to grow normally and exhibited

severe anæmia. Since the most characteristic symptom appeared to be a loss of blood coagulability (spelt with a K in the German languages), the new vitamin was given in the name of *vitamin K*. Subsequent investigation revealed that the gizzard erosions were due to the absence of an entirely different dietary factor.

Schonheyder has shown that the enormous delay in coagulation time in chicks deficient in vitamin K is not due to a disturbance in the fibrinogen calcium, or cellular elements of the blood, or in the thrombokinase content of the tissues. Some constituent of normal blood plasma was absent, however, for the addition of normal plasma to the blood of bleeding chicks restored the coagulation time to normal. The deficient element in the coagulation process was shown by Dam, Schonheyder and Tage-Hansen to be prothrombin. Although vitamin K itself could not behave *in vitro* as prothrombin, inconclusive evidence was obtained that vitamin K might be a constituent of prothrombin, perhaps a prosthetic group of the prothrombin complex. By a more convenient and accurate method, which involved the same principles as Quick's method for the determination of prothrombin (*vide infra*), Schonheyder has demonstrated an almost complete disappearance of prothrombin from the blood of chicks deficient in vitamin K. According to the result of Dam, Gavind, Lewis, and Tage-Hansen the intravenous or intramuscular injection of

vitamin K concentrates in the form of an emulsion reduced the coagulation time within an hour. The vitamin was ineffective when administered subcutaneously unless it was dissolved in water with the aid of desoxycholic acid.

Vitamin K was reported by Dam to be present in high concentration in hog liver and in certain seeds and in green leafy vegetables, but to be absent from wheat-germ oil. The latter finding clearly differentiated it from vitamin E. It was found to be a fat-soluble vitamin, present in the non-saponifiable but non-sterol fraction of extracts from potent sources. These findings in regard to the chemical behaviour of the vitamin were confirmed promptly and independently by Almquist and Stockstad who continued the investigations of Holst and Halbrook mentioned previously. Almquist later prepared a material which underwent crystallisation at low temperatures and which when added to the diet of chicks in quantities of from only 2 to 4 mgm. per kgm. of food protected chicks against deficiency symptoms. More recently Almquist and Klose have prepared a crystalline derivative of vitamin K by coagulation with cholic acid. The free vitamin is apparently an oily liquid at room temperatures. It has not yet been synthesized, nor elucidated.

The hæmorrhagic tendency as a result of vitamin K deficiency

was originally observed in chicks. Subsequently Dam, Schonheyder and Lewis produced the same symptoms in a variety of aviary forms, but were unsuccessful in the case of rats, guinea-pigs, and dogs. Almquist and Stockstad and Almquist, Pentler, and Mecchi have shown that micro-organisms are capable of synthesising the vitamin in food, in fæces, or in pure culture. This may possibly account for the difficulty encountered in producing deficiency symptoms in mammalian forms. However, Murphy has recently published a preliminary report which suggests that a hæmorrhagic condition associated with delayed coagulation may be produced in mice by dietary means. Greaves has recently reported that 12 of 77 rats maintained on a diet deficient in vitamin K developed hæmorrhagic symptoms associated with a low prothrombin level of the blood. The condition was corrected by the administration of vitamin K concentrates. Even when reared on a diet deficient in vitamin K, rats were found to eliminate the vitamin in the fæces as a result of bacterial synthesis. Apparently therefore dietary means alone may suffice to produce the condition in occasional animals.

The real significance of vitamin K for mammalian physiology and for clinical medicine was revealed by investigations along a different line. An enormous literature relative to the coagulation defect in the hæmorrhagic diathesis of jaundice has accumulated. This work

merely served to prove quite conclusively that bleeding in jaundice is in no way related to a disturbance in fibrinogen or calcium levels of the blood, to a deficiency in the formed elements of the blood, nor to any other easily studied component of the clotting mechanism. Until a few years ago the only available method for the determination of prothrombin level of the blood was Howell's prothrombin time. In view of this situation, Quick, Stanley-Brown and Bancroft in 1935 devised a more specific method for the determination of blood prothrombin, the only well-known element of the clotting mechanism which had not been adequately studied. In this method the most important variable, the thrombokinase, or platelet or tissue factor, is controlled by adding an excess of this substance to plasma before determining the coagulation time. By this method these authors were able to reveal a prothrombin deficiency in the blood of jaundiced patients exhibiting a hæmorrhagic tendency. Warner, Brinkhous and Smith devised a still more accurate and specific method for the determination of the concentration of prothrombin in the blood. This method was applied by Hawkins and Brinkhous to the study of the bleeding tendency which was previously observed to occur in dogs with chronic biliary fistulas. In such animals they observed a marked deficiency in the prothrombin level of the blood, which together with the bleeding could

be prevented by returning bile to the intestinal tract.

In the meantime Greaves and Schmidt had been conducting a series of experiments revealing the necessity of bile for the adequate absorption of the fat-soluble vitamins A, D and E. These investigators observed a hæmorrhagic tendency in their rats with bile fistulas and demonstrated that it was accompanied by a decrease in the blood prothrombin level as determined by the method of Quick. The condition could be prevented by the oral administration of bile. By this time the existence of vitamin K was becoming generally recognized and Greaves and Schmidt restored the normal level of prothrombin in the rats with bile fistulas by the administration of concentrates of the vitamin. Accordingly, the evidence began to indicate that fat-soluble vitamin K is required by mammals and that if bile, which is essential for its absorption, is absent from the intestine, deficiency symptoms quickly supervene.

Greaves has recently confirmed and extended his findings in rats with bile fistulas and showed that bile is necessary for the absorption of vitamin K, and that the bleeding tendency may be cured by the administration of bile if the diet contains vitamin K, or by large doses of vitamin K alone. Other vitamins were entirely ineffective. Smith, Warner, Brinkhous and Seegers have reported analogous results in dogs with bile

fistulas, and Dam and Galvind in chicks with bile fistulas.

Another factor has been shown to be of importance in the role of vitamin K in the economy of the mammalian organism. Smith, Warner and Brinkhous have shown that mild liver damage, produced by the repeated administration of chloroform to dogs, lowers the blood prothrombin level and induces bleeding. Under these circumstances the blood fibrinogen is not reduced. Warner has produced the same effects in rats by partial removal of the liver. Hepatic insufficiency of a degree sufficient to dangerously lower the blood prothrombin level leaves the fibrinogen concentration unaffected. The evidence therefore indicates that an adequately functioning liver is essential for the utilization of vitamin K in the production of prothrombin.

The possible clinical applications of these results obtained by animal experimentation were quickly realized and appropriate investigations were undertaken by a number of workers. Quick has demonstrated low blood-prothrombin levels in certain patients with jaundice or liver damage. Brinkhous, Smith and Warner have shown that the bleeding tendency in jaundice is accompanied by marked reduction in the blood-prothrombin concentration. They found that administration of bile or of vitamin K concentrates restored normal blood values and corrected the tendency towards bleeding. Dam and Galvind have also reported

the successful treatment of bleeding in jaundice by the administration of vitamin K concentrates. Snell, Butt and Osterberg have confirmed these results and claim that active bleeding may be controlled by this therapy. The evidence appears to indicate that a determination of the blood-prothrombin level is a valuable indication of future bleeding in jaundiced patients and that vitamin K and bile salts afforded an effective therapeutic measure in the control of the condition. In 1934, before vitamin K had come into prominence, McNealy, Shapiro, and Melnick reported that the administration of viosterol was effective in controlling the hæmorrhagic diathesis of jaundice. The viosterol was given orally in conjunction with bile salts in those patients whose acholic stools betrayed the absence of bile from the intestine. This addition of bile salts may have augmented the absorption of vitamin K as well as that of vitamin D and thereby contributed to the effectiveness of the therapy. However, effective results were obtained in patients to whom bile salts were not administered. These results could not be attributed to an improved absorption of vitamin K. Gray and Ivy who studied the blood-calcium changes in these patients concluded that the most reasonable hypothesis which might be advanced to explain the effectiveness of viosterol was that it improved liver function. How this improved liver function was translated into a reduction of the bleeding tendency was complete-

ly unknown. However, if the beneficial effect of the viosterol were sufficient to enable the liver to utilize more efficiently the limited amounts of available vitamin K so as to elevate the prothrombin concentration from a hæmorrhagic level to a slightly higher level, the results could be explained. This is, of course, pure speculation and the future will have to reveal whether or not it is valid.

Recent investigations have suggested another clinical application of vitamin K. Brinkhous, Smith and Warner have reported that the blood-prothrombin level of infants is very low when compared with adult values. After the first several months of life, however, it approaches the adult level. In a case of hæmorrhagic disease of the newborn the prothrombin concentration was found to be only 5 per cent of the adult level. A transfusion of adult blood significantly raised this value and resulted in the cessation of bleeding. Waddell, Guerry, Bray and Kelley have recently reported that the administration of vitamin K concentrates to two infants with very low prothrombin levels and prolonged coagulation time dramatically restored normal values. Vitamin K, therefore, may provide a simple and effective means for the control of hæmorrhagic disease of the newborn.

A new factor which may have to be considered in the explanation of hæmorrhagic tendencies has been pointed out by Warner

Brinkhous and Smith. These investigators have found that the prothrombin level is quite constant in various mammalian species, but that man and the guinea-pig differ from the others in that the prothrombin is converted to the active thrombin at a much slower rate. This may account partially for the fact that the human species is so subject to the hæmorrhagic diathesis.

Lichtman and Chambers have isolated a sterol compound from liver which is chemically distinguishable from vitamin K, but which is nevertheless claimed to be capable of restoring a normal coagulation time in chicks deficient in vitamin K and in rats with bile fistulas.

A new preparation remarkably effective as a hæmostatic agent for the control of bleeding during surgical procedures has been obtained by Seegers, Warner, Brinkhous and Smith. These workers have made highly potent, sterile solutions of thrombin, which when sprayed on bleeding tissues almost instantly put an end to the bleeding. These solutions are effective in the control of bone bleeding without the use of wax.

**Vitamin P and Capillary Fragility:** EDITORIAL (*Surg., Gynec. Obst.*, July 1939). It is widely accepted that an increase in the fragility of the capillaries is one of the earliest symptoms of vitamin C deficiency. However, an increased capillary fragility is not specific for this condition,

for a large number of factors influence the resistance of the capillaries as determined by the positive pressure or negative pressure methods. Liebmann, Wortis and Wortis have been unable to demonstrate any accurate correlation between capillary fragility as determined by these methods and the level of ascorbic acid in the various body fluids. Nevertheless claims have been frequently made that a variety of hæmorrhagic tendencies accompanied by increased capillary fragility will respond to the administration of natural sources of vitamin C. Armentano was unable to confirm these reports when pure ascorbic acid was used. This suggested to Armentano, Bentsath, Beres, Rusznyak and Szent-Gyorgyi in 1936 that some active constituent in the natural sources of the vitamin, which is lost in the process of purification, might be responsible for controlling these purpuric tendencies. They found that crude preparations of vitamin C were effective in the treatment of certain types of purpura which failed entirely to respond to ascorbic acid. The active constituent of these extracts was isolated in crystalline form as a mixture of flavone glucosides. To this substance they gave the name "citrin" or vitamin P. The test subjects were observed visually for purpura; capillary resistance was measured by a suction method; capillary permeability was determined by the method of Landis. The administration of 40 mgm. of extract per day to patients who were abnormal with respect to these tests

restored normal conditions. Thrombocytopenic purpura, however, was not improved by these measures. Bruckner and Szent-Gyorgyi later identified the active flavones as hesperidine and eriodictyol glucoside

Following these clinical observations attempts were made to provide experimental evidence from animals in support of the new vitamin. Bentsath, Rusznyak and Szent-Gyorgyi reported that guinea-pigs maintained on a scorbutic diet lived somewhat longer, lost less weight, and exhibited less severe hæmorrhage when citrin was made available to the animals. Both the control and the citrin-treated animals, however, succumbed to scurvy. The same authors obtained similar results when the citrin was replaced by hesperidine. These results were quickly challenged, however, by Zilva, who could detect no effect from the administration of citrin or its component flavones. The ameliorative effects reported by Szent-Gyorgyi could be readily produced by the administration of subcurative doses of ascorbic acid. Neither Moll nor Matussis were able to influence the course of scurvy in guinea-pigs by means of citrin. Bentsath and Szent-Gyorgyi then revealed that their experiments had been repeated at their request in a number of independent laboratories with some success and some failures. These discrepancies they attributed to the fact that citrin must contain traces of ascorbic acid to be effective. In fact, Bentsath and Das claimed that the effect of

citrin could be demonstrated only in animals which had received supplements of vitamin C before being subjected to the scorbutic diet. Zilva immediately pointed out that this factor could not have influenced his failure to confirm the effects of citrin. Accordingly the animal experiments have failed to provide any evidence supporting the existence of the proposed vitamin. A method for studying this substance in animal experiments, would be of great importance, but, as Robeznieks has shown, the available methods for the detection of flavones are so insensitive as to preclude the possibility of constructing a flavone-free diet for animals.

Clinical investigation of the effects of citrin in hæmorrhagic conditions has proceeded. Elmby and Warburg have reported that occasional individuals with a hæmorrhagic tendency associated with low ascorbic acid levels in the blood fail to respond to the administration of excessive amounts of ascorbic acid. Three such subjects studied, however, did respond to the ingestion of lemon juice with a rise of the ascorbic acid content in the blood and disappearance of the bleeding tendency. Lajos has found citrin to be effective in decreasing capillary fragility and permeability in "vascular" purpuras and hæmorrhagic nephritides. Similar results have been claimed by Raunvert and Lotze. Scarborough and Stewart administered hesperidine to six patients with resulting improvement of the clinical condition and

reduction of the capillary fragility. Three of these patients were exhibiting spontaneous petechial hæmorrhages which had followed the administration of arsenic or bismuth.

Jersild reported a case of a young woman with a typical case of Schönheim-Henoch purpura of many years standing which failed completely to respond to intravenous ascorbic acid therapy. Treatment with citrin, however, dramatically alleviated the symptoms and markedly improved capillary resistance. Withdrawal of the citrin produced relapses. The patient was later placed on a diet so deficient in vitamin C that ascorbic acid all but disappeared from the blood, yet no return of symptoms occurred as long as citrin was regularly administered.

The present status of vitamin P is by no means clear. Animal experiments have yielded no purport for the existence of the vitamin. Clinical experience with the substance is not yet extensive enough to definitely establish its therapeutic or pharmacological activity. At the present time even elementary evidence to prove that citrin is a vitamin required by man or any other species is completely lacking. However, if the clinical trials continue to be sufficiently encouraging to stimulate interest in its investigation, experimental procedures will undoubtedly be devised to disclose its true nature.

**Vitamin C and the Aging Eye:**  
S. M. BOUTON (*Arch. Int. Med.*,

*The Madras Medical Journal*

Vol. 63, No. 5, May 1939). From a comparison of the excretion values and the levels in the blood during and after treatment as well as from the results of ophthalmoscopic and reading tests, it appears that ascorbic acid deficiency can be held at least partly responsible for impairment of vision associated with senescence of the human eye and that the administration of ascorbic acid by mouth in adequate doses can counteract this process so far as the crystalline lens is not primarily involved. The lens, although showing a definitely subnormal ascorbic acid content with cataractous conditions, apparently cannot be favourably affected by the administration of ascorbic acid by mouth, even in excessive amounts after senile changes have set in. Little is gained by continuing the administration of large amounts of ascorbic acid if there is no measurable improvement after daily treatment for two weeks. Combining more than one of the vitamins known to be specifically associated with the metabolic functioning of the eye may prove successful when ascorbic acid alone ceases to be of benefit.

**Toxic Actions of Thiocyanates:**  
EDITORIAL (*B. M. J.*, 29th July 1939). Pauli in 1903 stated that thiocyanates were effective in reducing high blood pressure. The drug was used for this purpose but fell into disrepute on account of the toxic side actions that it set up. Westhal in 1935 reintroduced the drug for the treatment of hypertension. This

*Abstracts from Current Medical Literature*

use has been criticized on the grounds that the drug is valueless for this purpose and may be dangerous. Thiocyanates may give rise to a condition resembling iodism, but the commonest toxic effect is muscular weakness coupled with cerebral symptoms; the latter may resemble those seen in bromide poisoning. Thiocyanates merely cause fatal poisoning but Garvin reports a death following administration of therapeutic doses. He found seven human fatalities recorded in the literature. In three of these large quantities were taken with suicidal intent, but four were the result of therapeutic administration. The estimations of blood thiocyanate in the case reported by Garvin show clear evidence of cumulation, and suggest a daily excretion of about one-tenth of the thiocyanate present in the body. Severe toxic effects occurred when the blood thiocyanate rose to 18.7 mg. per 100 c.cm. Wald Lindberg and Barker have provided a review of the results of thiocyanate therapy, and conclude that thiocyanates are of therapeutic value when the blood concentration rises to between 8 and 14 mg. per 100 c.cm., but that higher concentrations (15 to 20 mg. per 100 c.cm.) are definitely poisonous. This conclusion indicates that thiocyanate therapy is dangerous in that the drug, which is cumulative, must be pushed to very near the toxic level. The authors point out the method can only be safe if the blood thiocyanate content is measured regularly. They also make some disquieting observations on the

subject of chronic poisoning. In some cases, they believe, the use of the drug has induced angina, and it is observed that patients who have taken thiocyanates over periods of five to ten years become anæmic and thin and undergo muscular wasting.

**Leucocytosis and Leucopenia:**  
EDITORIAL (*B. M. J.*, 29th July 1939). It is generally agreed that the white blood cells may be unevenly distributed through the vascular system, and that large quantities of cells may be moved from one territory to another for the most divergent reasons. This irregular distribution is connected with the tendency of the cells to assume a marginal position in the smaller vessels, or para-capillaries, as Vejlens calls them in a useful monograph on the distribution of leucocytes in the vascular system. It is usually held that the abdominal vascular region must be regarded as the reciprocal of the periphery, increase in the one being associated with decrease in the other. Vejlens deprecates the tendency to think in terms of leucocyte depots, and emphasises the far more important distinction between the large vessels and the para-capillaries. A depot is merely a situation in which para-capillary vessels occur in large quantities and the circulatory conditions are such as to admit at the time of an extensive marginal position of the white cells. Vejlens shows by direct observation that factors which cause the white cells to accumulate in the para-capillary vessels are dilatation of the

vessels, slowing of the circulation, and increase in the sedimentation rate of the red cells. In his experiments accumulations were especially likely to occur in the lungs and spleen, owing partly to the experimental conditions and partly to the vascular structure of these organs. It follows that in any study of the white cells the observer should be certain of the source of his blood samples before he interprets them. Blood obtained by venepuncture is truly representative of the state of affairs in the veins, but blood obtained by puncture of the skin or an internal organ cannot be assumed to be capillary blood. In the latter case only the first few drops indicate the local blood count, for the marginal white cells are carried out first and after a short time they are exhausted. At least one-third of the polymorphonuclear leucocytes in the skin are marginal. There are no marginal leucocytes during hyperæmia, but their number increases in stasis and pneumonia.

The distinction between true and false leucocytosis is emphasised by Das Gupta in an interesting study of the action of a number of drugs, presumed to be leucopoietic. Gupta assumes that leucocytosis may be due to (1) redistribution of circulating leucocytes, (2) mobilization of preformed reserves in the marrow, and (3) increased maturation of granulocytes; and he assumes that the third property alone is likely to be of value in therapeutics. Only transient leuco-

cytosis, due mainly to redistribution and partly to mobilization of leucocytes, was observed after single injections of pentnucleotide, sodium nucleinate, liver extract, histamine, adrenaline, and acetylcholine and related substances. Colchicine stimulated the proliferation of cells in the marrow, but the toxic effects of this drug outweighed its stimulant powers. No evidence was obtained that liver extract or pentnucleotide can accelerate the formation of white cells in health, even though injections are frequently repeated. Das Gupta criticizes the physiological evidence on which the introduction of pentnucleotide into therapeutics was based, and suggests that the associated procedures to which the experimental animals were submitted were in themselves enough to produce leucocytosis and hyperplasia of the marrow. He points out that neither iron nor liver will raise the red cell count beyond the normal level, and sees no reason why the leucopoietic tissues should behave differently when they are supplied with an excess of hæmatinic principles. In theory, liver and pentnucleotide might raise to normal a leucopoesis which had been depressed, but in practice they have been disappointing. At present the only way in which leucopoiesis can be raised above the normal level appears to be by some injury to the blood or blood-forming organs, and we remain ignorant of the chemical principle or principles by which these reactions are mediated.

The leucocytosis which occurs with exertion and excitement is probably a redistribution phenomenon. The nervous system plays some part in its control, but Fuzli has shown that, though diminished, it is not completely abolished by sympathectomy. The more remote possibility of an effect of the nervous system on leucopoiesis is raised by Reznikoff's finding that the most constant ætiological factor in agranulocytosis is a period of fatigue, worry, and sleeplessness. It is unlikely that the nervous state is the result of leucopenia or that a certain level of circulating leucocytes is necessary for the sense of well-being, for patients with chronic hypoplastic anæmia make no such complaints. There can, however, be no doubt of the importance of a

good white-cell response in resisting infection. Van Duyn emphasises the value of counting the white cells after operation when the patient takes an unexpected turn for the worse or follows a progressive downhill course. Surgeons are all familiar with leucopenia from overwhelming infection, but Van Duyn has found it where the degree of sepsis might have been thought insufficient, so that it seemed probable that the leucocyte reserve was at a low level before operation. He advises injection of liver and transfusion. Massias and co-workers advise vitamin therapy, and especially vitamin B<sub>1</sub>, as its chemical structure is allied to that of pentnucleotide, but neither their arguments nor their case histories are very cogent.

### WHERE THERE'S A PILL, THERE'S A WAY

*(Written during the Eighth Month of Pregnancy, by Which Time Life Has Become Very Pill-Like)*

Pills for iron and constipation,  
Pills to aid in relaxation,  
Pills of different shapes in green, and brown,  
and pink;  
Pills to make you energetic  
If you're feeling apathetic;  
What a pill-like world!—the embryo must think.

Pills to stimulate digestion;  
I should like to ask one question:  
Though the labels give to every pill a cue,  
Where, within you they are cruising,  
Is it not a bit confusing?  
How does each pill know exactly what to do?

When they're broken up and crummy,  
Do they gather in your tummy  
And decide just who does what and which  
goes first?  
Do they hold a consultation,  
Tell to each his destination,  
And then venture forth, resolved to do their  
worst?

I would bet a wooden nickel  
They are sometimes in a pickle,  
When they get down there and shed their  
little frills;  
And what's more, my precious baby,  
By the time you're grown up maybe  
You'll exist on just a heap of colored pills.

*(From J. A. M. A.)*

## Service Notes

The Executive Committee has appointed Dr. S. Thambiah, M.C., M.R.C.P.E., Secretary in the place of Dr. S. K. Sundaram who is on leave. Dr. S. Thambiah also acts as Editorial Secretary. Dr. V. C. Govinda Menon, M.R.C.P.E., has been co-opted a member of the Executive Committee.

The Committee is drafting another memorial to the Government on the question of the restriction of private practice and is proposing to wait on the Hon'ble the Premier and the Hon'ble the Minister for Public Health on deputation.

**Appointments.**—For the first time a member of the Provincial Service Dr. A. Lakshmanaswami Mudaliar, B.A., M.D., F.R.C.O.G., has been appointed the Superintendent of the Government Hospital for Women and Children in a permanent vacancy, though he has acted in that capacity several times before. Dr. A. P. Kuriappan, M.D., has been appointed Second Obstetric Physician and Surgeon. Our congratulations to both of them.

Dr. N. Mangesh Rao, F.R.C.S.E., and Dr. V. C. Govinda Menon, M.R.C.P.E., have been made Professors in the Madras Medical College in their respective appointments. Dr. M. G. Kini, M.C., F.R.C.S.E., and Dr. K. N. Pisharoti, M.D., M.R.C.P., have been promoted to the rank of Professors in the Vizagapatam Medical College. These changes in designations and promotions were long overdue and it is a

satisfaction to us that these have now been achieved in spite of the unfavourable conditions that face us.

For the first time, a Provincial Service officer, Dr. D. Kanakasabesan, M.S., F.R.C.S.E., has been appointed as Professor of Surgery and Surgeon, Government Royapuram Hospital, Madras, in place of an I. M. S. Officer.

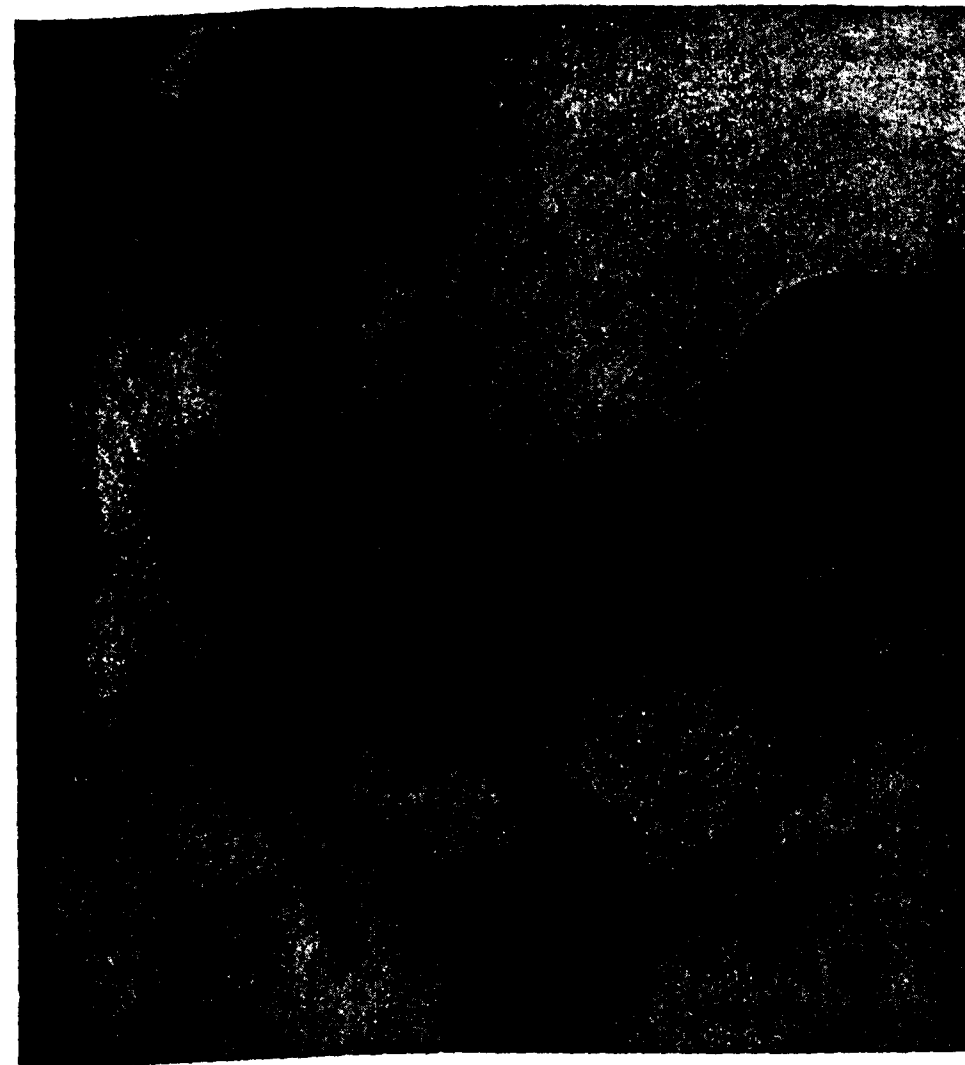
As against these appointments we regret to note that the post of Resident Medical Officer of the Madras General Hospital is now filled by an assistant surgeon and that a number of duty posts of assistant surgeons in the mofussil have been thrown open to honorary medical officers and some of them already so filled.

Dr. R. Sanjiva Rao, M.B.B.S., D.T.M., of the King Institute has been appointed to be in charge of the Anti-rabic department of the Haffk in Institute, Bombay. We heartily Congratulate him.

**Retirements.**—During the present quarter the following officers have retired on attaining the age of 55:—

1. Dr. D. Krishnayya, B.A., M.B.C.M., 1st July 1939.
2. Dr. Syed Ghulam Hussain Sahib, L.M. & S., 9th July 1939.
3. Rao Bahadur Dr. K. Raghavendra Rao, B.A., M.B.C.M., D.P., 25th August 1939.

We wish them a long peace and further useful the community.



## ACUTE PELVIC CONGESTION

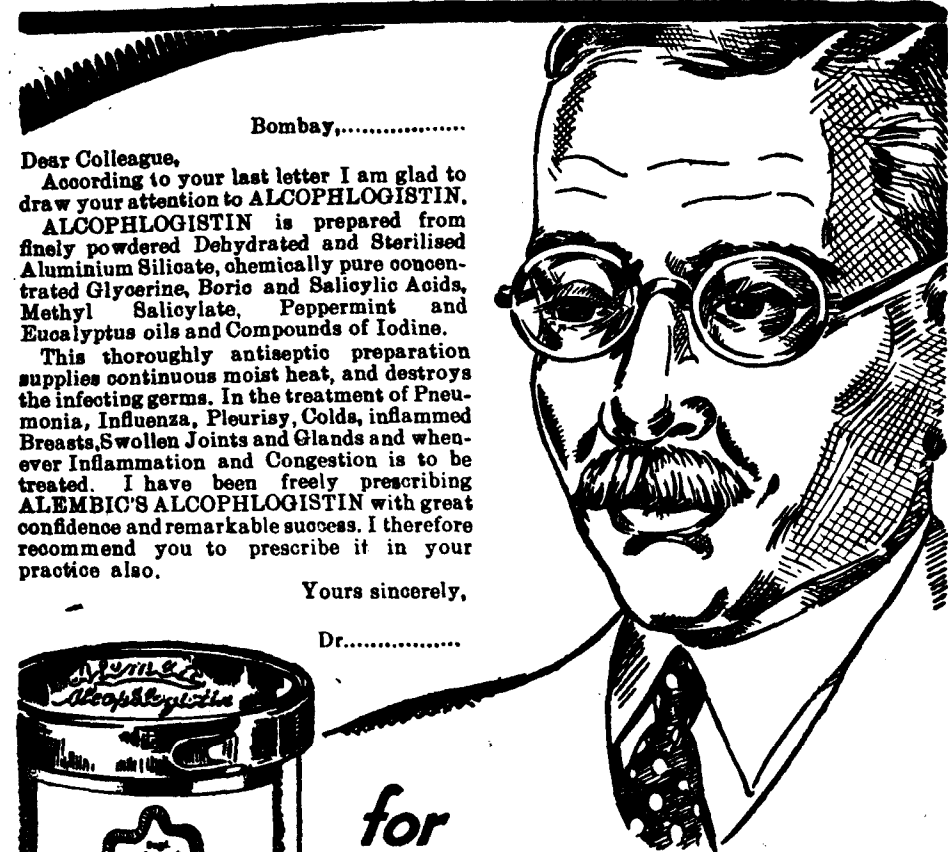
In the treatment of such conditions, the use of Antiphlogistine, applied vaginally, as tampons, and abdominally, as poultices, answers the need for both heat and glycerine medication for the relief of inflammation, congestion, and pain.

## ANTIPHLOGISTINE

PINGITIS • METRITIS • CERVICITIS • VAGINITIS

Sample on request

ENVER CHEMICAL MANUFACTURING COMPANY  
163 VARICK STREET • NEW YORK CITY



Bombay,.....

Dear Colleague,

According to your last letter I am glad to draw your attention to ALCOPHLOGISTIN.

ALCOPHLOGISTIN is prepared from finely powdered Dehydrated and Sterilised Aluminium Silicate, chemically pure concentrated Glycerine, Boric and Salicylic Acids, Methyl Salicylate, Peppermint and Eucalyptus oils and Compounds of Iodine.

This thoroughly antiseptic preparation supplies continuous moist heat, and destroys the infecting germs. In the treatment of Pneumonia, Influenza, Pleurisy, Colds, inflamed Breasts, Swollen Joints and Glands and whenever Inflammation and Congestion is to be treated. I have been freely prescribing ALEMBIC'S ALCOPHLOGISTIN with great confidence and remarkable success. I therefore recommend you to prescribe it in your practice also.

Yours sincerely,

Dr.....



*for*  
**INFLAMMATION  
AND CONGESTION**

**ALCOPHLOGISTIN**

**ALEMBIC CHEMICAL WORKS Co. Ltd.**  
**Bombay, Baroda, Madras, Calcutta.**

For Non-Specific Protein Therapy, the Medical Profession  
has fully endorsed the claims of

## LACTUMIN

A Sterile Milk Protein

in the treatment of

intractable skin affections, various types of Gynaecological conditions, Rheumatic and Gonorrheal arthritis, Puerperal sepsis, Iritis and other Chronic Inflammatory conditions.

Available in 2, 5 & 10 c.c. ampoules

Bengal Chemical & Pharmaceutical Works, Ltd.  
CALCUTTA :: :: BOMBAY  
Madras Agents: N. DASAI GOWNDER & CO.  
41, Bunder Street G. T., MADRAS

For Kala-Azar and Leishmaniasis

## STIBURAMIN

(A carbamide derivative of para-amino phenyl stibinic acid)

Tested Chemically and Physiologically in our Laboratory  
and in the School of Tropical Medicine, Calcutta.

Advantages:

High Chemotherapeutic Activity: Relatively Shorter Course  
Invaluable in Relapse: No Toxic Effect

Available in doses of

0.01 grm., 0.025 grm., 0.05 grm., 0.10 grm., 0.15 grm. and 0.20 grm.

Bengal Chemical & Pharmaceutical Works, Ltd.  
CALCUTTA :: :: BOMBAY  
Madras Agents: N. DASAI GOWNDER & CO.  
41, Bunder Street G. T., MADRAS

Printed at MESSRS. GORDON & CO., LTD. (Gordon Press), 768-770, Triplicane High Road, Madras,  
by R. Ravaimanickam, the Managing Director.  
Published by Dr. J. Christdosa David, M.B.B.S., Ph.D., Madras Medical Association.

# The Madras Medical Journal

THE OFFICIAL JOURNAL OF THE MADRAS MEDICAL ASSOCIATION

PUBLISHED QUARTERLY.

Vol. XIX.

OCTOBER 1939.

No. 4.

Joint Editors:

J. C. DAVID, M.B., B.S., PH.D. (EDIN.).

G. V. SATYANARAYANAMURTI, M.D.



### RATES OF SUBSCRIPTION.

For Members of the Madras Medical  
Service on payment of an Annual Member-  
ship fee of Rs. Five only.—Free.

For non-Members including Medical Practi-  
tioners—Rs. Three per annum, post free.

For bona-fide Medical Students—Rs. Two  
per annum, post free.

Foreign 7sh. 6d. Post Free.

Single Copy Twelve Annas.

## EDITORIAL NOTICE.

The Madras Medical Journal is issued quarterly, in January, April, July and October about 20th of the month. All Editorial communications, reports, books for review and exchange should ordinarily reach the Editor, The Madras Medical Journal, Dept. of Pharmacology, Medical College, Madras, one month prior to the date of issue of the Journal, preferably earlier. Original articles, clinical lectures, case reports, abstracts, Medical Society addresses are invited. Contributors of original articles will be supplied gratis with twenty reprints of papers, if applications for the same are received by the Editor along with the contributions.

## BUSINESS NOTICE.

### Subscription Rates.

To Members of the Madras Medical Service on payment of an Annual Membership fee of Rs. Five only—Free.

To non-Members including Medical Practitioners and others, Rs. Three per annum, post free.

To bona-fide Medical Students, Rs. Two per annum, post free.

Foreign 7sh. 6d., post free.

### Rates of Advertisement.

|                               | One Page. | Half Page. | Quarter Page |
|-------------------------------|-----------|------------|--------------|
|                               | Rs.       | Rs.        | Rs.          |
| Single insertion              | ... 20    | 12         | 7            |
| Three insertions              | ... 40    | 24         | 14           |
| 4 insertions                  | ... 50    | 30         | 20           |
| 4 insertions (inside reading) | 60        | ...        | ...          |

Discount of 33½ per cent will be given if advertisements are inserted for 3 complete years.

All advertisement charges and subscriptions are payable in advance. Letters relating to the publication, sale and advertisement department should be addressed to :—

**Dr. J. C. DAVID,**

Joint Editor, The Madras Medical Journal,

'Kedleston,' Ormes Road, Kilpauk, Madras.

Copies of the Journal can be obtained at twelve annas each from Messrs. Gordon & Co., Ltd., Printers, 768-770, Triplicane, Madras, or at the Editor's Office, Medical College, Madras. Changes of address and complaints of non-receipt of Journals should be immediately communicated to the Secretary, to the above address. Matter for advertisement should reach the Editorial Secretary, at least ten days before the date of issue of the Journal.

## THE MADRAS MEDICAL JOURNAL

Vol. XIX.

OCTOBER 1939.

No. 4.

## CONTENTS

|                                                                                                                                                   | PAGE    |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1. ROENTGEN TREATMENT OF CARCINOMA BREAST<br>By K. M. Rai, M.B., F.R.C.S.E. D.M.R. (Lond.)                                                        | ... 235 |
| 2. RECENT ADVANCES IN THE TREATMENT OF GONORRHOEA.<br>By N. Vasudeva Rao, M.B.B.S.                                                                | ... 242 |
| 3. PROBLEMS CONNECTED WITH THE DIAGNOSIS AND TREATMENT OF LEPROSY.<br>By S. Thambiah, M.C., M.R.C.P. (Edin.), D.T.M. & H. (Lond.), F.D.S. (Lond.) | ... 247 |
| 4. CLINICAL MEMORANDA.                                                                                                                            |         |
| (a) RECURRENT TUBAL PREGNANCY.<br>By R. G. Krishnan, M.R.C.S., L.R.C.P., F.R.C.S.I.                                                               | ... 251 |
| (b) ACUTE INVERSIONS OF THE UTERUS.<br>By R. G. Krishnan, F.R.C.S. (Ireland)                                                                      | ... 256 |
| (c) TREATMENT OF SPRAINS BY LERICHE'S METHOD<br>By P. S. Janardhanan, B.A., M.B.B.S.                                                              | ... 258 |
| (d) TWO CASES OF MOON LAWRENCE BIEDL SYNDROME<br>By R. E. S. Muthayya and T. R. Vythianatha Iyer                                                  | ... 260 |
| (e) AMYLOID DEGENERATION OF CONJUNCTIVA<br>By R. E. S. Muthayya, M.B.B.S., L.O.                                                                   | ... 262 |
| (f) A CASE OF OCULOGYRIC CRISIS IN CHRONIC ENCEPHALITIS LETHARGICA<br>By R. E. S. Muthayya, M.B.B.S., L.O.                                        | ... 266 |
| 5. ABSTRACTS FROM CURRENT MEDICAL LITERATURE                                                                                                      | 267     |
| 6. SERVICE NEWS AND NOTES                                                                                                                         | ... 295 |
| 7. BOOK REVIEW                                                                                                                                    | ... 297 |

The  
**Madras Medical Journal.**

The Journal of the Madras Medical Association.

PUBLISHED QUARTERLY.

Vol. XIX.

OCTOBER 1939.

No. 4.

**Roentgen Treatment of Carcinoma Breast**

BY K. M. RAI, M.B., F.R.C.S.E., D.M.R. (Lond.),

*Barnard Institute of Radiology, Madras.*

At the present moment it is safe to say that there are only two methods of treatment available by which a malignant disease can be successfully treated: Surgical excision, and Radio therapy which includes X-rays and Radium, there being no fundamental difference between the two agents in their biological action.

It is unnecessary for me to state here that, in order to obtain the best results, it is essential that both the agents should be under the control of the same hands since the successful application of both requires a very thorough knowledge of the physical factors involved.

Successful irradiation therapy of cancer of the breast demands perhaps more than most other branches of radiation therapy,

precise knowledge of the surgical and pathological problems involved, the life history of the disease and, in particular, its mode of spread.

The earliest form in which this treatment was applied in breast cancers was a post-operative measure which is still the practice of some surgeons. This method of treatment was used as early as 1914 about 20 years after the discovery of X-rays by Roentgen with the advent of the Coolidge tube. In the years which have elapsed since its introduction for this purpose, the details underlying its applications have undergone a continuous improvement keeping pace with the advances in our knowledge of mammary cancer itself on one hand and of the physical agents, X-rays and Radium on the other hand.

In this evolution there have been two important lines of investigation which have been particularly important in their influence upon methods and results. One of these is our understanding of the mode of dissemination of breast cancers as so fully explained by Sampson Handly, and the other, the great improvement which has taken place in our knowledge of, and control of X-rays and Radium, the result of researches by numerous physicists whose names are well known in Radiology.

The first of these two acquisitions of knowledge was clinical and although it exerted a profound effect upon the technique of the surgical treatment of the disease, that effect may be considered to have reached its maximum. The modern radical mastectomy is undoubtedly one of the most highly perfected of all surgical procedures and is to be expected that scarcely any further improvement in the future can be so radical in nature as to materially alter the present surgical statistics of this disease. In fact in one of his recent addresses, such an eminent surgeon as Sir Robert Kelly says:

"Surgical treatment in the last 35 years has not progressed at all in breast conditions, it has become less radical in buccal cancer, uterine growths and in osteo-clastoma, but has increasingly progressed in thoracic and central fields. Amputations for osteogenic sarcomata remain just the same and just as unsatisfactory."

"Let us see what an equally eminent pathologist says regarding this matter. Ewing, writing on this subject, says:

"From clinical and pathological studies I have drawn the impression that, in dealing with mammary cancer, surgery meets with (more peculiar difficulties and uncertainty than with) almost any other form of the disease. The anatomical types of the disease are so numerous, the variations in clinical course so wide, the paths of dissemination so free and diverse, difficulties of determining the actual condition so complex, and the sacrifice of tissue so great—as to render impossible in a majority of cases a reasonably accurate adjustment of means to end."

If these are the opinions of such eminent men—surgeons and pathologists—it should naturally follow that any agent which may add to our means of successfully combating such a disease and improving the results should be a welcome addition.

The other line of investigation, the physical, with its outcome in practical improvements in therapy, has been almost continuous and is still continuing. In fact, at the present moment it is in a state of more rapid transition and improvement than almost any other form of therapeutics. It is difficult to predict with accuracy what the ultimate outcome is likely to be, but is quite certain that this method permits of much further refinements and may be expected to make a very

important contribution to a problem which is admitted on all hands to be one of the most difficult in the whole field of cancer therapy.

It is obvious that the published results of surgical treatment must form the background against which any other method of therapy shall be studied, and here we meet with the first difficulty since there is a surprising discrepancy between the figures of different writers on this subject. There is still another difficulty since hitherto the inviolable practice of most surgeons has been to refer only inoperable cases to the Roentgen therapist. The percentage of five year cures of carcinoma of the breast, when it is absolutely confined to the breast, varies with different surgeons, but the average taken from available statistics is 70 per cent. But in a study of cases by Harrington in which there were no palpable lymph nodes, 29 per cent was found to have metastases at operation. A similar analysis by White of 195 operable cases found that, whereas clinical examination revealed only 38 per cent of axillary extension, microscopic examinations proved 51 per cent to have axillary metastasis.

Here lies the real problem confronting the surgeon regarding the curability of cancer of the breast. The percentage of five year cures drops down markedly when the disease is in this stage, and it is found that only 25 to 28 per cent are alive and well after five years. These percentages

have varied but little since the first radical operation was discovered.

The use of X-rays in the treatment of cancer of the breast began about 25 years back. In the beginning only low voltage, low dosage, and light filtration were used and, that too, against those cases which were declared by the surgeon as inoperable. The progress in the technique of treatment with such a background has been painfully slow till very recently. But very real progress in the treatment of these cases may be said to have started about fifteen years back with the manufacture of high voltage X-ray tube and the fixing up of an international standard of measurement of dosage—the Roentgen. Statistics are now available of five year cures and in expert hands it has reached as high a percentage as surgical extirpation under identical conditions. This figure is bound to improve as years pass on and with more knowledge of Radio-biology.

Some enthusiastic Roentgen therapists go so far as to say that all breast cancers should be treated only by irradiation therapy irrespective of the clinical stage of the disease. But until such time as we are in possession of more accurate knowledge of all the factors concerned, it should be the routine practice to deal surgically with all cases when the disease is entirely confined within the breast clinically and to follow up those cases with post-operative irradiation. When the disease has spread beyond the confines of the breast with

glandular metastasis, the five year surgical cure falls off very rapidly and, unfortunately at this point, the subject becomes more complicated by a number of other factors, all of which materially affect the statistical study. Such factors are: (1) the age of the patient, (2) the location of the primary tumour, and (3) rate of growth and type of the patients. I shall not here discuss the above factors in detail, but it is an agreed fact that mammary cancers are more rapidly fatal in young patients than in those of advanced ages.

The location of the primary tumour is of utmost importance, must always be known and recorded before treatment and will in some cases materially modify the plan of treatment. For, successful treatment depends upon effectively irradiating not only the primary tumour but all the probable lymphatic extensions. Although differences of opinion exist regarding the frequency of metastasis through the different lymphatic channels, there can be no difference of opinion as to the necessity of treating these extensions thoroughly. According to the emphasis laid on these points, the technique varies a little in the different centres of treatment. In the Barnard Institute of Radiology, as a routine, we irradiate practically the whole half of the front of the chest bearing the tumour, in addition to the axilla and the cervical lymphatics of the side even though there may not be any palpable glands. In doing this there is a margin of safety, because supraclavicular

extension is the most frequent in the view of most observers, although some assert that mediastinal spread is equally frequent.

To meet the latter contingency wherever it is feasible I put in the medial field at a distance of 3 c.m. from the middle line. In most Indian chests this corresponds to the internal mammary artery and will effectively irradiate these glands.

Information regarding the rate of growth of the tumour is of greatest value when it can be obtained with any degree of accuracy. In the absence of histological grading, this is of most value not only in the prognosis but it gives a fair idea of the radio-sensitivity of the tumour cells. Further it is the clinical experience of many that the rate of growth and resistance of the body seem to have some direct relation to body type, the most unfavourable being in the young, obese individuals in whom mammary cancer frequently runs a rapidly fatal course regardless of the nature of treatment. This body type does not tolerate irradiation therapy either, as well as the lean, wiry type.

*Method of Treatment.*—Radio therapy can be either (1) curative therapy or known as Radical treatment, or (2) palliative therapy. It should be understood that these two types of treatment are quite distinct from each other to an extent requiring a very different outlook towards principles of treatment. Curative therapy requires very intensive

irradiation of the tumour and all the probable lymphatic extensions. The dosage level should be taken up to a predetermined tumour dose in a prescribed time. On the contrary palliative therapy is quite distinct from the above. Here one tries to encourage as much fibrous tissue formation as possible which is the natural barrier against the spread of cancer cells. The technique here is the administration of smaller doses of radiation, the time factor being of no significance at all. The distinction between the two is not adequately appreciated even by some Radiologists.

“Curative therapy is attempted where experience shows that, if the response to treatment is according to expectation, cure is reasonably likely in that the whole diseased area can be reached and brought to a dosage level known to deal with the particular type of growth. When this is the purpose, every aid to perfection of technique, however elaborate or time consuming, must be enlisted, if the patient is to have a square deal, as that one treatment practically always determines the *final outcome as life or death*. Such aids include elaborate methods of achieving accurate dosage in radium therapy, expensive or laborious methods of beam direction in X-radiation, the use of an extended overall time of treatment, and the insistence on specially experienced nursing in hospital. If curative therapy fails, it usually results in palliation; but the question arises whether curative therapy is

justifiable when it fails to give a reasonable chance to cure. But this question exists in every branch of surgery. If however, after due consideration of this point, curative therapy is embarked upon, severe reactions must not be regarded as excessive”.

This is the teaching of Mr. Ralston Patterson, one of the foremost of Roentgen therapists. It is well, as a routine practice, to inform the patient as well as the referring medical attendant about this. Too often the practitioner and general surgeon think of X-ray or Radium therapy as a relatively mild affair. They should understand that very often there is little to choose between radical radiation treatment and a radical excision, in the amount of discomfort and risk suffered by the patient.

Both are anatomical therapy and there is no essential difference in the method of attack against this disease. Radical excision aims at removing *en bloc* the tumour tissues with a margin of healthy tissue all round along with the lymphatic extensions. Radical irradiation therapy aims at nothing less, but with this one important difference, *i.e.*, surgical procedure, here is the most mutilating form of treatment whereas radiation therapy aims at the removal of the disease of practically with the retention all the anatomical structures. Until such time as we are able to find the missing link in the causation of cancer, this sort of anatomical therapy has to continue and every attempt at

Dr. K. M. Rai's Case

Mrs. P.

*The Distribution of Radiation within the Fields irradiated.*

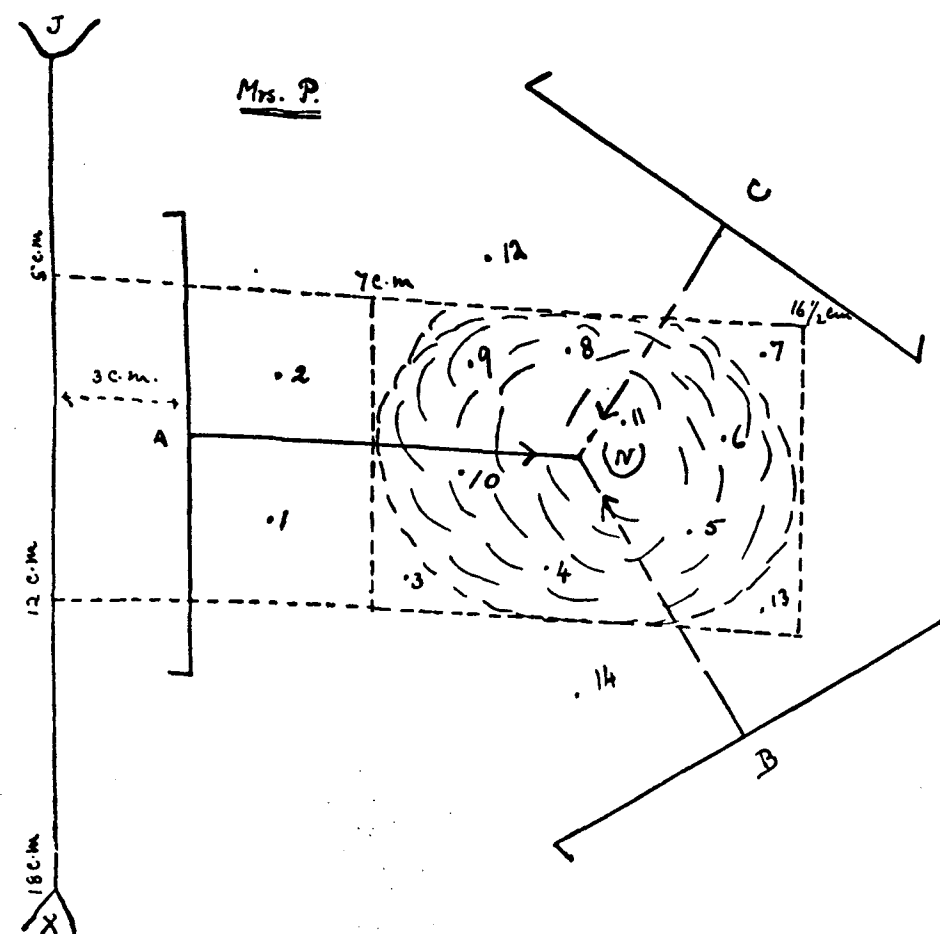
| Field     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| A ...     | 96* | 92  | 67  | 48  | 32  | 29  | 25  | 45  | 59  | 61  | 39  | 50  | 25  | 35  |
| B ...     | 19  | 24  | 48  | 66  | 72  | 60  | 45  | 42  | 38  | 48  | 54  | 30  | 90  | 82  |
| C ...     | 26  | 26  | 34  | 45  | 58  | 73  | 92  | 72  | 60  | 48  | 69  | 70  | 43  | 33  |
| Total ... | 141 | 142 | 149 | 159 | 152 | 162 | 166 | 159 | 157 | 157 | 162 | 150 | 158 | 148 |

\* All these figures are given 'per cent.'

The average within the tumour = 157%.  
The minimum within the tumour = 149%.  
The maximum within the tumour = 166%.  
Therefore the variation within the tumour = 5%.

\*

## Dr. K. M. Rai's Case



J, Jugular notch.  
 X, Xiphisternum.  
 A, B and C are the three tangential fields.  
 1 to 14 are arbitrary points selected within the irradiated area.

It has been the experience of a majority of Roentgen therapists that a tumour dose of 5,000 *r*\*, i.e., about 7,500 *r* skin dose over the three portals within the prescribed time factor gives the most satisfactory result. No doubt in a few cases very good results have been obtained with smaller doses, but it cannot be said to be uniform. The present tendency is to go higher still about 6,000 *r*, tumour dose being aimed at within four or five weeks consistent with the general reaction of the patient.

**Care of the Skin.**—Except in very well-cared-for patients, this high dosage has not been possible. Care of the skin in addition to good general nursing is of the utmost importance for a successful conclusion of the treatment. While under treatment the patient is advised not to use soap and water over the part or any sort of oil or ointment, but to keep the part absolutely dry by frequent dusting with a bland dusting powder. The patient is further advised not to expose herself to bright sunshine and to avoid all sorts of trauma over the irradiated area like coarse garments or a brisk rubbing with a coarse towel. Even with the above advice most of our out-patients break down into a moist erythema of the skin round about 2,000 *r* per field. This invariably

heals in about four weeks with careful attention leaving a soft, supple, depigmented skin which may later on go in for a telangiectasis. If there is really an ulcer, then a bland ointment is given. This particular case was taken up to as high a dose as 8,000 *r* skin dose with only a dry desquamation of the skin.

After these main fields were treated, the axillary and cervical lymphatics were treated in rotation. It is our invariable practice to give about 200 *r* to the axilla and 2,500 *r* to the cervical lymphatics in three weeks. Further this case got a castration dose of X-rays to each ovary to give her a permanent menopause.

The constitutional disturbances under the above technique are practically *nil*, but there is always a tendency for a secondary anaemia to develop which is overcome by a liberal exhibition of liver and iron. A dose of chloretone at bed-time gives a good night's rest and prevents any tendency for X-ray sickness, so also the routine administration of vitamins B and C. This is our usual practice.

I must express my gratitude to the Director of the Barnard Institute for allowing me to make use of all materials in connection with this paper.

\* *r* means rotation.

## Recent Advances in the Treatment of Gonorrhoea.

By N. VASUDEVA RAO, M.B.B.S.,  
Honorary Assistant Medical Officer, Venereal Department,  
General Hospital, Madras.

The treatment of gonorrhoea has undergone a revolution after the introduction of sulphanilamide which is comparable only to Ehrlich's introduction of organic arsenicals for syphilis. Unlike the arsenicals being specific, sulphanilamide claims to be a panacea being so easy to obtain and easier to administer the use of this drug may easily be abused by laity—leading to the dangerous complications such as acute hæmolytic anaemia and agranulocytosis which may end fatally. Considering this the absence of restriction of its sale is highly regrettable.

**Sulphanilamide.**—Para-amino-benzene sulphonamide—is obtainable in tablet form generally of 0.5 gramme for oral use which is the usual way of administration in cases of gonorrhoea. The action of sulphanilamide in gonorrhoea is explained by the fact that the drug is being excreted by the kidneys in such concentrations as to be bactericidal—specially in an alkaline medium. As demonstrated experimentally by Farrel, Lyman and Youman (1938), the secretion of the glands, notably the prostate draining into the posterior

urethra, contains sulphonamide in bactericidal concentrations. The chances of infection spreading to the posterior urethra, to the prostate and the epididymes are thus very considerably decreased.

During the treatment with sulphanilamide it must always be kept in mind that a certain concentration of the drug in blood (10 mgs. per 100 c.c.) is to be obtained rapidly and maintained at that level for the proper action. In man, this concentration is obtained within 2 to 3 hours after the oral administration, which has been found out experimentally and maintained for 4 to 5—the excretion being completed in 24—hours. Taking advantage of this point, the best action of the drug is obtained when it is administered at regular intervals of 4 to 6 hours.

The dosage recommended for Gonorrhoea is about 4 to 5 grammes a day—1 gramme per 20 lbs. of body weight—maximum being 5 grammes a day. It has been found by Long and Bliss (1937) that children stand a 50 per cent higher dosage than

adults, weight for weight. The total amount of sulphanilamide required for the total course is 40 to 50 grammes given in about two weeks' time—6 days in the first week at 9 tablets (4½ grammes) a day, and with a day's rest 6 tablets a day for six days during the second week—the total coming to 45 grammes which is considered a sufficiently good amount of drug for a course during the treatment of Gonorrhoea.

Considering the sudden onset of the complications it is advisable to do a blood count—total red blood cells, white blood cells, differential and thrombocytic counts of—every case before administering the drug and followed by another after a week and at the end of the treatment. Another precaution is to avoid all the substances containing the sulphur radical such as eggs, onions, garlick and the saline purgatives, as the sulphur from these may be a contributory cause in the formation of the sulphæmaglobinæmia—though this is not proved definitely—and in our experience in the Venereal Clinic of General Hospital very few of the cases developed this complication when they were given the usual ordinary Indian diet of the Hospital consisting of all these food stuffs. That is no reason to overlook this diet restriction specially in private cases where one cannot have a thorough supervision as in a hospital. A third precaution is to avoid sun light which may precipitate a special skin sensitization during the treatment leading to the different skin lesions.

It is advisable to instruct the patient to take a low residue diet of adequate caloric value and to take large amounts of fluids.

The complications, that have been noticed during the sulphanilamide therapy, may be classified as follows:—

1. *Reactions affecting the Nervous System.*—Mental disturbances, dizziness, palpitation, head-ache, "Drug" fever, sometimes associated with skin rashes, optic neuritis, tinnitus, paræsthesias, peripheral neuritis.

2. *Reactions affecting the Skin.*—Maculo-papular and urticarial rashes, sometimes associated with exposure to light exfoliative dermatitis.

3. *Reactions affecting the Hæmopoietic System.*—Leucopenia, agranulocytosis, acute hæmolytic anaemia, thrombocytopenia.

4. *Reactions affecting Urogenital System.*—Acute nephritis, urinary irritation—albuminuria, nitrogen retention, partial azospermia.

5. *Reactions affecting the Digestive System.*—Nausea, vomiting, diarrhoea, constipation, toxic hepatitis.

6. *Reactions affecting pigments.*—Cyanosis, methæmaglobinæmia, sulphæmaglobinæmia, excessive porphyrin formation.

Fortunately many of the complications are not severe, and disappear when the drug is withdrawn. Even the major

complications, like agranulocytosis, hæmolytic anæmia, sulphæmaglobinæmia, and skin rashes could be avoided, provided the precautions are taken and the patient kept under constant observation and stopping the administration of the drug soon after a tendency for their developing is discovered, the patient generally recovering uneventfully. Except in the major complications the drug can be continued with impunity soon after the patient recovers from them, and it is advisable to stop the drug in those cases which develop the major complications, and it is better to warn the patient also not to take any more in future of these tablets when it might be given unknowingly by some other medical man for some other condition from which the patient may suffer.

The treatment of gonorrhœa with sulphanilamide, seems really a great advance on the previous, prolonged, often irrational and uncertain methods. It has been found that when the tablets are given after a lapse of time—say a week or 10 days after the onset of the disease—the results seem better and quicker. The clinical signs and symptoms of the infection rapidly subside and disappear. The discharge almost ceases in 72 hours, and the urine clears in about a week. Bacteriological examination of smears and urine show a rapid reduction in the number of pus cells and almost complete disappearance of gonococci during the same period. It has been found that a minority

about 15 to 20 per cent do not respond to sulphanilamide therapy and, in such cases, it is not advisable to continue to administer the drug. In successful, apparently cured cases, after a period of two weeks, the patient is given rest from all treatment for about ten days or a fortnight, and tests of cure are performed after the rest interval. The tests are:—

- (1) Passing a full sized sound both in anterior and posterior urethra and prostatic massage after 48 hours.
- (2) Giving a provocative gonococcal vaccine (400 million) followed by clinical and bacteriological examination of, discharge, urine, prostate, etc.
- (3) Instillation of one-per-cent Silver Nitrate into the posterior urethra and subsequent examination.

When the patient is found to be negative after all these tests, he is discharged cured and asked to report after two to three months for a follow-up.

It has been found that sulphanilamide is also very effective in some of the complications of gonorrhœa—such as epididymitis and conjunctivitis. In cases of epididymitis, the swelling and pain rapidly disappear in 24 to 48 hours after the administration of sulphanilamide even without any local treatment excepting a suspensary bandage. Similarly in conjunctivitis the discharge, redness, chemosis and photophobia respond rapidly. Gonorrhœal joint

affections seem to respond not so quickly or satisfactorily to sulphanilamide therapy, but the combination of chemotherapy with pyrexia induced by T. A. B. or D'Melcos, has given very satisfactory results in the Venereal Clinic of the General Hospital. The local complication like Tyson's abscess, litteritis, periurethral, abscess, failed to show any response to sulphanilamide and required ordinary surgical drainage.

It may be mentioned that unlike the other preparations M. & B. 693 (2 Sulphanilylamino-pyridine) has the special advantage in that it could be administered even on the very first day of the disease and also the course of treatment finished in a week followed by the usual tests of cure which are mentioned. *Uleron* introduced by Bayer claims to be a very good one with very few complications, but our experience in the Venereal Clinic of General Hospital, though small, is to the contrary of the general opinion.

*Treatment of Vulvo-Vaginitis in Children.*—The response of this condition to sulphanilamide therapy is not as encouraging as that in adult gonorrhœa. The treatment of this distressing condition by ovarian Follicular Hormone, either by mouth or per vaginum has achieved most satisfactory results.

*Pyrotherapy.*—Treatment of gonorrhœa with artificially induced pyrexia has come into vogue some time ago. It is a well-known fact that gonococci

are thermolabile organisms. The thermal death time of gonococci of all strains is not the same, but varies between 106 to 103° F. It has been found out that it would be possible to exceed the thermal death time of the organism without injury to the human host, by adapting the temperature level in patients with gonococcal infections to the thermal death time of the particular strain of the gonococci responsible for the disease in each individual patient. For practical purposes it has been found that 4 or 5 treatments, each of 5 to 7 hours' duration, at a rectal temperature of 106 to 107° F at intervals of 3 to 5 days are productive of prompt and satisfactory results in the great majority of cases, the average total number of hours being about 20 to 25 hours. The artificial induction of fever is done by the Kettering hypertherm—the mechanism of which depends primarily on heat transfer by conduction from the circulating heated air. This factor, combined with prevention of the normal rate of loss of heat from the body by radiation and evaporation, is responsible for the elevation of the body temperature and its maintenance at any desired level. Artificial pyrexial therapy is not a simple measure—it is fraught with danger in the hands of people who are not specially trained. The success depends on the thorough training of the physician and the nurse, precautions have to be taken for protecting the patient from exhaustion by giving large amount of chlorides by mouth, as the loss of chlorides through sweat during the treat-

ment is much, the blood chloride falling on the average to 40 mg. per cent. It has been found out that about 2 to 5 litres of sweat is lost during each treatment containing about 20 to 25 grammes of sodium chloride. Gastric analyses showed the complete disappearance of free hydrochloric acid during the first 30 to 90 minutes. For combating these 2 to 4 litres of 0.6 per cent sodium chloride solution has to be given orally. If the patient has nausea and vomiting disabling him to take sodium chloride orally, it has to be administered intravenously (500 to 1,000 c.c. of a solution containing 10-per-cent Dextrose and 1-per-cent sodium chloride). Ability

to tolerate the treatment depends on the condition of the heart, resistance of the skin to heat, and the patient's temperament.

On account of the cost, the technical skill required in this method of treatment, and the large number of gonorrhoeal infections in any population, artificial pyrotherapy by hypertherm has only a limited field of application and cannot be used in institutional practice.

I am very grateful to Dr. R. V. Rajam, M.B.M.S., M.R.C.P., Venereal Specialist, General Hospital, Madras, for his guidance in this article.

## REFERENCES.

1. *Medical Annual*—1938.
2. Findlay—Recent Advances in Chemotherapy, 1938.
3. Walter M. Simpson, M.S., M.D., F.A.C.P. "Artificial Fever Therapy of Syphilis and Gonococci Infections". *The British Journal of Venereal Diseases*, July 1936.

## Problems connected with the Diagnosis and Treatment of Leprosy \*

S. THAMBIAH, M.C., M.R.C.P. (Edin.), D.T.M. & H. (Lond.).

F.D.S. (Lond.),

Lecturer in Dermatology, Medical College, Madras.

### Investigation

When a patient presents himself with a depigmented macule, the first problem before us is "what is this patch?" If one looks closely into this discoloration or decolorisation one has to attend to the following points:—General appearance and margin; scaling or non-scaling; disturbance of sensation as regards pain, light touch, heat and cold; if a hairy area, compare it with a corresponding area on the opposite side; does it sweat? The patient may volunteer to give some details. He might have noted that the part was becoming numbed, the hair thinned or shed, the part showed no sweating while the whole body was bathed in perspiration. In some patients, a hyperpigmentation, may be found surrounding the anæsthetic macule and here again a comparison with a corresponding area is necessary. It sometimes happens that while you are worried about the diagnosis, the patient volunteers the information that he or she has had the patch under question from birth. I have seen a num-

ber of early cases who developed a hyperpigmentation on the face and sometimes of the whole body. It is also interesting to note that in a patient who has scabies or tinea in a generalised form affecting more than half the cutaneous surface of the body, when the lesions are cleared by treatment, he will be found to be suffering from one of the types of leprosy. Here the patient has lost the protective sensation and he was not able to ward off the infection in the early stage.

### Early Patch

The early patch of the maculo-anæsthetic type is often ill defined and the borders shade off gradually into the normal skin. The patch is not scaly and gives an impression of atrophy in the affected area. On one side or on the entire borders small papules may be detected. Very often diagnosis may have to be based on the appearance of the lesion gained by experience. Help may be obtained by searching on the proximal side of the lesion for thickened and tender cutaneous nerve twig or twigs. When this is found, one may be

\* Reprinted from the *Journal of Indian Medical Association*, June 1939.

greatly struck by the amount of thickening and tenderness of this peripheral nerve filament. The affection of the nerve is a secondary neuritis produced by the overgrowth of the fibrous tissue scaffolding by irritation of the acid-fast bacilli.

#### Early Diagnosis

A number of questions will now arise from the foregoing statements. Can one recognise and diagnose an early leprosy case with neuritis without the presence of a maculo-anæsthetic patch? He will be a bold man if he attempts any such thing. Hundreds of things cause peripheral and other forms of neuritis in general medical field, and one cannot attempt a diagnosis to bring us to a stage earlier than the appearance of a depigmented anæsthetic patch. There is nothing in the body of the patient to mark the entry of the infection comparable in appearance to the primary chancre in syphilis, and again in the latter disease the actual date of infection from a correct history of exposure can also be determined. We are unable to attain this state of affairs as we are still groping in the dark as regards the method of transmission, and the portal of entry of infection into the system. In other words, unlike syphilis and other infectious diseases, we do not know the earlier stages of this disease. So, we are ignorant of the transmission, primary lesion indicating the entrance of the infecting organism and also the period of incubation. If the maculo-anæsthetic patch results from

a secondary neuritis caused by the presence of the bacilli in the nerve sheath planes, then we have to infer that the infection has been fairly long in the body. A mild bacillæmic stage precedes the anæsthetic patch stage. All types of leprosy, in their early stage, are maculo-anæsthetic, i.e., maculo-anæsthetic type ( $N_1$  of Manila Conference classification may pass on to  $N_2$  and  $N_3$  stages) or become nodulated and pass on to more nodulations and confluence (leonine appearance) or yet again may result in mixed type. The present recognisable early stage is the maculo-anæsthetic stage or  $N_1$ . I cannot go fully into the differential diagnosis for fear of consuming a large part of your time. One should keep in mind that in the irritative (neuritis) stage, the patch may be hyperæsthetic and not anæsthetic. I venture also to say that very often the thermal sensation becomes lost earlier than either light touch or pin prick. Doubtful patches should be examined once a month, and one will often find that the patch which had only a thermal restriction becomes anæsthetic to all the three forms of sensation—tactile, thermal and painful sensation. Congenital depigmented defects, early cases of leucoderma, tinea versicolor, depigmentation resulting from healing of all types of tineasis and even ordinary simple injuries, and pigmentary disturbances through endocrine dysfunction, dermal leishmaniasis, have to be kept in mind and eliminated. General avitaminotic conditions in children under 12 years usually

produce a scaly patch, which leaves depigmented areas on healing. Most of these conditions are easy of recognition, and anæsthesia is present in leprosy. Most of the early neural cases do not show bacilli from nasal scraping and smears from slit and curettage of the ear lobe and patch. Still in unexpected cases, without ear lobe thickening, routine examination of the ear puncture gives positive results and this also may be borne in mind before dismissing the patient with a record of negative results.

I need not touch on the nodular type, as there are no problems in this connection. Curettage smear and staining will fix the diagnosis. What is the significance of the presence of bacilli in nasal and pharyngeal smears? Are the bacilli being eliminated from the body by this channel or is the upper respiratory passage the point of entry and multiplication of the bacilli?

#### Treatment

Unless the disease is detected in the early stage ( $N_1$  type), the treatment is not effective. Should we treat the early  $N_1$  type? Opinion is much divided on this subject. Some advise keeping the patient under observation, while others are for treating the case to be on the safe side. I am with the latter group. If you treat a number of cases with  $N_1$  type of lesions, while all things else are equal, their response to treatment is varied. Some show a disappearance of the patches with a few injections, while

others require twice or thrice the amount. The number of external patches is no measure of the undeterminable systemic changes of the patient.

One cannot be interpreted as stressing the point too much if one advocates that general treatment is as essential as the specific treatment. When patients suffering from leprosy are given highly nutritious food, and their general hygiene improved, the disease undergoes a great amount of regression. I often wondered what benefit was conferred on pauper leprosy patients who attended the treatment centres when they cannot find a square meal a day and spent a large portion of their time in wandering about begging for food and sleeping in over-crowded places infecting others around them.

Chaulmoogra and hydnocarpus oil have remained our sheet-anchor. Patients who could take the oil by mouth without gastrointestinal upset, were those who derived the greatest benefit. Pure creosoted oil may be injected with profit and increased according to the tolerance of the patient. It is our custom to change the line of treatment only when the patient has become stationary on the above routine course. A mild protein shock with sterile milk, Aolan, Yatren-Casein, T. A. B. 10 to 20 millions intravenously once a week (all others intramuscularly) may be tried to get further improvement. Gold preparations as Auroprotasin, Lapion (Bayer) and Solganal B Oleosum have also given

good effects in resistant cases. A rest period is always necessary, say one month, after an intensive treatment of two months. This period may be utilised in improving his general condition by tonics, rest, diet, etc.

The treatment of nodular cases has always remained unsatisfactory. Intradermal infiltrations of oil and diluted esters or iodised Moogrol have only shown partial success. Trichloroacetic acid pure may be painted on large nodules, but one is disappointed to see their reappearance in the same place or in some other part of the body. Depigmented patches may be painted with dilute solutions of trichloroacetic acid 1 in 2 or 3 or 4, according to reaction and part involved. Face will require dilute solutions. I have nearly ceased attending to patches, as specific treatment—when successful—will cause their entire disappearance and the cosmetic results are highly satisfactory. Their retention will serve us as an index to the success of our treatment.

Beyond rest and antiseptics, perforating ulcer still remains a great problem. The thickened epidermis surrounding the perforating ulcer may be shaved off or burnt with fuming nitric acid to initiate healing.

Leprosy reaction rarely occurs in the ordinary course of leprosy.

It is a bacillæmia induced by injudicious treatment and rapidly breaking down of granulomatous tissue releasing large amount of bacilli into the circulation. Treatment by antimony tartrate or intravenous injection of mercurochrome is all that is at present in use, but is far from satisfactory. I obtained good results in 2 cases by resting the patient and giving 7 to 10 units of insulin to get over the anorexia and allowing sips of glucose water frequently without the use of the above drugs.

#### Isolation

When room and facilities are available, nodular cases (infective ones) should be sent into a settlement to quench definitely the source of infection to others. Periodical examination every quarter, of all contacts in an infectious leper's home, will help us to detect early cases and submit them to treatment in time. As most of the infection takes place in early childhood, all school children should be medically examined, and cases detected should be sent up to the nearest treatment centre till a satisfactory certificate can be issued. Good propaganda and a sympathetic medical attendant can contribute much to stamp out this scourge of mankind christened as the "Big Disease."\*

\* Read at the Scientific Section of the XIV All-India Medical Conference, Madras.

## Clinical Memoranda.

### RECURRENT TUBAL PREGNANCY.

BY R. G. KRISHNAN, M.R.C.S., L.R.C.P., F.R.C.S.I.,

*Government Hospital for Women and Children, Egmore, Madras.*

It is a well-known fact that ectopic pregnancies have the tendency to recur on the opposite side. Women who have already had an intra uterine pregnancy are about ten times more likely to have a recurrence in the other side than those who have never had an ectopic pregnancy. The conditions for developing tubal pregnancy are usually more or less the same in both sides. The question, therefore, is whether it is worth while to save the other tube in cases of ectopic pregnancy.

The first series of cases was reported by Abel in 1893, while Pestalozza in 1901 collected 111 cases. In several instances only a few months had elapsed between the two pregnancies while in others they were separated by an interval of several years as in the first case which I am presenting here. Sampson and Smith hold that recurrence occurs so frequently that one is justified in removing the uterus and the non-pregnant tube at the time of the first operation. Smith states that patients who have once had a tubal pregnancy are less fertile than normal women but are exposed to a greatly increased probability of a second ectopic gestation. Thus, within five years after the pri-

mary operation, 144 patients in whom subsequent conception was theoretically possible, had 47 uterine and 23 repeated tubal pregnancies.

I do not think one is justified in removing the uterus and the other non-pregnant tube at the time of the operation as experience in this Hospital has shown that recurrent tubal pregnancy is very rare. Only three cases have been so far in this Hospital. Moreover most of the patients will not stand the further strain of a severe operative procedure as sub-total hysterectomy.

In 1927, Masson and Simon reviewed a series of cases in which patients had been operated upon for ectopic pregnancy at the Mayo Clinic from 1903 to 1906. There were 437 patients in this series, 445 operations having been performed for ectopic pregnancy. In 198 cases in which it was theoretically possible for the patient to become pregnant later, the data indicated that 87 (44 per cent) had become pregnant; 162 pregnancies occurred in 87 cases, 110 of which were normal and 34 of which ended in miscarriage; 18 were extra-uterine pregnancies.

Charles W. Mayo and Strassmann have reviewed another series of similar cases.

From 1st January 1926 to 31st December 1935, 141 patients were operated upon for ectopic pregnancies. The number of cases in this group in which they were able to report the subsequent history following an ectopic pregnancy was 84. Thirty-one of 84 patients (36.9 per cent) became pregnant later, 23 (33.3 per cent) having intra-uterine pregnancies and 3 (3.6 per cent) having a recurrent extra-uterine pregnancy.

The first patient was 29 years old and had never been pregnant before. In March 1935 she was admitted with a left ruptured ectopic pregnancy and left salpingectomy was done. The uterus and right adnexa appeared normal. In July 1936 (after a year) she had a recurrent ectopic pregnancy in the right tube and the distal half of the right tube was removed. No adhesions were found at this second operation. This case belongs to the group in which neither from the history nor at exploration could a cause for the ectopic pregnancy be found.

The second patient, a woman of 26 years old, had sub-acute appendicitis. She had a left tubal pregnancy in 1929, and partial left salpingectomy was performed. In 1931, two years later, she had a recurrent ectopic pregnancy in the right tube. The cause for these ectopic pregnancies may be attributed to her appendicitis.

### The Madras Medical Journal

The third patient was 29 years old. She had had one full term pregnancy in 1925. Dilatation and curettage with suspension of the uterus (Baldy-Webster type) had been performed in 1928. She then had a left ruptured tubal pregnancy in 1935 and left salpingo-oophorectomy was performed. She had a recurrent ectopic pregnancy in September 1936 (after a year) and right salpingectomy was performed. There was no history of appendicitis, gonorrhoea or miscarriage. The ectopic pregnancies occurred after a full time delivery and after a suspension operation.

In the literature the percentage of recurrent ectopic pregnancies is not given by reviewing the cases of those patients who had the possibility of subsequent pregnancies, but by taking the total number of ectopic pregnancies observed in a certain hospital.

Rabinovitz, in 1911, collected a total of 147 cases of recurrent ectopic pregnancy or 3.9 per cent recurrent ectopic pregnancies out of the series of ectopic pregnancies. The same figure was obtained by Charles Mayo when he reviewed the literature for the following 26 years.

The total number of ectopic pregnancies at the Mayo Clinic between 1903 and 1926 was 445; the number of recurrent ectopic pregnancies 18, or 4.1 per cent. The total number of ectopic pregnancies between 1926 and 1935 was 148 and the number of

### Recurrent Tubal Pregnancy

recurrent ectopic pregnancies was 6, or 4.0 per cent. The percentage of recurrences was essentially the same.

#### Case Reports.

CASE No. 1: Mrs. P., aged 35, was admitted into the Government Hospital for Women and Children, on 21st September 1938, at 11.15 a.m. for pain in the abdomen and bleeding per vaginam. The previous night, at about 7, she had a slight pricking pain in the lower abdomen and nausea. She vomited once and went to bed without her dinner. She slept fairly well. The next morning, at 8, she suddenly got a stabbing pain in her lower abdomen in the left side and then back-ache just like labour pains. She passed a large clot of blood and then became cold and clammy and collapsed. She had a child ten years ago. She had undergone an abdominal operation for abdominal pain with vaginal bleeding after three months' amenorrhoea, on 9th May 1930. Her right tube was removed for an ectopic pregnancy and the uterus was fixed to the anterior abdominal wall by Dr. A. L. Mudaliar. Her periods were regular for three months after the operation. Since then she had no periods.

Examination at the time of admission disclosed her to be shocked and pale, cold and clammy with no pulse felt at the wrist and with a temperature of 97.4. Her heart beat was feeble and the rate was 75 per minute.

Abdominal examination revealed her abdomen soft and flat with dullness at her left flank and slightly tender over the left iliac fossa.

Vaginal examination revealed the cervix high up with the body of the uterus felt under the abdominal wall above the symphysis pubis, a feeling of fullness of Douglas pouch. She was treated for shock. Foot of the bed was raised; she was kept warm with hot water bottles under a blanket. Morphia gr. 1/4 was given by injection and subcutaneous saline was started and glucose water and brandy by mouth and rectum. Next morning her pulse and general condition had improved. The pulse was full and with good volume with a rate of 80 with a temperature of 99.6. Her blood pressure was 125/85.

Her abdomen was opened by Col. Plumptre under spinal anaesthesia by a right paramedian incision (above and below the umbilicus). Peritoneal cavity was filled with dark blood clots. Body of the uterus was fixed to the anterior abdominal wall by a thick short band of adhesions. Great omentum was covering the left tube and ovary. Left salpingo-oophorectomy was done. Douglas pouch was cleared of the blood clots. Uterus was fixed to the abdominal wall with a single linen suture. Abdomen was closed in layers.

*Specimen.*—The tube was found ruptured in its ampullary part. Unruptured ovum of eight weeks'

size surrounded by blood clots was found at the site of rupture. Ovary was healthy and normal in size.

She had a satisfactory post-operative reaction. Her temperature continued to be normal after three days' fever. She was discharged cured on 10th October 1938.

CASE No. 2: Mrs. M., aged 35, was admitted into the Government Hospital for Women and Children, Madras, 19th September 1938, for swelling and pain in the lower abdomen. There was nothing of interest in her previous history. Two years ago she had her first child after having been married for eight years. She had her periods regularly for a year, and for the last year her periods have been irregular and scanty lasting one or two days. (She is very vague about her periods of which she had given a history of amenorrhoea for a year in the Out-patient Department.) Along with this she has been having slight and continuous pain in her lower abdomen and also noticed a swelling in the abdomen which has been gradually increasing in size. Ten days ago, she got more pain in her abdomen and pain in the chest.

Along with this she had a slight reddish watery discharge per vaginum.

Examination at the time of admission revealed a pale and ill-nourished woman of 35 with a pulse rate of 90 with a normal temperature. Heart Beat 35 per cent. Urine nil abnormal.

Abdominal examination disclosed a tumour movable from side to side irregular in outline, bigger and cystic on the right side and hard nodular and small in size in the left side. It extended up to the umbilicus. It was not tender.

Vaginal examination disclosed a tumour which moved with the cervix. She was thought to be a case of fibroid of the uterus and was operated on 26th September 1938 after her heart beat had risen to 65 per cent with 4½ millions R. B. C.

Her abdomen was opened by a supra-pubic incision under spinal anaesthesia by Lieut.-Col. C. M. Plumptre, I.M.S. The body of the uterus was enlarged to 12 weeks' size and found displaced to the left by a broad ligament cyst on the right side, with no evidence of tube or ovary. This was adherent closely to the side of the body of the uterus. While trying to separate the cyst from the body of the uterus, a live foetus of about six months' size escaped while the placenta was completely within the broad ligament. There was no evidence of the left tube. Left ovary was normal and adherent to one end of a lithopedion, the size of a small pear, found attached to the broad ligament by a small pedicle, and to the great omentum. Sub-total hysterectomy was done leaving the left ovary behind. Placenta was removed entire, along with the broad ligament. Abdomen was closed in layers.

*Specimens.*—Uterus' size of three months' pregnancy. Endometrium was thick and easily separating from the body of the uterus. Foetus six months' size with cord attached to the placenta. Lithopedion about the size of a foetus, three to four months. Pathological examination of a piece of soft tissue attached to the lithopedion

showed remains of Fallopian tube.

Her immediate post-operative reaction was satisfactory except fever for two days and was discharged cured.

My thanks are due to the Superintendent, Government Hospital for Women and Children, Egmore, for permission to report these cases.

### FATHER CONFESSOR

#### *A Visit to the Obstetrician.*

Ask about your aches and pains ;  
Ask about inflated veins ;  
Tell him of your cramps and indigestion ;  
Furthermore, don't fail to note  
Last Tuesday's slightly scratchy throat ;  
Oh, spare him not a single stupid question !

I wonder how he stands it all !  
He's not St. Peter or St. Paul ;  
But his is a more difficult position.  
And, therefore, comes the Judgment Day,  
The stork, and God (and I) will say  
"A blessing on thee, saintly obstetrician !"

JULIET B. FURMAN.

(In J.A.M.A.)

## ACUTE INVERSIONS OF THE UTERUS.

BY R. G. KRISHNAN, F.R.C.S. (Ireland),

*Government Hospital for Women and Children, Egmore, Madras.*

This condition is a very rare and important cause of post-partum hæmorrhage. According to Beckmann not a single case occurred in 250,000 labours in the St. Petersburg Lying-in Hospital, while Madden noted it only once in 190,833 deliveries in Dublin. Not a single case occurred in our Hospital. Many obstetricians in large practice have never seen a case. It is much frequently noted in the practice of ignorant midwives.

The fundus of the uterus becomes inverted and comes into close contact with the external os (incomplete inversion) or may protrude through the external os (complete inversion). In rare instances the entire organ appears outside the vulva (prolapse of the inverted uterus). In not a few cases the placenta remains attached to the inverted organ.

*Etiology.*—For the production of the accident, three factors are necessary. Marked laxity or thinness of the uterine walls, particularly at the placental site, pressure from above or traction on the cord or placenta, and a patulous cervical canal. Its occurrence is also favoured by a fundal insertion of the placenta. Inversion may occur spontaneously as the result of the intra-abdominal pressure or from the mere weight of the intestines, but in most cases it is attributable

to violence resulting from the too vigorous employment of Crede's manoeuvre or traction upon the cord. Beckmann, who has carefully analysed 100 cases reported in the literature, believes that, in the majority of instances, the accident occurs spontaneously. The complication usually follows a full term labour. It is also an interesting fact that more than 50 per cent of the cases were primiparous women.

Mrs. S., aged 30, was admitted on 14th June 1938 with the complaint that her womb was out. There was nothing abnormal in her previous history. Her previous six labours were natural. The patient gave a history of having delivered a female child the previous day at 7.40 a.m. The labour was conducted by a barber midwife. At 2 p.m., she found she could not pass urine. She strained to pass urine after she was proposed up in bed. She found that her womb had come out. She was taken to the Government Hospital at Villupuram where an attempt was made under  $\text{CHCl}_3$  anaesthesia to replace the uterus. Then she began to bleed profusely. She was given 2 pints of subcutaneous saline and sent over here for treatment.

At the time of admission, she was pale, rather cold and clammy with a pulse rate of 128 and a

## Acute Inversions of the Uterus

257

temperature of  $98.4^\circ \text{F}$ . The uterus was not felt above the symphysis pubis.

Vaginal examination revealed a mass in the vagina protruding through the rim of cervix felt high up (acute inversion of uterus).

She was seen by the First Obstetrician and was given an injection of Morphia and vagina was packed with Dettol gauze.

16th June 1938. Vaginal discharge was plenty and purulent and not offensive. She was getting a rise of temperature in the evenings. Her blood showed heart beat 22 per cent, R.B.C. 117,600 and W.B.C. 112,500. She was put on glucose and brandy, soluseptasine and campolan injections and large doses of merrict amcitras and hot douches every four hours.

24th June 1938.—Vaginal discharge slight and blood-stained. There is no rise of temperature in the evenings.

1st July 1938.—She was fitted with Aveling's repositior (16 days after the occurrence).

2nd July 1938.—The repositior was removed as the body of uterus was felt to have almost gone back.

3rd July 1938.—*Per vaginum Examination.*—Inversion completely reduced and the fundus felt above the symphysis.

4th July 1938.—Heart beat improved to 39 per cent.

15th July 1938.—She was discharged cured.

My thanks are due to the Superintendent, Government Hospital for Women and Children, for permission to report this case.

## THE ENDOCRINE SYSTEM

The pituitary gland is  
In a vital position,  
Situating, as it is,  
Near the center of volition.

The medulla of the adrenals  
Affects the disposition  
Of the higher animals  
Through arterial constriction.

The secretions of the cortex—  
To Science unfamiliar—  
Busy in the female sex  
Cause symptoms most peculiar.

Its thyroids overactive  
That bring about strange glammers  
In ladies unattractive  
And notorious for their amours.

But as for making humans mad,  
There's nothing quite like the gonad.

(J.A.M.A.)

## TREATMENT OF SPRAINS BY LERICHE'S METHOD.

BY P. S. JANARDHANAN, B.A., M.B.B.S.,

*Government Royapuram Hospital.*

In the following seven cases of sprains I have tried Leriche's method of treatment which consists of injecting 2 per cent Novocaine solution into the sprained area:—

1. D. 24. M. Sprain of right wrist of 14 hours' duration due to a fall while playing football. No bony lesion in the X-rays. 15 c.cm. of 2 per cent Novocaine were injected around the joint. No after-pain was complained of. Cured in two days.

2. R. 12. M. Sprain of left ankle of 12 hours' duration. 10 c.cm. of 2 per cent Novocaine injected around the joint; 7 c.cm. were injected over the anterior aspect of the joint on the next day. Cured in four days.

3. W. 34. F. Sprain of internal lateral ligament of left ankle of ten days' duration due to twisting of the joint when getting off a tram. No bony lesion in the X-ray. 12 c.cm. of 2 per cent Novocaine injected into the painful parts; ankle strapped. Patient did not turn up to report afterwards.

4. K. 25. M. Twisting of right ankle at football two weeks earlier. Severe pain over the lateral aspect of the joint. No bony lesion. 12 c.cm. of 2 per cent Novocaine were injected into the painful area. The patient experienced fairly severe after-

pain which began half-an-hour after the injection and lasted for two hours. Cured in three days.

5. P. 17. M. Sprain of internal lateral ligament of left wrist of nine days' duration, due to a fall at football. No bony lesion in the X-rays. 7 c.cm. of 2 per cent Novocaine injected into the sprained area. The patient had no after-pain and was cured in four days.

6. M. 30. M. Sprain of the internal ligament of the left ankle of seven days' duration produced by twisting of the ankle while getting off a tram. No bony lesion. 10 c.cm. of 2 per cent Novocaine injected into the painful area. There was severe after-pain lasting for about three hours. Cured in four days.

7. V. 16. F. Sprain internal lateral ligament of left ankle of three weeks' duration. No bony lesion. 10 c.cm. of Novocaine were injected. Slight after-pain was complained of. Cured in two days.

The results have been very satisfactory, all the six patients who reported getting cured in less than five days' time, in contrast to the orthodox forms of treatment which take 10 to 14 days for a cure and have the additional disadvantage of

## *Treatment of Sprains by Leriche's Method*

259

restricting to a certain extent the patients' activities. All the above were cases of severe sprain and an X ray picture was taken in each instance to exclude any possible bony lesion; and after the injection the patients were allowed to carry on their normal activities. The treatment is very simple, the only disadvantage being the after-pain which some of the patients experienced. One would like to know, however, the late after-histories of joints treated by this method to find out whether it has produced any weakness or laxity of the joints.

The treatment is based on the following rather heterodox pathology of sprains enunciated by Leriche:—

The general belief that a sprain is due to tears of ligaments is probably wrong, as Leriche has not found any evidence of such tears at operation. He considers a sprain to be a nervous reflex following trauma and producing vasomotor disturbances. When a ligament is violently stretched or twisted, the sympathetic nerve-endings around the joint are excited and the vasomotor equilibrium in the neighbourhood is upset, probably through a spinal reflex or axon reflex with the production of vasodilatation which is responsible for the symptoms of sprain

—heat, pain, swelling, and diminished mobility; the occurrence of effusion into the tissues stimulates the nerves further, thus producing a vicious circle. To this state of affairs Leriche has applied the term "Vasomotor dis-equilibrium"; it takes eight to ten days to return to normal, or may persist for months or years giving rise to chronic sprain. Novocaine infiltration is supposed to cure by blocking of the afferent impulses, thereby breaking the vicious circle and permitting early restoration of Vasomotor equilibrium.

Though most authorities will not accept Leriche's theory, there is no doubt that the treatment based on that theory is very effective.

Leriche has employed the same treatment in the case of certain fractures involving joints. Campbell has reported very satisfactory results in a number of cases of first degree ankle fractures, and neither displacement of the fragments nor non-union has occurred in his cases.

I am very thankful to Capt. D. K. Sabeshan for help in writing this article, and to the Superintendent of the Royapuram Hospital for permission to have it published.

## REFERENCES

Moynihan: *British Medical Journal*, 1939.  
Campbell: *Lancet*, 1938.

## TWO CASES OF MOON LAWRENCE BIEDL SYNDROME.

BY R. E. S. MUTHAYYA and T. R. VYTHIANATHA IYER,

Refraction Department, Government Ophthalmic Hospital, Madras.

### CASE 1.

Male, Hindu, aged 14 years.

Complaint.—"Short sight."

Preliminary Subjective Test :

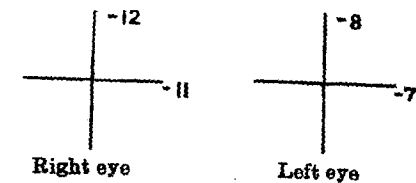
Right Eye Vision.—6/36 one letter, with - 20 Sph. 6/24 and 6/18 one letter.

Left Eye Vision.—6/36 one letter, with -20 Sph. 6/24 ?

Read with each eye large Tamil type close to face.

Pupils were active. Was prescribed atropine ointment.

Retinoscopy.—



Ophthalmoscopy.—Both eyes showed myopic fundi with vitreous opacities. The optic discs were of a dirty pale colour and the arteries narrowed. A few 'bone corpuscle' pigment patches were present and these were best seen on the nasal side of the optic disc in the left eye. The fundus view on the whole was rather hazy. But it was not very difficult to come to a conclusion that one was dealing with retinitis pigmentosa in myopic eyes.

On enquiry, the boy gave a history of night blindness for eight years.

He was mentally dull and very backward at school. He was fat. The adiposity was particularly noticeable in the face, chest, abdomen and thighs. The penis was small. He had no axillary or pubic hair. Left foot had a supernumerary toe.

Skiagram of pituitary fossa was reported to be normal.

A study of pedigrees in hereditary diseases is not only difficult but likely to lead to erroneous inference.

The genealogical tree, as far as could be traced, is appended. In five generations, two members showed this symptom complex, six with defective vision with polydactyly. Two babies which died early had supernumerary digits only. These might have lived longer. The patient has a brother with the same syndrome, another mentally very dull and a third with supernumerary digits only. One brother and sister and parents are apparently healthy. His paternal uncle, whose wife was not from the same stock as the patient's mother, has a daughter with defective vision and 24 digits. The disease is exhibited more on the mother's side of the patient whose father and great grand-father took wives from the same stock.

Dr. R. E. S. MUTHAYYA's Cases  
Moon Lawrence Biedl Syndrome



CASE 1.  
Boy, aged 14.  
Note slight adiposity ; no pubic hair ;  
six toes on left foot.



CASE 2.  
Girl, aged 13.  
Note adiposity ; no pubic hair.



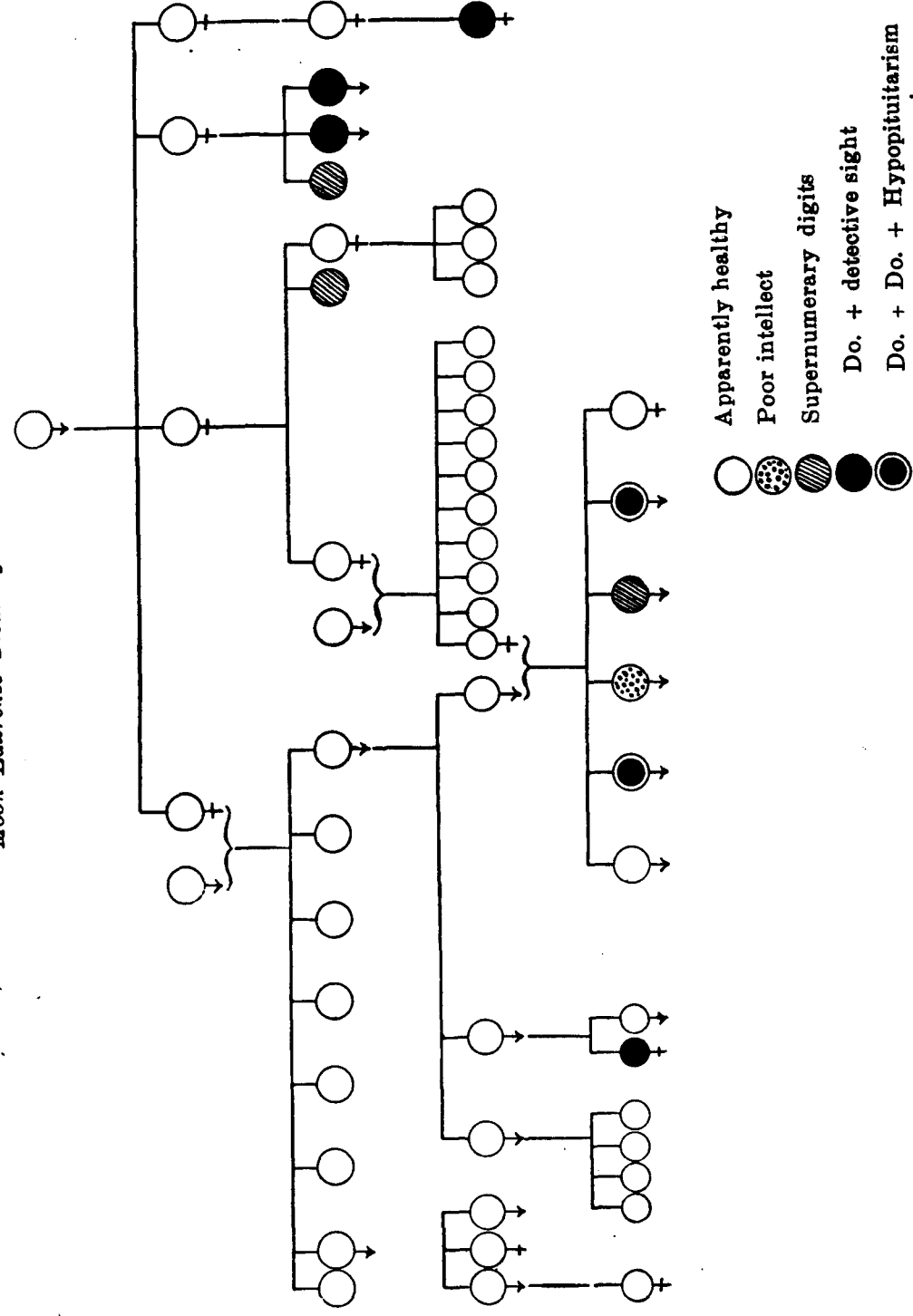
Of CASE 2.

Note short thick limbs, conical fingers and syndactyly in left foot; amputation scar of supernumerary toe.

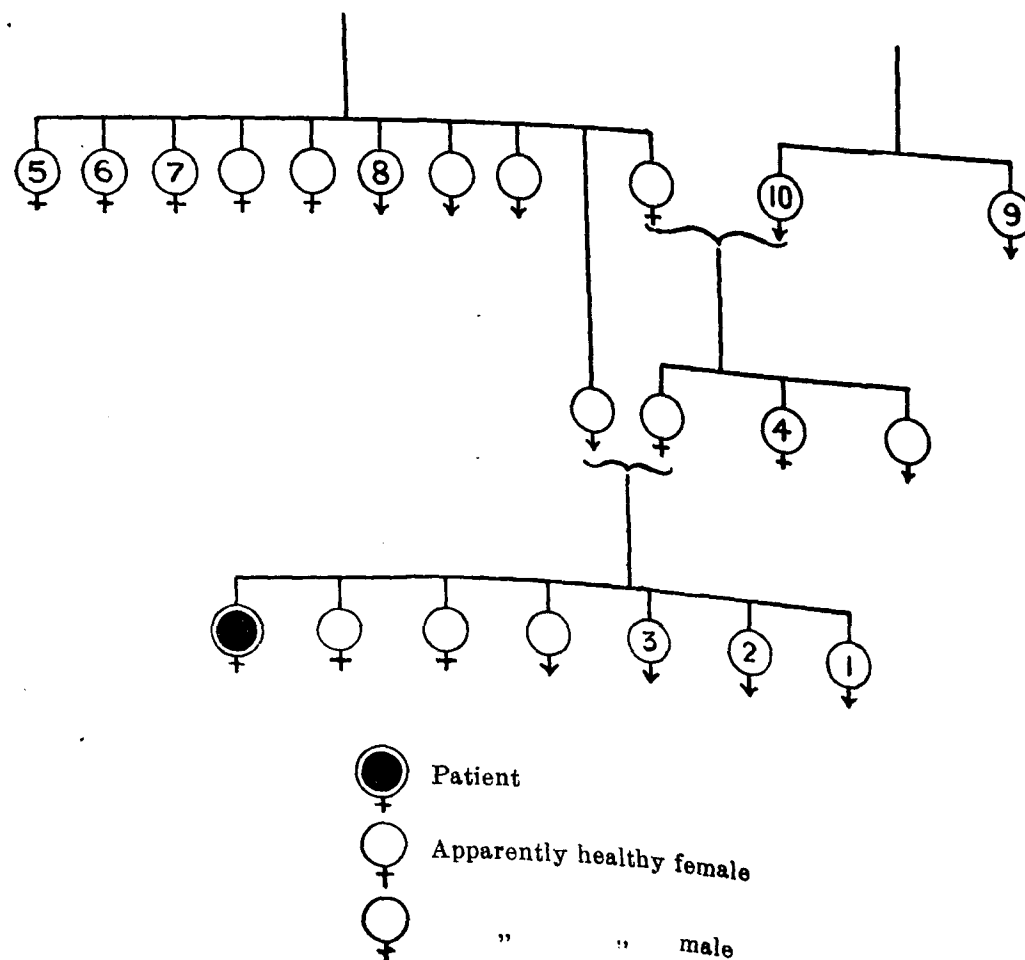


Of CASE 3.

**Family Tree of Case 1.**  
*Moon Lawrence Biedl Syndrome.*



Family Tree of Case 2.  
Moon Lawrence Biedl Syndrom



|          |      |                  |
|----------|------|------------------|
| 1, 2, 3, | died | soon after birth |
| 4,       | "    | 6 months old     |
| 5,       | "    | 30 years "       |
| 6,       | "    | 12 " "           |
| 7,       | "    | 5 " "            |
| 8, 9,    | "    | 30 " "           |
| 10,      | "    | 65 " "           |

## Two Cases of Moon Lawrence Biedl Syndrome

261

Retinitis pigmentosa is known to occur in different pedigree as different characters, dominant, recessive, or sex linked. The symptom complex in question appears to be recessive autosomal determined by more than one gene at work.

### CASE 2.

Female, Hindu, 13 years.

**History on Admission.**—“Fever five years ago followed by blindness.”

**Preliminary Examination.**—Perception of light was present in both eyes. It was difficult to elicit definite answers from the patient in testing acuity of vision. Sometimes she was found walking about without any aid.

**Ophthalmoscopic Findings.**—As the patient had a vertical nystagmus, it was difficult to observe the fundus details, the eyeball oscillating at a very rapid rate. The arteries were narrowed and ‘Bone corpuscle’ pigment patches were seen. The optic discs were not as pale as one would expect in an ordinary case of advanced retinitis pigmentosa.

On enquiry the history furnished by the patient's grandmother was admitted to be unreliable. The vision had been defective for a long time and the patient was afraid of going about in poor light.

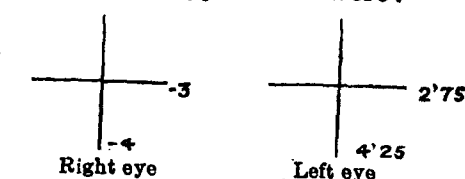
The girl was about 4 ft. 4 inches high, weighing 88 lbs., with short thick limbs and conical fingers. Adiposity was marked in

the face, chest and abdomen. Supernumerary digits in the left hand and both feet had been amputated in childhood. Left foot showed syndactyly. She was very dull, so much so, testing the vision was very difficult. She had not menstruated. Pubic and axillary hairs were absent. The genealogical tree is attached.

Patient's mother married her maternal uncle. Nobody else in family showed the diseases.

Atropine ointment was applied and the appearances of eyeground were confirmed.

Retinoscopy results were:—



X-ray of pituitary fossa according to report showed no changes. Blood serum reaction (Kahn's test) was negative. Blood pressure 88/60 mm. Hg. Urine was normal. Total quantity passed in 24 hours: 44 ounces; specific gravity 1012. B.M.R.: +8%

**Glucose Tolerance:**—

|                    |                 |
|--------------------|-----------------|
| Blood sugar before | glucose 0.078 % |
| One hour after     | 0.125 %         |
| Two hours after    | 0.125 %         |

It was so difficult to draw blood from the patient that it was obtained only three times.

We are much indebted to Lt.-Col. P. Verdon, I.M.S., Superintendent, Government Ophthalmic Hospital, Madras, for his kind permission to publish the case.

## AMYLOID DEGENERATION OF CONJUNCTIVA

BY R. E. S. MUTHAYYA, M.B.B.S., L.O.,  
Government Ophthalmic Hospital, Madras.

**General Pathological Consideration.**—Amyloid is a compound of chondroitin-sulphuric acid and albumin, resembling boiled sago in appearance. It stains mahogany brown with iodine which when followed by sulphuric acid gives a blue colour, responsible for the introduction of the term "amyloid". Methyl violet is more reliable. It stains metachromatically, the amyloid taking a rose red colour and the rest of the tissues a bluish violet. Congo red stains amyloid substance red and is absorbed by it. This latter property is made use of in detecting the condition during life, a rapid disappearance of the dye from blood after intravenous administration supporting a diagnosis of amyloid disease. In ordinary routine sections stained by hæmatoxylin and eosin amyloid appears as a homogeneous structureless pinkish substance and is indistinguishable from hyaline material which does not however give the characteristic stain with methyl violet. Typical staining reactions are not obtained sometimes owing to prolonged or improper preservation or slight variation in chemical composition. The substance is first deposited in the connective tissue fibrils in the walls of arterioles. From here the degeneration spreads into the surrounding tissues which undergo pressure atrophy. This disease is met with either (1) as a widespread affection—amyloidosis—involving the liver, spleen, kidneys, lymphnodes, etc., or (2) as localized form in the conjunctiva, respiratory tract, tongue, heart or lymphnodes draining chronically inflamed regions. Amyloidosis occurs in longstanding suppurative conditions of bones and joints, in empyema, in syphilis with breaking down gummata and in chronic tuberculosis of bones, joints, lungs and kidneys, particularly with secondary infection. More rarely it is met with in chronic dysentery, malaria, rheumatic fever, Hodgkin's disease and in cases of malignant tumours. Sometimes, it is present without apparent cause. Experimentally it can be induced in animals by injecting bacterial toxins and in mice by injecting sodium caseinate and by feeding with cheese. Horses used for preparing anti-diphtheritic serum and mice with transplanted malignant tumours sometimes develop this disease. A rich lipoid diet seems to afford some protection against the disease experimentally produced in animals. The source of chondroitin sulphuric acid is a mystery as destruction of cartilaginous tissue is not to be seen in all cases of amyloidosis. This disease in either form is extremely rare nowadays. During the last thirty years, postmortem examinations in the Madras General Hospital Mortuary have revealed amyloidosis in only four cases. One probably before 1877 (date is not known), one in 1877, one in

## Amyloid Degeneration of Conjunctiva

1878 and the last in 1906. Recently an obscure case of hepatomegaly in the Government General Hospital, Madras, was diagnosed during life as primary amyloid degeneration of the liver and proved to be such by liver puncture and congo red test.

### Amyloid Degeneration of Conjunctiva:

This may occur—

- (1) as part of a systemic disease, i.e., general amyloidosis;
- (2) in diseased conditions of the conjunctiva like trachoma.
- (3) in circumscribed tumour form associated with a similar condition in the nose and larynx; or
- (4) as a clinical entity, and it is with this form we are chiefly concerned at present.

**Geographical Distribution.** This rare disease is common in the Russian Baltic.

**Age Incidence** has been put down variously by different observers. Usually it occurs in young adults.

**Symptoms and Signs.**—The general health of the affected persons is quite good.

The disease process usually commences in the transition fold and spreads to the lid and bulbar conjunctiva. The affected area becomes raised, has a yellowish translucent waxy appearance and shows nodular swellings which may be of considerable size. The tissue is firm but friable and usually avascular. The patient

consults for swelling of the lids and the chief difficulty experienced is in opening the eyes. Sometimes, the cornea is involved with obscuration of vision. One or both eyes may be involved.

**Histopathology.**—The amyloid substance is deposited in the subconjunctival connective tissue into which occurs a cellular infiltration of plasma cells chiefly and small round cells, mast cells, eosinophile and large mononuclear leucocytes. In sections stained by hæmatoxylin and eosin, the amyloid material is seen as collections of numerous small pinkish irregular angular bits chiefly around blood vessels when these are present. Methyl violet gives the characteristic colour in typical cases. Sometimes heterogenous reactions are obtained. The surface epithelium of the conjunctiva is thinned. It may be ulcerated or cornified. The tissue is generally avascular. Sometimes dilatation of neighbouring vessels occurs and the condition has been described as "amyloid racemose aneurysm". In long standing cases other degenerative changes like fatty degeneration, calcification, ossification or glycogenic infiltration are also seen.

**Diagnosis.**—A raised firm, but friable yellowish pink nodular mass in the interpalpebral zone extending into the fornices and encroaching upon the cornea in overhanging folds is highly suggestive.

1. Hyaline degeneration has the same appearance clinically

and in routine pathological sections but methyl violet clinches the diagnosis in typical cases.

2. A history of fever and pre auricular glandular swelling serve to distinguish Parinaud's disease.

3. A massive tuberculoma of conjunctiva is clinically differentiated by inflammatory changes with ulcerations and adhesions.

4. Rhinosporidiosis is characterised by small papillomatous processes with yellow points on the surface of the "growth." The histological picture in 2, 3 and 4 is quite different.

*Treatment.*—Has hitherto been by extirpation.

#### *Case Reports.*

1. A Hindu, male, aged 28 years.

#### *History:—*

Large papillomatous exuberant yellowish growth from tarsal conjunctiva. Bilateral, involving both upper and lower lids. Insidious onset and gradual growth. Duration uncertain. No evidence of trachoma.

A bit was received for examination in the department of Pathology, Madras Medical College.

Microscopically, section showed masses of homogeneous reddish stained hyaline-like material in between which vascular spaces, and a few fibrocytes and plasma cells were seen. The hyaline-like material gave typical reaction of amyloid substance with methyl violet.

2. N. S., Hindu, female.

*History.*—Cockscomb-like growth of eight years' duration in upper fornix of left eye.

Clinically, there was no evidence of systemic amyloidosis and apparently the general health was good.

A bit was received for examination in the department of Pathology, Madras Medical College.

Microscopically, section showed stratified epithelium and underneath it dense masses of amyloid substance with numerous blood vessels. There were also collections of plasma cells and round cells beneath the epithelium and elsewhere.

Another bit consisted of an ulcerated and vascular granulation tissue infiltrated with numerous plasma cells and a few eosinophiles. The staining reactions obtained, however, were not as satisfactory as in Case 1. A dull red colour was obtained with methyl violet which could not be preserved.

#### *Comments.*

1. This disease is exceedingly rare in South India. Since 1920 only two cases have been seen in the Government Ophthalmic Hospital, Madras. During this period about 475,000 patients attended the Hospital. The Pathology Department of the Madras Medical College also has reported only two cases up to date.

2. Both the cases belonged to the northern districts.

3. The condition is met with in young adults here.

4. In one case the condition was unilateral and of the tumour type.

5. In the second case, the staining reactions were not typical.

6. Vascular spaces were a feature of both the cases. Probably the type of degeneration dealt with is allied to the 'raccoon amyloid aneurysm.'

7. Congo red stains amyloid substance a bright red colour which is bound to show through the conjunctiva if the dye is injected intravenously. A quick and easy diagnosis may therefore be attempted in this manner without resorting to biopsy and section cutting.

8. There is considerable controversy concerning the reversibility of the process of amyloid degeneration. The substance, though very stable, undergoes absorption in experimental animals when the cause is removed, if the deposits are not massive. In the case of conjunctival amyloid degeneration, a partial removal of the deposit is followed by absorption and cure as in Wright's case of 1924. This is useful to remember, as a total extirpation with mutilating results is unnecessary.

9. The occurrence of amyloidosis in infective conditions, of local amyloid degeneration of

lymphnodes draining chronically inflamed areas, the experimental production of the disease in animals by bacterial toxins, the association of trachoma with some cases of amyloid degeneration of conjunctiva and the constant and early infiltration of the sub-conjunctival tissues with inflammatory cells, suggest an infective origin. Sulphonamide preparations found to be of some value in secondary infections in trachoma may be worth a trial in this disease.

#### *Summary.*

1. General pathology of amyloid degeneration is briefly considered.

2. A description is given of amyloid degeneration of the conjunctiva as a clinical entity.

3. Two case reports are given.

4. The rarity of the condition is shown by statistics.

5. Diagnosis of the conjunctival disease by intravenous injection of congo red is suggested.

6. Treatment of the disease by partial removal is advocated and a trial of sulphonamide is suggested.

I am very much indebted to Dr. P. Ramachandra Rao, Professor of Pathology, Madras Medical College, for his kind permission to publish the cases, and to Rao Bahadur Dr. T. S. Tirumurti for confirming the diagnosis.

#### REFERENCES.

- Annual Reports of Government Ophthalmic Hospital, Madras.*  
*American Encyclopedia of Ophthalmology*, Vol. I.  
 Duke-Elder.—*Textbook of Ophthalmology*, Vol. II.  
 Fuhs.—*Textbook of Ophthalmology*.  
 Boyd.—*Textbook of Pathology*.  
 David Perla and Henry Gross.—*American Journal of Pathology*, January 1935.  
 R. E. Wright.—*Archives of Ophthalmology*, Vol. liv, No. 3, 1935.

# A CASE OF OCULOGYRIC CRISIS IN CHRONIC ENCEPHALITIS LETHARGICA.

BY R. E. S. MUTHAYYA, M.B.B.S., L.O.,  
Government Ophthalmic Hospital, Madras.

Male, aged 36, Teacher.

I have seen the person during 1930 to 1935. Though I had no occasion to examine him, I had always regarded him as a mild case of chronic encephalitis as he had a somewhat fixed staring look with a partially open mouth and slight rigidity of facial muscles.

On 28th March 1939, he consulted me for trouble in his eyes. His complaint was that sometimes his eyes became suddenly rotated upwards and became fixed in that position for five to thirty minutes. He had had these attacks for four or five years. Now they recurred more frequently and were becoming worse in severity and longer in duration. These spasms of conjugate upward deviation of the eyes were very incapacitating as he was unable to look in any direction except upwards till the spasm passed off. Twice he got these attacks while on cycle on the road and he gave up cycling. A few months before consultation he made himself very conspicuous at a musical recital. He was to take part in a quartette. When the time came for him to sing, he was seen looking heavenward trying hard to read the music held high up in his hands. He was prone to these spasms particularly in the evenings especially after exposure to bright light or

glare during the course of the day.

On examination.—

Right Eye Vision.—6/9 bar one letter, 6/6 bar one letter with -0.5 Sph. 6/5.

Left Eye Vision.—6/12 two letters, with -0.5 Sph. -0.75 Cyl. ↓ 6/5.

Read with each eye 0.5 Snellen. Accommodation in each eye 6.5 dioptries.

Insufficiency of convergence of right eye.

Maddox wing test showed exophoria of 10°.

Muscle movements were normal otherwise. The pupils were regular, equal and normal in size and reactive to light and accommodation. Fundi appeared normal.

Physical examination showed parkinsonism, tremor of closed eyelids and of protruded tongue and excessive salivation. He had no rigidity of trunk or limb muscles. He was normal otherwise to clinical examination.

He took phospholecithin (not prescribed by me) for three months. He is free from the ocular spasms. I do not correlate these facts, nor offer any comment. The fact remains that the condition which was steadily growing worse during five years has been relieved after exhibition of phospholecithin for a few months.

## Abstracts from Current Medical Literature.

**The Treatment of Pneumonia with M. & B. 693 : Report on 50 Cases with Controls :** AMIR CHAND, G. F. TAILOR, AND NAND LALL CHITKARA (*The Indian Medical Gazette*, Vol. LXXIV, No. 5, May 1939, page 527.)

was eliminated in 24 hours, and that it was completely eliminated in 50 hours. The concentration in the blood of human beings is at its maximum five hours after it is being given by the mouth.

### Absorption and Excretion in Animals and Man.

Experimental work on rabbits has shown that—

(a) the drug is rapidly absorbed from the intestines;

(b) the concentration of the drug in the blood reaches its maximum at the end of the second hour;

(c) it drops to half this maximum concentration in the blood at the fifth hour;

(d) it disappears entirely from the blood after 24 hours; and

(e) the concentration in the cerebrospinal fluid follows closely on that in the blood.

It was upon these observations that the four-hourly administration of the drug was originally based.

The work on human beings has given results similar to those on experimental animals. Baines and Wien found that M. & B. 693 appeared in the urine 45 minutes after one gramme had been given by mouth, that 60 per cent of it

Hobson reports the blood concentration in a male adult volunteer who received by mouth six doses of 1 gramme of M. & B. 693 at intervals of two hours. The maximum concentration of 10 mgm. per 100 c.cm. in the blood was reached between the third and fourth hour and was maintained for 24 hours, after which it quickly dropped to zero within the next 12 hours. This shows that doses repeated at short intervals will maintain a high concentration in the blood and also in the cerebro-spinal fluid.

### Activity in Experimental Infections.

The discovery of the activity of M. & B. 693 in experimental infections was made by Whitby (1938). Work had previously been done since 1935 on the action of various sulphonamide derivatives on pneumococci in Germany, France and England, which had shown that these compounds had some inhibitory action on pneumococci. Whitby worked on mice giving them M. & B. 693 by mouth by means of a stomach tube. He concluded that 'M. & B. 693 protects the

mouse effectively against 10,000 lethal doses of pneumococcus type I and affords considerable protection against 100,000 lethal doses of other types of pneumococci'. He also showed that it was as effective as sulphanilamide against hæmolytic streptococcal and meningococcal infections.

Fleming (1938), working at St. Mary's Hospital, London, with de-leucocytized blood and defibrinated blood which had not been deprived of its leucocytes, showed that it is not bactericidal without leucocytes, but is strongly bacteriostatic while, with leucocytes, it enhances enormously the anti-bacterial power of the blood, both to hæmolytic streptococci and pneumococci. He concluded that the increased anti-bacterial power lies in the serum. M. & B. 693 does not prevent encapsulation of the pneumococci. He describes methods for estimating the anti-bacterial power of the serum.

#### *Report of the Trial in the Mayo Hospital, Lahore.*

During the months of December 1938 and January 1939, 50 cases of pneumococcal pneumonia have been treated in the Mayo Hospital, Lahore, with M. & B. 693, and 50 kept as controls; both lobar and broncho-pneumonia were included. With a few exceptions cases have been treated alternately with M. & B. 693 and by ordinary means, but in two or three cases strict alternation of cases has not been followed, M. & B. 693 being given to the more serious cases.

#### *The Madras Medical Journal*

The dose was according to the plan worked out by Gaisford and Evans in Birmingham and recommended by May and Baker, namely, 4 tablets each of 0.5 gramme on admission, repeated four-hours later, a further 2 tablets four-hourly for 36 hours followed by 1 tablet four-hourly for a further 36 hours. The plan of doses was interfered with, in some cases, by vomiting. In some cases the drug was not given if the patient was asleep.

Of the 50 cases treated with the drug, five cases died giving a mortality of 10 per cent. Of the control cases there were nine deaths, i.e., a mortality of 18 per cent.

Eleven cases of pneumonia came to the Hospital during this period in a moribund condition and died within the first 24 hours in Hospital and have not been included, either in the control or treated lists of cases.

In the 50 treated cases, two deaths occurred in 24 cases who came to the Hospital during the first five days of the pneumonia, i.e., a mortality of 8.5 per cent, and three deaths occurred in 26 cases who came on the fifth day or after, i.e., a mortality of 11.5 per cent.

In the control group, 16 cases came to the Hospital during the first five days of whom one died, a mortality of 6.25 per cent, while 34 cases came on the fifth day or after of whom eight died, a mortality of 23.75 per cent.

#### *Abstracts from Current Medical Literature*

The most striking result of M. & B. 693 treatment is that the temperature comes down to normal within 24 or 48 hours of giving the drug. This was noted by Gaisford and Evans and was obvious in this Lahore group. In 39 cases of the treated group the temperature fell to normal in 48 hours, i.e., in 78 per cent of the treated cases. In the control

group, however, only one case of the 50 had a normal temperature within 48 hours of admission to Hospital. In 28 of the 50 treated cases the temperature was normal on or before the sixth day while in only three out of the 50 'controls' was the temperature normal as the result of normal crisis on or before the sixth day of disease.

| Groups      | Total Number of Cases | Total deaths and Mortality rate | Cases treated before five days | Deaths and Mortality rate | Cases treated on fifth day or after | Deaths and Mortality rate |
|-------------|-----------------------|---------------------------------|--------------------------------|---------------------------|-------------------------------------|---------------------------|
| M. & B. 693 | 50                    | 5 or 10 per cent*               | 24                             | 2 or 8.5 per cent         | 26                                  | 3 or 11.5 per cent        |
| CONTROLS    | 50                    | 9 or 18 per cent*               | 16                             | 1 or 6.25 per cent        | 34                                  | 8 or 23.75 per cent       |

\* This difference is far from 'significant' statistically, and, in an infinite number of experiments, in which two groups of patients were treated by exactly the same method, this—or a greater difference—would be observed once in every three times.

This is shown also by the following table:—

| Groups      | Total Number of Cases | Average days of temperature in Hospital | Average stay in Hospital |
|-------------|-----------------------|-----------------------------------------|--------------------------|
| M. & B. 693 | 50                    | 2.7                                     | 9.9                      |
| CONTROLS    | 50                    | 5.96                                    | 13.8                     |

#### *Complications.*

**Vomiting**—This occurred in 16 cases of the treated group and is apparently due to the action of the drug on the stomach. A supply of the drug suitable for injection has been obtained and will be used in future for those who vomit. As yet no ex-

perience of these injections is available

**Leucopenia.**—This was noted in one case. White blood cell counts were done in all cases at intervals. In one case treated with M. & B. 693 the white cells fell from 25,000 to 12,000 during treatment, but there were no

adverse clinical signs. The patient made an uninterrupted recovery.

Vomiting was the only complication of any importance noted though the following complications are recorded by other workers: headache, nausea, breathlessness, dizziness, lassitude, general malaise, drug rash and fever, cyanosis and methaemoglobinæmia.

*Unresolved Pneumonia*.—This was noted in three cases treated with 693 and in three of the controls.

*Empyema*.—This has occurred in two treated cases, one of whom is not included in this group as he is still in the Hospital, while none occurred in the controls. This agrees with the findings of the Birmingham workers that empyema is commoner in cases treated with M. & B. 693. In these two cases the empyema has been aspirated by a syringe and needle and the cases have been treated with M. & B. 693 without operation. They are progressing satisfactorily and it appears that operation will not be necessary. One has been discharged as cured.

Further experience is needed before coming to any conclusions as to the value of the drug in pneumococcal empyema.

An enlarged spleen due to previous malarial infection was noted in six of the M. & B. 693 cases and in three 'controls' and received appropriate treatment.

In many of the M. & B. 693 treated cases the sputum remained blood-stained when the temperature came to normal. Clinically, there was no obvious sign that resolution took place in an abnormal way or at an earlier or later period than in the untreated cases.

Retention of urine was noted in two cases.

Subnormal temperature was noted in two cases after treatment was completed.

Owing to delay in obtaining type sera from America, the typing of pneumococci has only been done during the last few weeks. It is proposed to type all future cases and to obtain information as to the relation of the type of pneumococcus to the therapeutics of the drug.

The Punjab Government has given a grant for anti-pneumococcal Felton's serum. This will be tried in pneumonia with and without M. & B. 693 in the Mayo Hospital during the next year in order to assess the value of serum treatment.

During this period, four cases of pneumococcal meningitis following pneumonia were admitted and treated with full doses of M. & B. 693—all died. Recently a case of primary pneumococcal meningitis has been treated with M. & B. 693 outside the Hospital and he has recovered completely without any complication.

### Summary and Conclusions.

From the above, the following conclusions are drawn:—

The mortality is greatly reduced by the use of the drug in this series of cases—from 18 per cent in untreated cases to 10 per cent in the treated.

By the use of M. & B. 693, the days of raised temperature in Hospital are greatly reduced, from an average of 5.96 days in the controls to 2.7 days in the treated.

The stay in Hospital is reduced on the average by four days. Most cases were kept in the Hospital until signs of resolution were complete. Some cases in both groups left against medical advice.

It is obvious that for statistical purposes these figures are too small in number to draw final conclusions, but, taken with other published results, they indicate the value of this new drug.

Vomiting was the only complication of any importance noted, and it occurred in 32 of the M. & B. 693-treated cases. There appears to be no serious toxic action of the drug.

Both from the clinical day to day study of these cases and from a study of the cases reported elsewhere, we think there is convincing evidence that M. & B. 693 should be given to all cases of pneumococcal pneumonia as the routine treatment, until a better drug be made available.

Further evidence as to its value will accumulate rapidly. Knowledge of the use of concentrated anti-pneumococcal serum used with M. & B. 693 will be available within the next year or two. But it is unlikely that serum will come into general use in pneumonia because of its expense.

This group of cases is small but they are collected to confirm for Indian patients the work done in England and elsewhere and to bring to the notice of medical practitioners the value of this new drug.

**M. & B. 693 and Pneumonia:** T. H. TULPUL (Medical Bulletin, Vol. VII, No. 10, May 20, 1939). M. & B. 693 is a synthetic compound with a chemical formula (P aminobenzene sulphonamido pyridine).

Whitby in 1938 showed that this substance is chemo-therapeutically active in mice against Pneumococci Types I, II, III, V, ... etc, in experimental infections. It was also found that this drug has a low toxicity for animals. It appeared to be equally effective experimentally against meningococci. After this valuable experimental work it was ascertained that the drug could be given with safety to human beings, and that in therapeutic doses it did not produce any untoward effects. Evans some time later published this report on the clinical trial of this drug in a group of 100 cases of pneumonia. He had 100 cases of pneumonia serving as a control group. The mortality of the treated group was 8 per cent while that in the control group

was 27 per cent. During the first few weeks of this investigation, small doses were given. Later the dose was increased as the smaller dose was found to be inadequate in serious cases. It was also found that the drug did not give rise to any serious complications. Encouraged by this, many other workers published their results only to confirm the conclusions drawn by Evans.

Since December to March, the authors have used M. & B. 693 in 44 cases. During December and January every single patient suffering from pneumonia was requested to buy M. & B. 693. If he refused he was treated in the ordinary way. Such cases formed the control group called 'Non-M. & B.' group. M. & B. 693 tablets were given in addition to the ordinary treatment. Usual routine treatments consisted of painting the affected side with liniment iodine, intravenous injection of glucose with 2 c.c. coramine every six hours, rum and glucose, oz. i, t.d.s., and of Mist. Antipneumonia of the J. J. Hospital thrice a day. During February the authors reduced the number of drugs that were being given to pneumonia patients in addition to M. & B. 693 and during March the authors did not give any other drug besides a hypnotic at night. In serious cases only intravenous glucose with coramine was given and venesection was done in a couple of cases. Out of the 16 'non-M. & B.' group five died as against only one death from the 'M. & B.' group. So great

### *The Madras Medical Journal*

was the difference in the mortality of these cases that from February every patient suffering from pneumonia was treated with M. & B. 693.

M. & B. 693 is put up in tablet form. Each tablet contains 0.5 gm. of the drug. The tablets are given crushed and suspended in an ounce of milk. Though slightly bitter in taste patients did not reject them. Four tablets (2 gms.) were given on admission. This was followed by two tablets every four hours both during the day and night. Thus 7 gms. were given in 24 hours. Smaller doses than these failed to give good results. When the temperature began to fall the dose was reduced to two tablets six-hourly. This was continued for a day or two, and then one tablet was given three times a day, for another 24 hours.

The diagnosis in every case was based on the characteristic history and unequivocal physical signs of pneumonic consolidation. Diagnosis of cases, in which such unequivocal physical signs were not obtained, was confirmed by X-ray. Presence of rusty sputum or herpes was in favour of the diagnosis.

#### *Effect of the Drug.*

**Temperature:**—From 24 to 36 hours after the administration of the drug, the temperature began to fall and touched normal within the next 12 hours or so. With the fall of the temperature, the general condition of the patient also improved. The toxicity was less. Pulse and respiration also

### *Abstracts from Current Medical Literature*

improved. The patient was feeling well generally. Though the lung signs did not improve, seeing the general improvement of the patient with the fall of the temperature, it was felt that the drug was much more than a mere antipyretic. This fall of temperature did not depend upon the white blood cell count. In our series it has varied from 4,500 to 27,300.

#### **CASE NO. A.**

M. C., a Christian male, was admitted to the Hospital with a history of continuous fever, pain in the left side of his chest and cough with expectoration for the last four days. The sputum was 'reddish' (rusty) in colour since the previous day. On admission his temperature was 101°, pulse was 120 and respirations 40 per minute. Base of the left lung was impaired on percussion. Breath sounds were harsh and there were no crepitations. White blood cell count was 10,000. The patient was given the above-mentioned treatment. The next day M. & B. 693 tablets were started. The temperature was normal on the 6th day and his general condition was much improved. The lung signs persisted. He was discharged cured a week later. The lungs were clear both on clinical and X-ray examination at the time of his discharge.

#### **CASE NO. B.**

K. B. N., aged 35, was admitted for fever and pain in the chest of three days' duration. On admission his temperature was 102.4°.

Pulse was 132 and respirations were 36 per minute. Alæ nasi were working. On examination, base of the right lung was showing diminished movement. Percussion note was impaired, air entry was diminished and a few crepitations were heard at the end of inspiration. White blood cell count was 17,000. M. & B. 693 tablets were given from the 2nd day of admission. The temperature dropped to normal within 24 hours. Patient was discharged on the 11th day of his illness. The lungs had not completely resolved. X-ray showed evidence of pleurisy at the right base.

Another slight variation from the normal was noticed. In some cases the temperature having touched normal rose up again to fall back to normal within 24 to 36 hours. This might be due to insufficient concentration of the drug in the blood of the patient.

#### **CASE NO. C.**

T. W., aged 16, was admitted to the Hospital for fever, pain in the chest for the last four days. Temperature was 103° on admission, pulse was 120 and respirations were 3 per minute. There were unequivocal signs of lobar consolidation at the left base. White blood cell count was 13,000. The patient was given M. & B. 693. The next evening the temperature touched normal. The general condition was much improved. The temperature remained normal for about 36 hours and then shot up to 103.5°. The same evening, however, the temperature was again normal. After this the

patient made an uneventful recovery.

At one time comparatively smaller doses were given as the drug was not available in the market. The dose was reduced to two tablets six-hourly. When the dose was thus inadequate three types of temperature charts were obtained:—

(a) The temperature touched normal within 24 to 36 hours but rose up again and the disease followed its normal course.

(b) The temperature showed a tendency to fall within 24 hours; but then rose up again. With the rise of temperature, patient's condition became serious and extension of the original lesion took place.

(c) The temperature did not come down to normal. Improvement in the patient's condition was not noticed. On the other hand toxicity increased, and on examination it was found that the second lobe was affected.

#### CASE NO. D.

A. S. D., a male, aged 16, was admitted with a history of continuous type of pyrexia, pain on the right side of the chest and cough with expectoration for the last six days. His temperature was 99.5° on admission. At night his temperature rose up to 101.5°. Respirations were 40 and pulse was 15 per minute. On examination he was very toxic. Signs of lobar consolidation were present at the right base. Left side was clear. Abdomen was distended.

#### The Madras Medical Journal

W. B. C. 12,000. Two tablets of M. & B. 693 were given every six hours. The temperature showed a tendency to fall but the pulse and respiration were not altered. Two days after admission, signs of pleurisy could be elicited on the left side. Temperature became intermittent. Patient was discharged against advice on the eighth day after admission.

#### Untoward Effects.

**Toxicity, Etc.**—Batchelor, Lees and Murrel (1938) used this drug in treatment of gonorrhoea. Toxic effects were encountered in 29 per cent of the cases. The commonest manifestations were headache and nausea. The other complications noticed by them were dizziness, skin eruptions, lassitude, cyanosis, vomiting, breathlessness, diarrhoea, emptiness and hunger.

**Sudden Death:**—One such death is reported so far. Patient was being treated for pneumonia. His temperature came down as he expired. This was noticed on two occasions.

#### CASE NO. E.

G. H. D., a male, aged 50, was admitted on the tenth day of his illness. On admission his pulse was very feeble and was cyanosed. He had signs of lobar consolidation at the left apex. Rales were heard on both sides of the lung. Venesection was done and glucose and coramine 2 c.c. was given every 4 hours, intravenously. M. & B. 693 tablets were started. Two

days after admission his temperature came down to normal and his general condition was beginning to improve. That very night he became pale. He was covered with sweat. Heart became feebler and he expired. This sudden death may not be due to the drug, as the patient's condition was very bad and the heart was likely to have failed at the time of crisis.

The second case was an adult who was admitted as pneumonia of the right apex. He did not recover from his illness and he began to get intermittent pyrexia and cough with purulent sputum. His right apex showed unequivocal signs of cavity which was confirmed by X-ray. White blood cell count was always over 15,000. He was given glucose with alcohol intravenously without any effect. We then tried the effect of M. & B. 693 on him. Within 12 hours his temperature touched normal and remained normal for another 12 hours. He had taken a total of only ten tablets, i.e., 5 gms. In the afternoon he was quite well; in the evening, however, his pulse became fast and feeble and he expired within half an hour.

It is possible that this patient was sensitive to M. & B. 693.

The following table shows the complications and the number of cases in which it was detected:—

| Complications   | Number of Cases. |
|-----------------|------------------|
| 1. Sudden death | 2                |
| 2. Headache     | 1                |
| 3. Vomiting     | 4                |
| 4. Drowsiness   | 3                |
| 5. Cyanosis     | 1                |

**Case Mortality:**—To judge the usefulness of this drug it is necessary to determine the case mortality. The sudden drop of temperature that is seen in majority of cases treated with M. & B. 693 is of no value as the sudden drop of temperature is quite common at the time of crisis in pneumonia. In "non-M. & B." group of 16 cases we had five deaths. Leaving the one case that died within 24 hours of admission to the Hospital we had four deaths in 16 cases. That is 25 per cent of mortality. In M. & B. group, on the other hand, there were 44 cases out of which only five died. Leaving aside one case that died within 24 hours—and it was not possible in that patient to administer sufficient quantity of M. & B. 693—we get only four deaths. This brings the mortality rate to 9 per cent. This mortality rate is in agreement with the cases published so far. The drop of mortality rate from 25 per cent to 9 per cent is so remarkable that one cannot help concluding that this drug is a great advance in the treatment of Pneumonia. Resolution with disappearance of the physical signs does not take place so rapidly. It takes its average, normal course.

#### How does it act?

Whitby (1938) stated that this drug appears to exert definite action on the capsule of the pneumococcus. Fleming (1938) tried to ascertain whether this chemical substance has any action on bacteria *in vitro*. He experimented on pneumococcus and streptococcus hæmolyticus. He

concluded that, in concentration that can be obtained in the blood, M. & B. 693 retards the growth of pneumococci. It has, in such concentration, no bactericidal action. As a result of further experiments the following points were concluded :—

(1) The blood of the patients taking M. & B. 693 has a much increased anti-bacterial power against pneumococci.

(2) This power lies in the serum which is strongly inhibitory to the growth.

(3) This serum not only inhibits growth but also inhibits the production by pneumococci of substance which alters the blood.

The above results can be obtained in the following four ways :—

(1) The drug may have a stimulating action on the specific and non-specific body defences.

(2) It may neutralise toxic bacterial products.

(3) It may act on the bacteria either as a germicide or in some other way by interfering with invasive power and ability to multiply rapidly.

(4) Some combination of these.

To investigate the exact way in which M. & B. 693 acts, Whitby and McIntosh (1939) did a large amount of experimental work. This drug was not found to produce leucocytosis in mice. Phagocytic activity was also not

noticed. Administration of M. & B. 693 had no stimulating action on the body defences nor did such administration affect the quality, quantity and speed of production of recognised specific anti-bodies.

The drug was not instantly active and there was a quantitative relationship between the effective dose and the number of bacteria affected. There was a definite 'lag' in action. This showed that the drug was not a simple bactericide. M. & B. 693 is active on highly virulent and rapidly growing organisms. It is inactive on rough organisms.

With these experimental data the authors concluded that M. & B. 693 is not a simple germicide. It probably acts by neutralisation of some metabolic function or enzymatic activity. Leucocytes were not necessary for this action.

**Picrotoxin in the Treatment of Barbiturate Poisoning.**—T. L. LOVIBOND and G. C. STEEL (*Lancet*, September 2, 1939) gave injections of picrotoxin to a woman brought in deep coma, due to barbiturate poisoning. The woman revived in 24 hours and was quite normal afterwards. Injections of 0.3 per cent solution were given, 6 mg. each time every half-an-hour or so until seven injections were given and then only when relapse was imminent. Life was dramatically saved in this case.

**Test of Glomerular Function with Sodium Ferrocyanide:** E. J. STIEGLITZ, M.D., (*Archives of Internal Medicine*, Vol. 64, No. 1, p. 57)

Sodium ferrocyanide being excreted by the glomeruli, may be safely used as a test substance for determining glomerular efficiency.

**Method.**—Ampoules of sterile dry pure sodium ferrocyanide containing 0.5 gramme of the hydrated salt, or about 0.25 gramme of the anhydrous salt, were employed. Ferrocyanide salts might be decomposed by the gastric acid if taken orally, but on slow intravenous injection no evidence of toxic effects have been observed.

The contents of one ampoule are dissolved in 10 c.c. of sterile distilled water and administered by slow intravenous injection. It is essential that this solution be clear before the injection is started; the salt dissolves rather slowly. Specimens of urine are collected thirty, sixty, one hundred and twenty and one hundred and eighty minutes after the injection and their content of ferrocyanide determined by analysis. It is immaterial just how much water is consumed before or during the test; the rate of excretion appears to be independent of the volume of the urine. Ample fluid to make possible the prompt voiding of urine at proper intervals is desirable.

The titration of ferrocyanide is carried out with a 0.4 per cent. solution of cupric sulphate (0.004 gramme per c.c.). Before titration the specimen is acidified with concentrated sulphuric acid. Cupric ferrocyanide is a slightly

soluble red salt but is more soluble than the well-known prussian blue (ferriferrocyanide). To determine the end point in titration, drops of solution of ferric chloride are placed on a tile, and as the titration proceeds a drop of the unknown is placed in contact with the ferric chloride. If free ferrocyanide is present prussian blue is immediately formed; if all the ferrocyanide has already been precipitated as cupric ferrocyanide, a distinct delay occurs before the appearance of this blue colour. The end point is therefore red when the appearance of the blue is delayed four to five seconds.

The calculation is based on the chemical equation:  $\text{Na}_4\text{Fe}(\text{CN})_6 + 2\text{CuSO}_4 \rightarrow \text{Cu}_2\text{Fe}(\text{CN})_6 \downarrow + 2\text{Na}_2\text{SO}_4$ . The molecular weight of  $\text{Na}_4\text{Fe}(\text{CN})_6$  is 301.08 and that of  $\text{CuSO}_4 \times 2$  is 319.26. If the solution of cupric sulphate contains exactly 0.004 gramme per c.c., then 1 c.c. of the solution precipitates exactly 0.0038 gramme or 1.52 per cent. of the injected dose of 0.25 gramme of anhydrous sodium ferrocyanide. The exact strength of the cupric sulphate is best measured by electrolytic methods.

The excretion rate of ferrocyanide approximately parallels the results obtained with the urea clearance test, the Phenolsulphonphthaleine test and the renal concentration test.

Extension of the control series of patients with apparently normal renal function has further

clarified what constitutes a normal response. The range of variation is not excessive.

Calculating the rates of excretion on the basis of the ferrocyanide remaining within the body rather than the total dose of salt reveals that the rate of excretion is remarkably uniform throughout the period of study.

In hypertensive arterial disease without other evidence of nephritis the glomerular function is early and clearly impaired. This depression is most conspicuously manifest during the first hour of excretion. The curve of the percentages of excretion in hypertensive disease is characteristic and suggests that occult glomerular injury depreciates the capacity of the glomeruli to excrete certain solutes promptly.

The final evaluation of the usefulness and clinical applicability of the test of glomerular function with sodium ferrocyanide can come only after extended investigation, but the present report clearly confirms the impression gained in the preliminary studies and emphasises its potential value in clinical study of the relation of glomerular injury to hypertensive disease.

**Studies on the Excretion of Sulphanilamide by the Digestive Glands:** H. M. CARRYER and A. C. IVY (*Journal of Pharmacol and Experimental Therapeutics*, July 1939) find that sulphanilamide is excreted in the bile, pancreatic juice, gastric juice,

succus entericus and saliva of the dog, in appreciable quantities. Levels of the drug (8 to 12 per cent) that are thought to be bacteriostatic may be attained in the hepatic bile. The concentration of the drug in pancreatic juice roughly parallels the concentration in the blood but is less. The highest concentration of the drug in the secretions under consideration was obtained in the gastric juice. The concentration may be as high as 50 mgm. per 100 c.c. of gastric juice at 4 to 6 hours after the oral administration of 2 grammes of the drug to dogs weighing from 8 to 13 kgm. Excretion of sulphanilamide in gastric juice with blood levels as low as 2.2 mgm. per 100 c.c. was demonstrated.

**Sulphanilamide in Bacterial Endocarditis:** W. W. SPINK and F. H. CRAGO (*Arch. Int. Med.*, LXIV, 228, August 1939) gave sulphanilamide to twelve patients with subacute bacterial endocarditis. Organisms were recovered repeatedly from the blood of the patients. The etiological agent was *Streptococcus viridans* in 11 cases and *Staph. albus* in one. Sulphanilamide rendered the blood stream sterile in 6 of the 12 cases. The bacterial effect was temporary except in two patients. In four patients there was a decline in the temperature coincident with the administration of the drug. Though the drug was taken for a long period by several of the patients, there was a marked decline in the erythrocyte level in only one case. In none was a depression of the leucocytes noticed. But it is the

opinion of the authors that sulphanilamide group of drugs will be of doubtful value in the treatment of subacute bacterial endocarditis because of the very nature of the focus of infection. The proliferating mass of bacteria situated well beneath the surface of the vegetation is probably protected, at least in part, from the action of free sulphanilamide in the blood, as well as of specific antibodies. When the organisms approach the surface of the vegetation they are carried off in the circulating blood, and under these circumstances may be killed.

Since the presence of sulphanilamide in the blood may have a bacteriostatic effect on some strains of *Streptococcus viridans*, sulphanilamide probably should be administered to any patient with valvular lesions, who may be subjected to oral surgical procedures. It is well known that after the extraction of teeth or after tonsillectomy, temporary bacteræmia with *Streptococcus viridans* may result.

**Dihydrotachysterol for Parathyroid Deficiency:** E. ROSE and F. W. SUNDERMAN (*Arch. Int. Med.*, LXIV, 217, August 1939) studied the effects of dihydrotachysterol on five patients with parathyroid deficiency following thyroidectomy from 5 months to 13 years previously. The patients were given a diet rich in calcium (approximately one gramme per day). All rejected food was weighed and the calcium content calculated. The results confirm the previous reports that dihydrotachysterol was effective in re-

lieving the symptoms of parathyroid deficiency and increasing the concentration of serum calcium. The preparation used was a 0.5 per cent solution of dihydrotachysterol in sesame oil. It was given orally. An initial dose of 5 to 10 c.c. daily for three or four days usually results in a marked rise in serum calcium in three to nine days after the first dose is given. The maintenance dose is between 2 and 6 c.c. weekly in cases of mild involvement. There is a cumulative effect, and periodic determinations of the serum calcium are essential to prevent hypercalcaemia. Dihydrotachysterol increases the urinary excretion of calcium at the expense of the faecal calcium.

**Three-Dye Treatment of Burns:** J. B. DEVINE (*Medical Journal of Australia*, June 1939) describes a three-dye method of treating burns and scalds, which is of particular value for industrial and military first-aid purposes, because it at once substantially relieves pain and commences a treatment which will be carried on in the hospital. In 27 cases this method was used and in ten tannic acid and flavine method. The three-dye mixture consists of a 1 per cent aqueous solution of gentian violet and brilliant green and a 0.1 per cent solution of neutral acriflavine. The mixture is quite stable and keeps indefinitely. It is swabbed on the area and no dressing is applied. No attempt is made to clean up the burnt area. A preliminary injection of morphia is given if the burn is extensive to relieve pain centrally. If the burn is not

extensive the application suffices to relieve the pain. A second application after about half an hour is given but is not necessary. Tanning commences immediately. The tan formed is not so thick as that produced by tannic acid and it is more flexible. During the process of epithelisation care must be taken, by the use of splints, to prevent contractures due to scarring. The advantages of this method are claimed to be the inexpensiveness, the stability and the ready availability of the mixture, the rapid formation of a coagulum which is more pliable than that formed with tannic acid, the analgesic action of the gentian violet. The mixture is more efficient in preventing infection than tannic acid. The two disadvantages are that the mixture stains clothing and linen and in very small children and babies the coagulum formed may be too thick and it may crack at the edges.

**Circulatory Effects of Intravenous Injection of 50 per cent Dextrose and Sucrose Solutions in Patients with Heart Disease:** ELLIS, LAURENCE B and FAULKNER, JAMES M. (*American Heart Journal*, 17, 542, May 1939). Dextrose is frequently administered to patients with heart disease either with the purpose of benefiting the cardiac condition itself or as therapy for some other condition when the heart disease is incidental.

In spite of the widespread use of the substance and the numerous clinical reports in the literature, there is a paucity of reported

### *The Madras Medical Journal*

experimental studies dealing with its actual effect on the hæmodynamics of the circulation in man.

The present study was undertaken to ascertain what changes actually take place in the circulation of cardiac patients as well as of individuals with normal cardio-vascular systems during and following the intravenous injection of 50 per cent dextrose and sucrose solutions. From such a study information may be gained regarding the therapeutic effectiveness and possible dangers of this procedure.

#### *Method.*

All procedures were carried out with the patient recumbent following a period of rest long enough to stabilize the arterial blood pressure and the heart rate. The sugar solution was warmed and injected into an antecubital vein at a rate of 10 c.c. a minute. A total of 100 c.c. was given in each instance. Ordinary commercial ampoules of dextrose solution were employed. The sucrose used was, in part, a commercial preparation and in part consisted of several lots made up in the laboratory by dissolving commercial sucrose in freshly distilled water and sterilizing it by passage through a Berkfield filter.

Once or twice the subject complained of pain at the site of injection or along the course of the vein. If this occurred the experiment was stopped. Of the subjects receiving dextrose, one complained of slight chilliness 45 minutes following the injection

### *Abstracts from Current Medical Literature*

and one had a mild chill after 45 minutes. There were more reactions following sucrose. On two occasions mild chilliness occurred about an hour after the injection and in five instances chills varying from one to two hours. These chills bore no relationship to the lot of sucrose employed and may well have been caused by the procedure for determining venous pressure, in which it was necessary to infuse saline solution very slowly over a period of about 45 minutes. Otherwise the patients experienced no subjective sensations during or following the injection. No definite beneficial effect on the patients' clinical state as the result of the administration of the sugar was apparent.

Observations were made of the arterial and venous blood pressures, the heart rate, and relative changes in the plasma volume as estimated by alterations in the plasma protein and hematocrit values.

Thirty-six studies were made, 19 with dextrose and 17 with sucrose. Two of the subjects to whom dextrose was given had no evidence of cardiovascular disease; the remainder had heart disease. Of these, three were convalescent from congestive failure, and two had suffered coronary thromboses four and six weeks previously but did not have congestive failure. The remainder were suffering from congestive failure varying in degree, from mild to very severe. The majority of this group had

both right- and left-sided failure and most of them were severely decompensated.

Of those to whom sucrose was given, three had no cardiovascular disease and the remainder had heart disease. Five of these were compensated at the time of the study and the others were suffering from varying degrees of failure.

Of the total group of cardiac patients the etiology of the heart disease was hypertension or arteriosclerosis in 20; in five it was rheumatic, and in one it was syphilitic. Five patients were given both sucrose and dextrose.

#### *Results.*

1. *Effect of Clinical Condition on the Response.*—Although there was considerable variation among different individuals in the results obtained, the cardiac patients tended to respond in the same general way as did the control subjects, and the etiology of the heart disease or the degree or type of heart failure did not apparently influence the response obtained.

2. *Dextrose versus Sucrose.*—In general, the effects produced by dextrose and sucrose were similar. Both sucrose and dextrose were administered to five patients. All of them showed a tendency to react in a similar fashion to both substances.

3. *Arterial Blood Pressure and Heart Rate.*—Very little effect was observed on arterial blood pressure or on the heart rate. In four instances, either

the systolic or diastolic blood pressure, or both, increased from 10 to 22 mm. for a short time following the injection, and in five cases the pressure fell a like amount. In the remainder there was no essential change.

In seven cases the heart rate increased from 8 to 10 beats per minute, and once the increase was 20 beats. These increases lasted, as a rule, a very few minutes following the cessation of injection. The remaining 29 subjects showed pulse rate changes of less than 8 beats per minute, usually none at all.

4. *Venous Pressure.*—There was a tendency for the venous pressure to increase throughout the injection and to start to drop again immediately on its cessation. In one instance there was a slight drop of venous pressure during the injection; in every other case it increased, the rise varying from 0.5 to 7 cm. of water, with an average of 2.6 cm. for those who received dextrose, and 3.5 cm. for those who received sucrose. There was no correlation between these changes and the presence or absence of heart disease or the extent or type of heart failure, with the initial level of the venous pressure, or with the amount of increase in plasma volume. The venous pressure had usually returned to the control level within ten minutes after the injection. In six instances it remained elevated by 2 cm. or more for 30 minutes, but in all but one of these cases it had reached the control level in one hour. In a few instances it fell below

the control level at the end of 30 to 60 minutes. This was probably caused largely by increase in mental and physical relaxation on the part of the subject, but may in part have been the result of a decrease in blood volume caused by the diuretic effect of the hypertonic injection.

5. *Plasma Volume.*—The maximum dilution of the blood plasma as estimated from the changes in the plasma proteins, took place almost always within one minute after the end of the injection. This increase in plasma volume was in most instances maintained for about 30 minutes, but had usually disappeared in 60 to 90 minutes. In three cases only was any appreciable increase in plasma volume maintained for 60 minutes. Of the nine patients in whom plasma volume changes were studied at the end of one minute, the increase ranged from three to 17 per cent, with an average of 13 per cent (equivalent to approximately 400 c.c. of fluid). In 22 patients the change in plasma volume at the end of 30 minutes was noted. In two cases it had fallen below the control level, -3 and -8 per cent, respectively. In the remaining 20 it was still elevated by 1 to 19 per cent, with an average of 9.1 per cent. The apparent decrease of plasma volume which occurred ten times at the end of 60 to 90 minutes may have been due partly to the experimental error of the technique .... but was probably mainly an actual decrease resulting from diuresis caused by the hypertonic solution.

#### Discussion:

These findings have certain practical clinical implications. In the first place, one has objective experimental confirmation in man for the clinical belief that hypertonic dextrose and sucrose solutions are of but very temporary value when given to increase blood volume. It is probable that in states of vascular collapse the increase in plasma volume may be of even shorter duration than in the subjects ... studied. The administration of 50 per cent dextrose solution to increase blood volume will, however, continue to have clinical usefulness in emergency conditions when acute but temporary vascular collapse can be tided over, or in more severe shock while waiting for the more effective measure of blood transfusion.

As far as can be judged from these results, there is no essential difference between the action of dextrose and that of sucrose on the hemodynamics of the circulation.

It is also clear that the injection intravenously of 100 c.c. of 50 per cent dextrose or sucrose solution within ten minutes produces a distinct strain on the cardiovascular apparatus. Although the absolute burden is apparently no greater cardiac, patients have much less reserve for such emergencies. No untoward results were encountered in the present series, but it seems not unlikely that in an occasional case such an extra load on the circulation of a patient whose

cardiac status is already in precarious balance may result in serious consequences.

The intravenous injection of 100 c.c. of 50 per cent dextrose solution at a rate of 10 c.c. per minute is roughly equivalent in its immediate effect on the cardiovascular system to the infusion of 500 c.c. of a 5 per cent solution of dextrose in physiologic saline at the rate of about 30 to 40 c.c. per minute, or of 1,000 c.c. at a somewhat slower rate. The clinical use 50 per cent dextrose solution is therefore rational when it is desired to produce the effect of a markedly hypertonic solution or to introduce sugar parenterally into the body without giving much fluid, but it is not rational to give it with the idea that less strain on the circulation is produced than would result from the injection of a liter of 5 per cent dextrose solution. When the latter is given slowly there probably results less immediate strain.

**Experimental Observations on Headache:** G. W. PICKERING (*British Medical Journal*, 1, 907, May 6, 1939). There are few symptoms more common or more obscure than headache. In most instances we do not know how, or from what structure, the pain arises. Partly perhaps as a consequence the diagnostic value of headache is less than in many other varieties of pain and its therapeutics is disappointing.

*Histamine Headache.*—In experiments in which headache was

caused by intravenous injections of histamine, the course of events seemed to be as follows: The first phase is one in which dilatation of the small vessels predominates and in which the intracranial arteries, though probably relaxed, are prevented from dilating by the fall of arterial pressure inside and by the rise of intracranial pressures return to normal as dilation of the small vessels subsides, and coincidentally the larger intracranial arteries, whose walls are still relaxed, expand; it is this expansion which seems to rise to headache. Finally relaxation of the intracranial arteries passes off and headache subsides.

Observations such as these are of interest in demonstrating with some degree of probability the mechanism of one variety of headache and in showing that it is possible to attack the problem of headache by experimental means. There are two forms of headache which resemble the histamine headache in certain particulars.

#### *Lumbar Puncture Headache.*—

A very characteristic headache occasionally occurs a few hours to a few days after lumbar puncture and particularly...when the patient has been allowed up and when several attempts have been made to enter the spinal theca.

The headache is usually throbbing, and is frequently felt diffusely over the cranial vault; it may be accompanied by vomiting and by neck rigidity and other signs of meningeal irritation. The most characteristic

feature of the headache is its very conspicuous increase when the patient sits up.

The writer has made observations on post-puncture headache in four cases. He observed that the headache throbbed with the pulse (three instances) was increased by jugular compression (three instances), and was increased by shaking the head (two instances). In one case carotid artery compression did not affect the intensity of headache.

From the available facts it is clear that the pain is due to a mechanical disturbance occasioned by a diminution in the cerebrospinal fluid pressure in the cranial sub-arachnoid space, since headache is associated with low cerebrospinal fluid pressure and is abolished when the pressure is restored to normal, and since the headache is so conspicuously increased by sitting up. It is conceivable that the pain arises from widening of the intracranial arteries owing to the fall in the pressure outside these vessels. It is also possible that the pain may arise from distortion of the dura in the neighbourhood of the large venous sinuses, as by a backward and downward displacement of the brain consequent on the emptying of the sub-arachnoid space. If the first hypothesis were correct, we should expect the lumbar puncture headache to behave to experimental interference in the same way as the histamine headache. The two resemble each other in their throbbing character in their relief by sub-arachnoid

injection of saline, and in their exacerbation by shaking the head. They differ in the lumbar puncture headache being more conspicuously affected by posture and being increased by jugular compression, and perhaps also in the effects of carotid compression. However.....if 15 c.c. or more cerebrospinal fluid are removed by lumbar puncture before the injection of histamine, the subsequent headache is increased by jugular compression. This peculiar finding suggests that the differences in behaviour of the two headaches may reflect a difference in the amount of cerebrospinal fluid in the sub-arachnoid space rather than a difference in the actual source of the pain. The behaviour of the lumbar puncture headache is, however, also quite consistent with the view that it arises from stretching of the dural venous sinuses by a hyperæmic and displaced brain.

*Pyrexial Headache.*—Headache occurs commonly in association with pyrexia in many acute infections. Such headaches behave very similarly to the histamine headache. This similarity suggests that these pyrexial headaches are likewise due to stretching of the sensitive structures around the intracranial arteries, presumably arising from relaxation of these vessels; as yet there is no indication as to how such relaxation might arise.

*Migraine.*—In the classical migraine attack there are three events—visual or other aura being succeeded by headache and

vomiting; but sometimes one or more of these components are absent. The headache is typically unilateral and throbbing, and is increased by movement, particularly of the head. In the two latter features it resembles the histamine headache, as it does in its relief by compression of the common carotid artery.

A review of the literature would seem to suggest that the headache in migraine arises from stretching the coats of the scalp or of immediately adjacent tissues.... The idea that a vascular disturbance is the basis of headache and possibly of the other phenomena of migraine.... has not won acceptance because of the variability in the colour and temperature of the face and in the state of the arteries of the scalp as determined by the eye and by the finger.

In recent years the important fact has been added that the headache of migraine is abolished by intravenous or, less certainly intramuscular, injection of ergotamine tartrate. Graham and Wolff... have found that after the intravenous injection of 0.37 to 0.5 mg. of ergotamine tartrate the decline of headache runs parallel to a decrease in the temporal pulse, but that the cerebrospinal fluid pulse is not consistently altered. They have also found that digital compression of the common carotid, temporal or occipital arteries, relieves the pain in the distribution of these vessels. Finally they have shown that pain arises in the distribution of the vessel when the temporal artery is

exposed under local anaesthesia and distended with saline injected into the proximal end, the distal being obliterated with the finger. They conclude that migraine headache is due chiefly to tension set up around the dilated arteries of the scalp, but they believe that dilatation of intracranial arteries may play a part, because in certain instances greater relief is afforded by compression of the common carotid than by simultaneous compression of the temporal and occipital arteries on the same side. . . . Injection of ergotamine tartrate does not diminish the intensity of headache from subsequent injection of histamine.

Although these observations suggest that the diameter of the temporal and other arteries of the scalp is an important factor in determining the migraine headache, we do not know whether the pain is due to simple arterial dilatation or whether there is another factor such as sensitization of the pain nerve endings by a chemical agent. The older writings have some doubt as to whether the temporal arteries are always dilated in migraine, and it had not yet been shown whether, in those suffering from the malady, vasodilatation of the scalp—produced for example, by a hot bath—is necessarily accompanied by pain. We may ask, too, whether the arteries of the scalp are peculiar among the superficial arteries of the body in giving rise to pain when dilated, for we do not yet know of any comparable condition elsewhere and we may ask what is the

agent which dilates the extracranial arteries, and what is its relation to the preceding and presumably intracranial events responsible for the dura.

#### *Raised Intracranial Pressure.*

—The most widely held hypothesis of the mechanism of intracranial headache ascribes the pain to stretching of the parietal dura by raised intracranial pressure. The appeal in this idea lies in its accounting in a simple manner for headache being the commonest and often the earliest symptom of a number of diseases in which the intracranial pressure becomes raised. The writer has never been clear as to how the parietal dura can be supposed to become stretched, for it is well supported by the rigid cranium. The hypothesis does not account for the hystamine, headache, and pyrexial headache, since in these conditions. . . . raising the intracranial pressure by sub-arachnoid injection of saline actually relieves or abolishes the pain. Nevertheless, the hypothesis must be judged on its merits.

*Cerebral Tumour.*—Cerebral tumour is the classical example of a disease raising intracranial pressure, and, in support of the theory now being considered, provides two facts which have been widely quoted, namely, that headache is frequently abolished by decompression, and that it can often be relieved by intravenous or rectal injection of hypertonic solutions. Such few facts as the writer has had the opportunity of eliciting in

cerebral tumour, are not however in accord with the idea that the pain is the direct result of raised intracranial pressure. Thus he has observed two cases of temporo-sphenoidal tumour, and one of cerebellar tumour—all verified at operation or necropsy, in which headache was produced, or an existing headache accentuated, by the removal of cerebrospinal fluid by lumbar puncture.

In the first two of these cases the relief of headache when intracranial pressure was raised by jugular compression, and the onset or increase of headache when cerebrospinal fluid was removed and its pressure lessened, clearly show that the pain cannot have been due to simple rise in intracranial tension. The observations would be consistent with the headache of cerebral tumour being of similar origin to that following histamine, but the points of similarity demonstrated are too few to establish identity. Another mechanism which might envisage as being brought into play, particularly intracranial tumour, would be some change in the spatial relation of brain and dura matter, with consequent tension on the venous channels uniting them.

*Meningitis.*—Meningitis is another condition in which headache and raised intracranial pressure are associated. Here the headache is much more stable than in cerebral tumour, and it is a simple matter to investigate the relation between cerebrospinal pressure and headache.

Typical observations made in one case offer a simple explanation for headache being usually relieved but sometimes enhanced by lumbar puncture in meningitis. The afferent impulses responsible for the pain evidently may arise at all levels of cerebrospinal fluid pressure, but are increased when this is very high or very low. In this condition stimulation of the pain nerve endings may be due to a chemical substance resulting from the inflammatory process. On the analogy of the experiments of Lewis and Hess on the skin, we might imagine that such a disturbance might also sensitize the pain nerve endings in the meninges to a mechanical disturbance otherwise inadequate. The throbbing character of the pain, its susceptibility to variations in intracranial pressure, and its increase by shaking the head and jugular compression. . . . usual in such patients, would all be compatible with some such explanation.

*Traumatic Headache.*—This form of headache has also been supposed, without evidence, to be due to raised intracranial pressure, but Penfield has explained it more satisfactorily in another way. The complaints of headache and giddiness usually begin several weeks after a blow on the head. The pain is maximal near the site of injury, and spreads to a varying extent; it is commonly persistent, but may be increased by acts such as lifting heavy weights and blowing the nose. In such patients, Penfield found that when he injected air

into the cranial sub-arachnoid space by lumbar puncture the old headache usually failed to return when the pain due to air insufflation had subsided. In some patients the symptoms were unrelieved by this treatment, and in these he observed abnormalities in cranial subdural space, whither the air passes from the sub-arachnoid space in the course of a few days. In some of these patients the dura was exposed by trephining near the site of the injury, the scalp alone being anaesthetized. A blunt probe passed into the subdural space encountered adhesions and, when these were near a meningeal artery, elicited pain precisely similar to that which the patient complained. Penfield therefore supposes that the headache following head injury is due to tension on adhesions which develop between the dura and arachnoid near the site of the injury. The development of tension in the adhesions is explained as follows: When the brain is injured it swells either from hæmorrhage or cedema near the site of injury and moves a little in relation to the skull; in this position the adhesions form. The brain eventually returns to its original position as the effects of injury subside and the adhesions come under strain.

**Injections of Highly Concentrated Liver Extract in Treatment of Idiopathic Ulcerative Colitis,** CHENEY GARNETT (*Archives of Internal Medicine*, 63, 813, May 1939). Innumerable therapeutic agents have been advocated for the treatment of idiopathic ulcerative colitis.....As a new form of

highly concentrated liver extract for parenteral use is now available, this has been tried in the treatment of eight patients with colitis, seven of whom presented classic examples of the ulcerative type of unknown case. Gratifying results were obtained in every instance with possibly one exception.

The case records of these eight patients with idiopathic ulcerative colitis show that a remission took place in each case about the same interval after treatment with injections of liver extract was started. Although remissions naturally occur during the course of the disease and the number of patients treated is small, such a uniformity of results could hardly be entirely coincidental, particularly as these patients had never shown sustained improvement with any other form of therapy. Most of them showed some evidence of improvement by the third or fourth week of treatment, and definite improvement was invariably manifest by the second month. Those with many ulcers and but slight physical disability were slower in showing an alleviation of symptoms which could be positively recognized. Certain symptoms are worthy of special attention.

The diarrhoea was as a rule definitely diminished by the end of the third week. Usually the number of bowel evacuations was at least halved.....If adequate maintenance treatment with liver extract was not continued, recurrence of the diarrhoea occurred

from two to four weeks after it had been stopped. In three cases such relapses developed.

If the patient was not having any formed stools, some of them became formed by the end of the first month of treatment with injections of liver extract. Liquid defecation ceased entirely during the second month.....Gross pus commonly disappeared from the stool within one or two weeks. Gross blood and mucus were more persistent but were absent or occurred only in traces by the end of the second month of adequate therapy. They tended to reappear promptly if the diarrhoea increased. The cramps and tenesmus improved as the diarrhoea subsided and usually disappeared with the cessation of the expulsion of liquid faeces and gas. When fever was present and closely observed it tended to subside within five to ten days.

"When the loss of weight was marked, improvement in nutrition and gain in weight were often striking.....The gain was commonly apparent by the third week of liver therapy and commenced even before diarrhoea ceased. In three cases.....the loss of weight was not a feature of the illness. Improvement in the general condition was highly gratifying but was what would be expected in any one recovering from a prolonged siege of dysentery. In half the cases the patient has already returned to his normal mode of living after a prolonged period of disability.

Direct objective evidence of improvement in the colitis is furnished by follow-up proctoscopic examinations in six of seven cases in which ulceration was observed before liver therapy was started. In one case the intestinal mucosa appeared normal two months after therapy was started. In two cases.....the intestinal wall was normal except for one or two small hæmorrhagic areas four and eight months later, respectively. In the three remaining cases.....ulcerations were still present six weeks later, but pronounced improvement was evident in two, and slight but definite involvement in one. The lastmentioned patient..... had received no maintenance therapy after the original nine consecutive days of treatment. It may be concluded from these observations that healing of the intestinal wall may be evident as early as the second month and may become complete subsequently. Further follow-up proctoscopic examinations are of course necessary to clarify the rapidity and extent to which healing of the pathologic process may take place. As structural changes in the bowel vary so much from case to case, naturally the rate of healing will vary in proportion to their extent and chronicity. Follow up Roentgen studies have been carried out in only two instances.....No definite changes in the intestinal outline have occurred, but it could hardly be expected that alterations in the contour of the intestinal wall due to fibrosis would be likely.

The exact amount of liver extract which must be injected to induce a remission in idiopathic ulcerative colitis cannot yet be stated. . . . . As clinically and pathologically idiopathic ulcerative colitis varies greatly in its severity, it would not be surprising to find that the dose of a successful therapeutic agent would also have to be variable. Practically, a patient should receive not only enough of this agent to make him well but also enough thereafter to keep him free from symptoms. At present this will have to be determined for each patient.

The concentrated liver extract used was reticulogen in all cases except for brief periods in two cases.

In the management of idiopathic ulcerative colitis a trial of parenteral liver therapy should consist of the intra-muscular injection of 10 units of liver extract, three times a week, for the first month, then 20 units a week for the second month and a maintenance dose of 20 units every two weeks thereafter. In exceptional instances the maintenance dose may have to be increased to 20 units every seven to ten days. It may also be reduced to 10 units once in two to four weeks if the disease is mild.

It is probable that the substance contained in liver which seems to exert a beneficial effect on the course of ulcerative colitis is one at present unknown and is not identical with vitamin B<sub>1</sub> or B<sub>2</sub> or fraction G of Cohn.

In conclusion, it must be emphasized that the reported findings in no way suggest a cure for ulcerative colitis, but they do suggest that a remission may be induced and maintained by the regular administration of liver extract by intramuscular injection.

**Successful Treatment of a Case of Sprue with Nicotine:** FUCHS, HEINRICH AND WISSELINCK, ARNOLD (*Klinische Wochenschrift*, 18, 722, May 20, 1939.) By the experience of Elvehjem, it is proved that nicotinic acid, or rather its amide present in large amounts in the liver of mammals, is the antipellagra vitamin. On the basis of this recognition, it seemed probable that conditions related pellagra might also be influenced by nicotine and, in a case of anæmia due to a hernia in the hiatus, the conjecture has already proved correct. A case of sprue was the next to be tried with an encouraging result.

The patient was a male, 31 years old on November 1931, when he came down with diarrhoea for which no obvious cause could be found. Various contradictory diagnoses were made in several large clinics, for example, duodenal ulcer, gastroduodenal fistula, open pylorus, duodenitis, etc. In 1935, a trial laprotomy was performed, revealing nothing in particular, except adhesions of a scar from an early appendectomy, which were dissolved. At that time, an extremely rapid passage of the stomach contents into the duodenum had been demonstrated. In 1937, after a

transient improvement, an intestinal catarrh, aphthous stomatitis, and oedema of the legs below the knee of a non-cardiac origin appeared, and occasionally, burning sensations in the tongue, which were improved by campolon. The patient lost much of his weight and hair.

The patient was treated at the Clinic three times: (a) in November 1937, (b) in February 1938, and (c) in November 1938. (a) The skin showed a brownish pigmentation. The tongue (tip and margins) was slightly atrophic, the nails of fingers and toes were brittle, there was a marked dorsal lordosis, and the stools were fatty. The hæmoglobin content of the blood was 60 per cent; erythrocyte count, 258,000 and leukocyte count, 5,800; sedimentation reaction 13/26, blood pressure (Riva Rocci) 95/55, and weight 57.8 kg. (height 186 cm.) (b) The skin was brownish-gray, oedema of the legs below the knee was present (electrocardiogram, negative). Up to seven fatty stools occurred daily. Other symptoms: kyphosis; contracted thorax; bloated abdomen; an indication of clubbed fingers; distinct decalcification and osteoporosis of the bones, demonstrated by Roentgen picture, and bulimia, especially a desire for carbohydrates. (c) Hæmoralopia, heart burn to the extent of vomiting, troubles in the ankle joints, in walking, formication in hands and feet, and dyspnoea.

The observations finally led to the diagnosis of genuine sprue. The treatment was in the main dietetic, but campolon, vitamin B

and vigantol were also tried, likewise, nicotonic acid, with a negative result. Surmising that the latter was not used drastically and energetically enough, another trial was made, starting December 2, 1938, and continuing to this day, with daily 100 mg. intramuscularly or subcutaneously and a pause of 14 days after every series of 14 injections exclusive of all other medications. Due to this treatment, the symptoms mentioned have disappeared or are improving. The patient has become stronger and more resistant to fatigue than he had ever been. His weight has increased to 80 per cent, and the erythrocytes count to 3,840,000. After another month, the blood picture was practically normal (hæmoglobin 90 per cent, and erythrocyte count 4,370,000), and the patient was able to work. The injections had no untoward secondary effects and caused no reactions, except a slight sensation of heat and itching immediately after the incorporation. The solution nicotinic acid was given him for his own use, neutralized and containing 0.5 per cent of tricresol.

Of the clinics to which the writers had sent nicotinic acid with instructions for use in genuine sprue and related conditions, one has thus far reported a positive result in one case.

The original article contains no further detail regarding the drug and the doses used.

**Urinary Tract Infections, from General Practice Standpoint:** MUMFUS, H.C., JR. (*California* and

one may be certain that some abnormal anatomical condition is preventing proper drainage, or that one of the organisms—such as *Streptococcus faecalis* or *Aerobacter aerogenes*—is present, and that the battle is going to be hard and long fought.

It apparently has little effect on *Streptococcus faecalis*, which is the specific organism of impetigo and frequently seems as difficult to eradicate from the urinary tract as from the skin. This organism probably never occurs as a natural invader of the urinary tract, but is carried on in instruments or catheters improperly sterilised. In stained smears it is characterised by the organisms occurring as oval cocci joined together by a refractive streak down the centre. When a urinary infection has not responded to this type of therapy, the presence of this organism should be suspected. The administration of the drug by mouth appears to give better results than its administration by needle, and the new form of the drug dispensed under the name of 'neoprontosil', while unquestionably less toxic, seems also less efficacious.

Another advantage of this drug over other urinary germicides is its effectiveness in an alkaline medium. So many urinary infections are mixed in character, and not infrequently one of the organisms will be capable of splitting urea into ammonia, so that the possibility of receiving any therapeutic effect from either mandelic acid or methenamine is nil. The pseudomonas and proteus group of organisms are the chief

offenders in this respect, although there are some of the cocci that seem but slightly less efficient in the production of ammoniacal urine.

One of the most frequent causes of failure in the treatment of urinary tract infections in the male is the reinfection of the urine from chronic foci in the prostate. Sulphanilamide is found in the prostatic secretion and would appear, therefore, to be particularly indicated in these cases. Were it not for its distressing side reactions, this drug would indeed seem the ideal urinary antiseptic, but its untoward reactions seem the thorns of this particular rose.

Coccus infections of hematogenous origin..... seem to be little affected by either mandelic or prontosil therapy, while those of the ascending type usually respond to one or the other. Fortunately, the hematogenous type of infection is, in the majority of cases, a self-limited affair, from which the patients recovers; but when it assumes a chronic form, treatment by neoarsphenamine has proved the most successful drug for its eradication... The most efficient and best tolerated dosage scheme is to give 0.2 gramme followed in five or six days by 0.3 gramme. If no improvement is noted after these two injections, it is rare for a third dose to produce good results. The elimination of foci in the cervix, prostate, teeth and tonsils in this type of infection is most important and, until taken care of recurrences, seem certain.

## Service News and Notes

**Our Future.**—The one important event since the publication of the last issue has been the resignation of the Ministry. We are awaiting the reply of the Government to our latest memorial and our request that a deputation from the Association may be received by the Government. The memorial was sent long before the resignation of the Ministry.

**The Annual Meeting,** which we hope to hold as usual during Christmas week will be a momentous one as the future of the service will come in for a good

deal of discussion. A subscription dinner will also be held preceding the annual meeting and we trust members will muster strong at both these gatherings.

**Confirmations.**—At last, long though belated, comes the news of the confirmation of the following civil surgeons and assistant surgeons. We congratulate them and hope that this is only a prelude to the confirmation of quite a number of others of both categories who have been waiting patiently for a considerable period:—

### Civil Surgeons.

|                             |                             |
|-----------------------------|-----------------------------|
| V. Krishnamurthi.....       | with effect from 15-12-1936 |
| S. Venkatasubba Rao.....    | 2- 6-1938                   |
| B. Sanjiva Rao.....         | 16- 2-1937                  |
| N. Mangesh Rao.....         | 1- 7-1937                   |
| A. Srinivasulu Nayudu.....  | 10- 6-1937                  |
| E. Achyutha Menon.....      | 10- 6-1937                  |
| Major T. V. Rajaratnam..... | 20-12-1937                  |

### Assistant Surgeons.

|                                  |                             |
|----------------------------------|-----------------------------|
| P. Madhavan.....                 | with effect from 10- 6-1937 |
| S. Balasubrahmanyam.....         | 6- 4-1939                   |
| P. Venkata Rao.....              | 3- 8-1937                   |
| N. Rajamanikam.....              | 27- 8-1937                  |
| C. K. Padmanabha Menon.....      | 4- 9-1937                   |
| R. E. S. Muthayya.....           | 9-10-1937                   |
| V. R. Thayumanaswamy.....        | 10-10-1938                  |
| K. G. Krishnaswamy.....          | 1- 6-1939                   |
| Md. Habibullah Saheb Bahadur.... | 22-11-1937                  |
| G. Thimma Reddy.....             | 10- 2-1938                  |
| K. C. Jacob.....                 | 9- 3-1938                   |
| M. Narayana Prabhu.....          | 27- 5-1938                  |
| D. V. Subba Reddy.....           | 1- 7-1939                   |
| R. S. Viswanathan.....           | 25- 1-1939                  |
| M. A. Parthasarathy.....         | 15- 6-1938                  |
| W. Achayya Naidu.....            | 29- 1-1939                  |
| D. Ram Annamalai.....            | 3- 2-1939                   |

*The Journal.*—One gets tired of making the chronic complaint that members do not take the least interest in the conduct of the Journal. We can write pages on the apathy of most of the members, the glib promises never to be fulfilled made by some when approached on the subject, and the whole-hearted and unfailing support given by a few to whom all honour and praise are due. Whether the members really desire the Journal to be continued or not, must be once for all decided at the ensuing annual meeting.

*Obituary.*—It pains us to record with almost clockwork regularity the passing away of one or more of our colleagues.

We regret to record the death of Dr. C. Rangamanujayya, L.M. & S., Retired Civil Assistant Surgeon, who was promoted from the ranks of Sub-Assistant Surgeon.

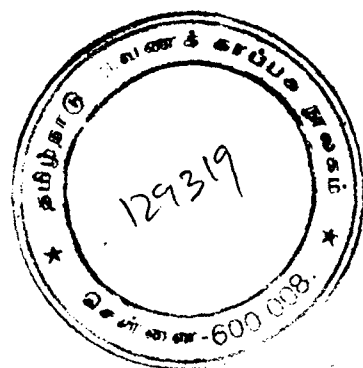
We tender our heartfelt condolences to the bereaved family. His daughter is a student of the pre-registration class of the Madras Medical College.

Very tragic has been the passing away, while still in harness, of Dr. A. Krishnayya, M.B.B.S., Lecturer in Anatomy, Stanley Medical College, at the age of 52, of heart failure on Monday, the 6th November. His was a gentle and lovable disposition. He radiated kindness and was greatly respected and adored by his students. He leaves behind him a large family, his eldest son being a student in the fourth year class in the Madras Medical College. To his bereaved family we extend our sympathy and heartfelt condolence in their great sorrow, on behalf of all our members.

J. C. D.



The late  
DR. A. KRISHNAYYA, M.B.B.S.



## Book Review

**Pharmacology, Materia Medica and Therapeutics:** BY B. N. GHOSH, M.B.E., F.R.F.P.S.G., F.R.S.E. (Hilton and Co., Calcutta, Rs. 8-8 or 15 sh. net). This is the fifteenth edition of a text-book which is popular not only in this country. It extends over 763 pages, including the index and is divided into seven parts. It has in addition three appendices in which poison regulations, etc., have been dealt with. In addition to the chapters on the pharmacology of the drugs in use in the western system of medicine, Part VI comprises a summary of the actions and uses of the better known indigenous drugs, which have a vogue in this country.

No pain has been spared to make this book up to date to the student of medicine by removal of obsolete material and inclusion of the newer remedies of repute. Kymograph tracings illustrating the action of a number of drugs add to the usefulness of the book.

The author has taken a lot of trouble to give references whenever required. But it is question-

able whether it is the best policy to introduce controversial matter or points not generally accepted in a text-book mainly intended for under-graduate students, though the relevant references might be given. A number of prescriptions are given at the bottom of the pages in order to help the student to practise the writing of similar prescriptions by himself; but it is better to avoid showing the student the way to write the undesirable "shot-gun" type of prescriptions.

A notable omission is *Mapharsen* which has now established a place for itself in the arsenical treatment of syphilis. A few mistakes also occur. For example, the dose of bismuth sodium tatrato on page 482 should be 0.03 gramme and not 0.3 gramme. The name *Vinyl ether* has been misspelt more than once.

But these criticisms do not detract the book of its value. We have no hesitation in recommending it to all students of medicine and, as a reference volume, to members of the profession.

J. C. D.