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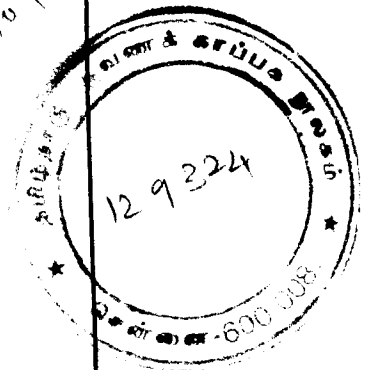
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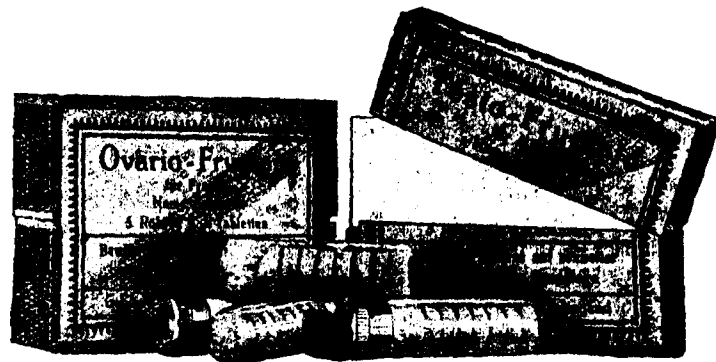
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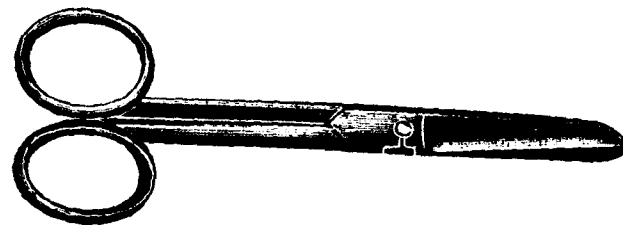
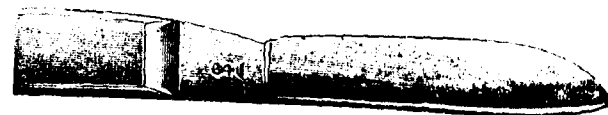
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THE MADRAS Medical College Magazine

Vol. VI

DECEMBER

No. 3

Surgery in Madras

BY MAJOR K. G. PANDALAI, F. R. C. S., (Eng.), I. M. S.

To people who are accustomed to see the elaborate ritual of a modern surgical operation performed with ease day after day in the operating theatres of any large hospital, it is not always easy to imagine the miserable beginnings from which the present day growth of surgical art has sprung. We have all read of the remote past, the classical period, centuries before the Christian Era, when the pioneers of Indian medicine were practising, under different circumstances, what must have been to them modern and advanced surgery. We read in books on the History of Medicine that the ancient Hindus were able to perform successful operations in all parts of the body and had invented instruments of various designs for this purpose. The records of their achievements fill even the modern student with wonder and are a tribute to the

industry, ingenuity and creative talent of our ancestors. But, alas, the seed which was borne on the tree of knowledge in India was wafted away by the winds of circumstance and fell and multiplied in far-off lands. While, in our own country, the art which our forefathers developed was allowed to fall into disuse, it flourished in other countries and it has been our unhappy lot to see that the spirit of science in India has had repeatedly to be revived by periodic contact with foreign civilisations. It may be a fruitful subject for speculation to think what might have been the history of India, if the caste system had never been introduced or, if foreign invasions had never taken place, but when one speaks of modern surgery in Madras, our people are likely to imagine that we are speaking of something quite new and exotic in origin. With such a brilliant surgical past as India could show in its ancient History I am loth to look upon modern surgery as a gift to us of the civilisation of the West. I like to look upon it as an offspring of our own that had wandered away to foreign lands in an early age and has returned to us in his adult vigorous manhood, grown out of all recognition even by his parents. Apart from this aspect of the question, the facility and safety with which every part of the human frame is now-a-days explored by the surgeon in his efforts to cure disease are undoubtedly a modern feature. Readers, particularly of the younger generation, may feel surprised to know that as recently as 20 years ago, operations on the abdomen were rarely performed in Madras and that whenever such was done a sensation was caused in the medical world, and students and medical officers crowded into the theatre to see it done. If you speak to some of the older men of the Medical Service who have retired within recent years about the experience of their younger days, you will hear many strange thing

The senior surgeons of those days, with great solemnity and much thought, began working away from 7 o'clock in the morning to get through what was to them a long (?) list of major surgical operations consisting of a case of hernia, a case or two of hydrocele and another of piles. An operation for hernia, was considered a serious undertaking and I still remember, one of the now senior officers of the I. M. S., 20 years ago, attempting to perform an operation for hernia and get into difficulties with the neck of the sac. I was his assistant and a tragedy was narrowly averted by the accidental entry of the then Superintendent of the Hospital who was reputed to be a capable surgeon. He saw the situation at once and drawing his hand out of his trousers' pocket without hesitation, pushed his fore-finger down the sac into the peritoneal cavity and proceeded to explain to the young surgeon the further steps of the operation. The remarkable thing is that, in this case, nothing untoward happened and the patient got well. To watch an amputation of the leg for gangrene, large crowds of students gathered in the theatre and when an external urethrotomy was announced on the notice board much excitement prevailed. It is not generally known that till about 30 years ago a strict rule prohibited chloroform being given by any one, other than an officer of the I. M. S. I know of an instance in which a senior assistant surgeon was taken severely to task for administering chloroform to a patient in hospital in an emergency. No doubt the object of the rule was beneficial and it was clearly intended to prevent untrained people administering such a poisonous and ill-understood drug as chloroform was in those days. The outcome of abdominal operations could not be so confidently foretold as in these days and hardly any private practitioner attempted to perform a major opera-

tion under an anaesthetic. This latter was exclusively the domain of the Hospital surgeons, and I can remember the days when Indians requiring surgical aid had no one else to come to but the surgeons on the staff of the General Hospital. X-rays were known, but were rarely employed either in diagnosis or in treatment. Biochemistry did not exist and all the bacteriological and microscopical examination required in the Hospital was carried out by the Professors of Hygiene and Pathology in the Medical College.

The evolution from this comparatively primitive state of affairs was a slow process. *Pari passu* with the advance in therapeutic and diagnostic methods elsewhere, the nature and scope of surgery in Madras steadily grew, and as new and younger men replaced the older men, the Science and Art of Surgery was steadily being pushed forward until it attained its present high rank. It is not easy to allot the credit for the present high standard of work one sees in Madras to any particular individual or period within the past decade and we can realise that every one had his share and contributed to the final result.

Certain noticeable features of present day surgery may be picked out for special mention. We have passed from the age of *antiseptic* to the age of *aseptic* surgery. We have advanced from the stage when complicated pre-operative preparations were the routine, to a stage of comparative simplicity. We have ceased operating with one eye on the clock and do not aspire to create fresh records for speed in operating. We realise that deliberate and carefully undertaken manoeuvres executed with a fair amount of speed which comes with practice are more beneficial to the patient than slipshod and clumsy performances rapidly carried out more in the

style of a juggler than of a surgeon. We also notice that surgery is being viewed by the public of Madras with more favour than in past years. The confidence of the public in the safety and certainty of operative treatment has been gradually secured, thanks to the perseverance and devotion to duty of our distinguished predecessors with the result that the amount of work turned out in the Hospital has more than doubled itself within the past 10 years. Not merely has the quantity of work increased but its quality and variety have also risen. In this connection the annual report of the General Hospital, Madras, for 1925, is most instructive reading and will amply repay perusal. One is at once struck by the large amount of major operative work turned out in this Institution and cannot help feeling surprised that such a small number of surgeons (three) should be able to do so much work in a year as it takes 5 or more men to do in other places. There is, therefore, considerable strain on the time and physical capacity of our surgical staff and a case appears to have been made out for the appointment of additional surgeons.

If only the public of Madras realised the quantity of humanitarian work that is being carried on by a band of stout-hearted men in the General Hospital, under circumstances which are far from ideal, involving risk both to patients and surgeons alike, there would be less toleration of that kind of irresponsible talk about the shortcomings of the Hospital which is occasionally permitted in the columns of the lay Press. There is no doubt about the great popularity of the Institution and of scientific medicine in this province. The Hospital fills a worthy and essential place in the life of the city and it is gratifying to note that the authorities are contemplating an extension of its usefulness by providing additional and improved

accommodation for its congested departments. From the remotest corners of the Presidency an ever-increasing stream of people of all classes and both sexes continues to pour into the wards of our Hospital and the time has come for a greater amount of philanthropic propaganda work to be undertaken by medical men in co-operation with the leaders of social opinion, in order to educate the masses to seek medical and surgical relief at an earlier stage of disease than they do at present. One cannot help feeling a sense of shame that the medical propaganda work done in this province should be so little compared to other countries and it is hoped that along with the rising tide of national consciousness now spreading everywhere in the country, a greater realisation of the needs of popular health would also become manifest. The question is one that requires enthusiasm and money, and it is hoped that the energies of the younger generation of medical men would be directed towards the instruction of the public to take earlier notice of such serious diseases as tuberculosis, venereal diseases and cancer, all of which are now levying a heavy toll of human lives in this Presidency.

It may be stated without fear of contradiction that surgery in Madras has attained a level not inferior to that of any other country in the East, but in order to maintain the position already attained and to launch out into fields hitherto unexplored, there is a crying need for enthusiastic younger men, well qualified and willing to devote their time to special branches of our art. There is no doubt that accommodation as well as additional equipment are urgently needed, but along with these there is a greater need than ever for men ready to devote their lives to the specialities of surgery.

One of the greatest impediments to modern scientific

development in Madras is the absence of workshops in which the requirements in ordinary medical and surgical apparatus could be easily met and essential repairs carried out without delay in our own country. The existing conditions are unfavourable to rapid progress as today the requirements of a surgeon practising in India have mostly to be provided by the manufacturer in Europe. I am aware that, as in all industrial undertakings newly started in this country, the initial difficulties will be great and competition with foreign producers who have already established a reputation will be serious, but in spite of these handicaps one attempt has to be made and the foundation truly laid in the immediate future for a greater development of the science and art of Indian surgery.

One other serious defect in the organisation of our surgical services in Madras is the absence of a specially trained anaesthetic staff. Whereas, in other countries, men undergo special training and apprenticeship under a master in the science and art of anaesthetics, and later devote their lives to the practice of this special branch of medicine, are properly paid and occupy a position of responsibility no less than that of physicians, surgeons or other specialists and is considered an honourable speciality to follow, here in Madras, we have not advanced much from the days when chloroform was first discovered. We use practically no anaesthetic but chloroform as a routine in spite of its known dangers, we allow young and inexperienced men to administer the drug every day in our theatres, we change the anaesthetists and transfer them so often that they never become experienced in the art, we pay them so little that the work is not popular, with the natural result, that the art of anaesthetics has come to be looked upon as an inferior and undignified branch

of the surgical art. I am afraid that until we take steps to place anaesthetics in a respectable and a responsible position, until we get men specially trained abroad in the latest developments of the art and accord them a status proportionate to their responsibility, surgery cannot advance very much farther in Madras and would not become freed from that constant dread of fatality under an anaesthetic which now oppresses them every moment that they are operating.

Some Cardiac Stimulants

Their Mode of Action

BY CAPTAIN J. C. DAVID, M.B.B.S.

In certain cardiac disturbances, due to narcotic poisons, or due to infection, which lead to cardiac failure, it is important to tide the heart over the danger. If, then, owing to the effect of a drug, it beats better for only a short time, and again, produces a better pressure in the heart, the heart itself is better nourished and may recover from the threatened fatal poisoning. The output of the heart may be improved by various changes in its properties, depending on the cause of its failure. Drugs which influence the heart in such a beneficial way are known as "Cardiac Stimulants". It is the duty of pharmacological analysis to ascertain which functions of the heart are stimulated in each case, impulse production or conduction, contractility or tonus. It will, therefore, be profitable to consider the mode of action of some of the more common drugs used to stimulate the heart and circulation.

Camphor

Camphor is a stearoptene obtained from the volatile oil of *Cinnamomum Camphora*. It is also synthetically prepared. Two stereo-isomers exist. Both varieties are active, the dextro or the ordinary camphor of commerce being somewhat the more powerful. It is very difficultly soluble in water. It is more soluble in alcohol; and in ether and oil it is very easily dissolved.

Camphor is very slowly absorbed and after its absorption it is rapidly transformed into camphoglucuronic acid and detoxicated by this synthesis.

Small doses of camphor, about 5 grains, dilate the skin vessels and give rise to a feeling of warmth as with alcohol. Large doses slow the heart and the blood pressure falls (see figure 1). In small doses camphor has little or no action on the mammalian heart. It is often stated, mainly as the result of experiments on the frog's heart, that camphor excites the automatic centres in the heart. If the heart of a frog is brought to diastolic standstill by chloral, the application of camphor may bring back the beat though in a feeble and ineffective manner. But a healthy heart shows no response to the administration of camphor. In Germany it is largely used to revive the circulation in dying patients in whom the automatic centres of the heart are believed to be failing. Reliable clinical evidence of this effect is lacking. It has been used in unconsciousness and collapse and in the weakness of fevers as an injection in olive oil, but there is great doubt about its action except as a reflex circulatory stimulant to some extent. It changes the distribution of blood by acting on the vasomotor centres. But, for this purpose, doses producing convulsions are necessary in normal animals. In man, however, much smaller doses are used; nevertheless, subcutaneous injections of such small doses improve the circulation even in agonal stages of disease, though often but transitorily. It has been frequently observed that centres whose tonus is low react better to small doses of stimulating drugs than normal ones do. Similarly a string can be stretched by less force if it has previously been slack. This may, in a way, explain the effect of camphor on ill-nourished hearts.

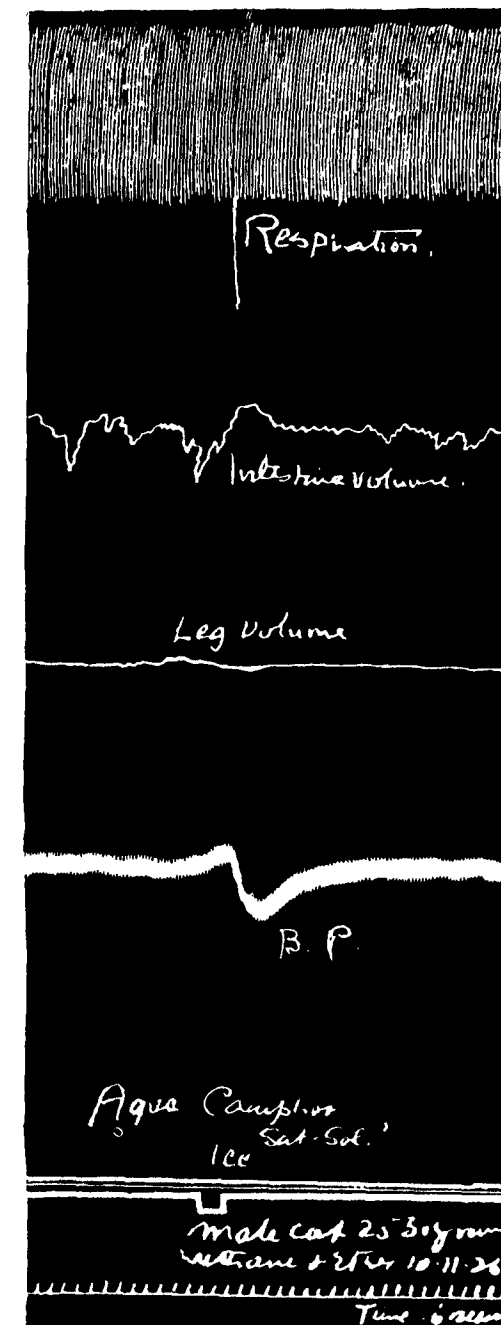


Fig. 1.

Note the slight fall of blood pressure. No perceptible change in volume of intestines or leg.



Fig. 2.

1/20 cc. or less than 1% of absolute alcohol in the perfusion fluid depressed the isolated heart of a kitten. Note the diminution of the amplitude of heart beats.

To sum up—camphor cannot ordinarily be considered a circulatory stimulant. But in the conditions of heart failure, where stimulus production in the heart threatens to fail, camphor is undoubtedly a heart stimulant.

Musk

Musk derived from the preputial follicles of the musk deer was once official and has been used for the same indications as camphor. It is now seldom employed. Its reputation has also been tarnished by the various imitations on the market. But its popularity with the indigenous practitioners and as a domestic remedy in India is still high. There does not seem to be enough experimental evidence, however, for retaining this as an efficient cardiac stimulant.

Ether

Ether also is frequently employed in the form of subcutaneous injections. A direct stimulant effect on the activity of the heart has not yet been shown. If, after the injection of ether, an evanescent improvement of the circulation in cases of collapse has been seen, it is certainly due to sensory stimulation. Such an injection is painful in conscious states. Its effect on respiration and circulation is reflex just like that of other sensory stimuli. Ether causes dilatation of cutaneous and brain blood vessels and constriction of the splanchnic vessels. This vascular effect combined with the reflex action may lead to an improvement of the blood pressure and so a better perfusion of the coronary vessels. The acceleration of the pulse rate is central in origin and not due to any direct action on the heart. The action of ether on the heart can, therefore, be regarded as secondary, and there is, as yet, no clear proof of a direct favourable action.

Alcohol

Whether alcohol has a direct stimulant action on the heart is a much debated question. Different observers have noted differences in pulse-frequency and have given different interpretations of these changes. Its effects on the circulation are rather inconstant, varying not only with the dose and concentration and mode of administration but also with the condition of the individual.

Experiments on the isolated heart show that alcohol in a strength of about 1 per cent in the perfusion fluid damages the heart (see figure 2). Certain other observers have obtained opposite effects with a concentration of 0.13—0.3 per cent especially in hearts which were beating badly. Nevertheless, the changes in experiments on warm-blooded animals have been small and inconstant. Normal hearts working under favourable conditions are but little affected, as is the case with camphor. As the stimulating action of alcohol is much more distinct in badly nourished hearts the suggestion that alcohol acts as nutrient material is evident. Alcohol penetrates into all tissues and it may serve as a source of energy. However, during the burning of alcohol in the heart, dangerous intermediate substances (aldehydes) may arise, which would oppose the favourable effect of this useful source of energy.

Small therapeutic doses in man produce generally (but not always) an insignificant quickening of the pulse rate, due mainly to excitement. The cutaneous vessels are dilated and the splanchnic vessels are somewhat constricted leading to a rise of blood pressure. This along with the stimulating action on the exhausted heart may alter the distribution of blood in the body causing im-

provement in the force of the pulse, the output of the heart, the mass movement of the blood and consequently the efficiency of the circulation. This may serve to produce decided therapeutic effects especially in conditions of exhaustion. Its usefulness as a quickly acting (diffusible) stimulant can scarcely be doubted in various forms of circulatory collapse, the main element in its action being the reflex stimulation increasing the pulse rate, the blood pressure and the respirations. The reflex action being brief, alcohol acts mainly as a temporary emergency remedy to tide the patient over the immediate dangers. For this about an ounce of whisky or brandy may be given undiluted and repeated if necessary.

In exhausting fevers alcohol may be valuable because of its nutritive and energy producing properties. Because of its excitant and depressant stages it must be carefully prescribed, and then only when it is really indicated. In such cases $\frac{1}{2}$ to 2 tablespoons of brandy in half a glass of milk may be prescribed.

Cushny is of opinion that the action of alcohol on the circulation in small quantities ($\frac{1}{2}$ to 1 $\frac{2}{3}$) may be favourable in some cases but is so slight and inconstant that it is impossible to regard it as a basis on which serious therapeutics can be founded. This, though partly true, is too dogmatic. Cushny, whose recent death all those interested in Pharmacology would deplore, never accepted any theories that he could not prove in the laboratory. But long experience has supported the value of alcohol as a restorative and stimulant in conditions of shock and exhaustion due to various causes. But it must be used discriminately and only when it is really indicated. Indiscriminate use leads to more harm than good.

A word about the habitual use of alcohol. It may be considered as probable that a certain amount of alcohol (variable in individual cases) may be taken daily without any demonstrable permanently injurious effect. But it stands equally certain that it is as dispensable to the organism as nicotine or caffeine and that it must be looked upon purely as a luxury. The injury done by such use of alcohol lies chiefly in the fact that it is so apt to lead to the use of immoderate amounts. Moreover such daily use of alcohol, in moderate quantities though it be, has nothing to recommend it; but, on the other hand volumes may be written about its uselessness in conserving energy, its deleterious influence mentally and morally and the diseases it can be a precursor of.

Atropine

Atropine is sometimes used in certain cardiac conditions. Its chief action is to paralyse the inhibitory mechanism in the heart. The heart consequently beats faster and the blood pressure rises. This occurs only when there is some tonic central effect. Thus the quickening is decided in dogs and little in cats. In man it varies with the age and disposition but is usually greatest between the ages of 25 and 40. It has no effect in babies and but little effect in old age. It is possible that atropine may also directly stimulate cardiac muscle. Any such effect, however, is of comparative insignificance. Blood pressure rises as the result of the quickening of the heart. The cardiac output per minute is consequently increased.

Atropine is used in some cases of heart disease in which the pulse is very slow and irregular. It is also employed in the inhibitory stage of poisoning by digitalis and chloroform.

Strychnine

Accurate observations show that strychnine has no direct action on the heart, though some workers claim that it has. The heart is slowed by stimulation of the inhibitory centre. It tones up the nervous mechanism all over the body and by improving the tonicity of the stomach and intestines it may indirectly help in the proper nutrition of the heart and circulatory system. It has been used in heart disease but all exact observations agree it has no beneficial action. In weakness of the circulation from inefficiency of the vaso-motor centre it may act. In rare cases this weakness of the medullary centre stimulates heart disease and this may account for the belief in the virtues of strychnine as a cardiac tonic.

Adrenalin

Adrenalin is a typical stimulant of cardiac activity. It is the active principle of the medulla of the supra-renal gland and is identical with the "chromaffin substance" which is found in the adrenal medulla and in association with sympathetic cells elsewhere. It will be remembered that the medulla of the adrenal body is a direct outgrowth of the sympathetic system and consists first of neuroblasts. Adrenalin is a simple amine derivative, closely related to tyrosine. It is also synthetically prepared.

Its typical action consists in a highly specific stimulation of the physiological (not anatomical) endings of the myo-neural junctions of the entire sympathetic system. The augmentory innervation of the heart being sympathetic its effect on this organ is a highly stimulating one. At the same time it causes a great rise of blood pressure from peripheral stimulation of the vaso-con-

strictor mechanism of the systemic vessels added on to the cardiac acceleration.

The intravenous injection of adrenalin into a normal animal produces the following striking phenomena. The blood pressure rises sharply with marked acceleration of the heart beat; as it approaches its maximum the heart beats are greatly slowed and strengthened. The pressure then quickly returns to its normal and the pulse also regains its former rate (see figure 3). The stimulation of the cardio-accelerator nerve endings causes the heart to beat more rapidly at first. The subsequent slowing is due to the stimulation of the vagal centre in the medulla which in turn passes off with the return of the blood pressure to normal.

Practically no systemic effect can be secured by the oral administration of adrenalin and relatively little by the hypodermic method. Vaso-constriction limits absorption which is necessarily slow permitting destruction of the epinephrin before it reaches the circulation. The intravenous method is the route 'par excellence'. Intramuscular injection produces a smaller response though more lasting. Its action is instantaneous but fleeting. The tissues oxidise it quickly and the effect disappears as rapidly. In cases of threatened heart failure its powers of restoring the circulation have been proved both in animals and in man; for example, in animals in which the heart has been arrested by excessive doses of chloroform the circulation may be restored by the intravenous or intracardiac injection of adrenalin. 1/20 cc. of the 1 in 1000 solution will cause the heart beat to reappear in a cat under such circumstances. Less than 1/4 cc. can produce cardiac stimulation in man. Even in an isolated perfused heart the irritability of which has been knocked out by cardiac poisons and even after the heart has ceased to

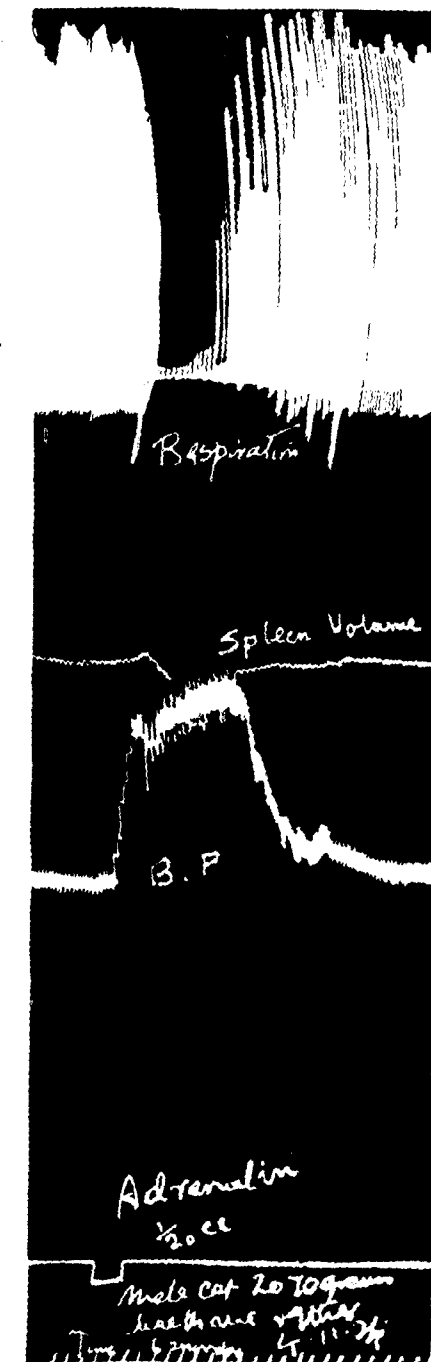


Fig. 3.

Note the rise of blood pressure with constriction of spleen volume and bronchial dilatation.



Fig. 4.

1/40 cc. of Adrenalin in the perfusion fluid stimulated the isolated heart of a kitten after it was nearly knocked out by a toxic dose of Quinidine.

beat, a trace of adrenalin in the perfusing fluid causes the heart to beat again with greater force and with marked increase in the amplitude (see figure 4). In using epinephrin for cardiac stimulation, the dose—or rather the rapidity of injection—must be controlled by the state of the heart. Overdoses of epinephrin kill by cardiac dilatation with pulmonary oedema. In cardiac insufficiency injection of 1 m.g.m or 1 cc. of a 1 in 1000 solution may produce distinct dilatation of the heart. This has been confirmed by radioscopy. It is therefore unwise and unnecessary to give liquor adrenalin in 1 cc. or even $\frac{1}{2}$ cc. doses. A much smaller dose is quite sufficient to produce therapeutic results. A hypodermic injection of 1—2 minims of the liquor often gives relief in asthmatic attacks immediately. The same dosage is quite enough for counteracting 'shock' or anaphylactic phenomena or those 'nitritoid crises' that occur sometimes after injections of arsenical and antimony compounds.

While camphor and alcohol have no stimulant action on a normal heart whose nourishment is good and whose contractions are strong, adrenalin stimulates it causing its characteristic effects.

Adrenalin, for therapeutic uses, should be standardised by biological assay. It deteriorates in time and assumes a brownish tint. Tabloids of the drug deteriorate, perhaps sooner than solutions in sealed ampoules. They even become inert in course of time.

Pituitrin

This is another drug that is sometimes used as a circulatory stimulant. It is not a cardiac stimulant in the same sense as adrenalin is, and its use for such a purpose unless it be for the purpose of raising the blood pressure by constricting the vessels in cases of shock is not justified.

Pituitrin also acts on the heart muscle causing it to beat more slowly. This is also due to the stimulation of the vagus centre from flooding of the brain by the increased blood pressure. The excised heart is also slowed showing that the main effect is on the heart muscle. The sudden fall of blood pressure that is sometimes seen just after injection is due to this depressant action.

Usually the blood pressure rises as the result of vaso-constriction. This rise occurs even after the endings of the vaso-constrictors in the walls of the vessels, have been paralysed by ergotoxin. So the action here also is directly on the vessel walls. The rise is not so high as after adrenalin but is more sustained. An interesting phenomenon occurs if a second injection is given after the blood pressure has returned to normal. There is either no rise of blood pressure or the rise may be a much slighter one, the vessel walls apparently having lost their power of response to its active principle. Or the blood pressure may fall instead of rising owing to the presence of depressor substances in the preparation (see figure 5). Clinicians often forget this when they give repeated injections of this drug.

The Digitalis Group

This group of drugs is our sheet anchor in the treatment of heart disease. The most important members of this group are digitalis, strophanthus and squill; but a number of other plants mostly poisons are also included under this heading. They include *Apocynum Cannabinum*, picturesquely called, 'the vegetable trochar' owing to the success that has attended the treatment of dropsy with this drug; *Adonis vernalis*, which can replace digitalis in therapeutics with success; several arrow and ordeal poisons like the famous upas tree of the Malayan

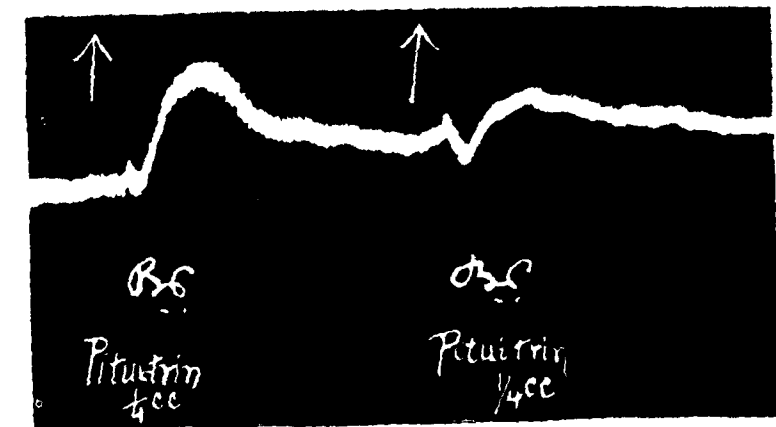


Fig. 5.

Cat anaesthetised with Urethane. $\frac{1}{4}$ cc. of Pituitrin given at 1st. arrow mark caused a rise of blood pressure. A second injection of $\frac{1}{4}$ cc. Pituitrin produced quite an imperceptible rise with an initial fall. (Read from left to right).

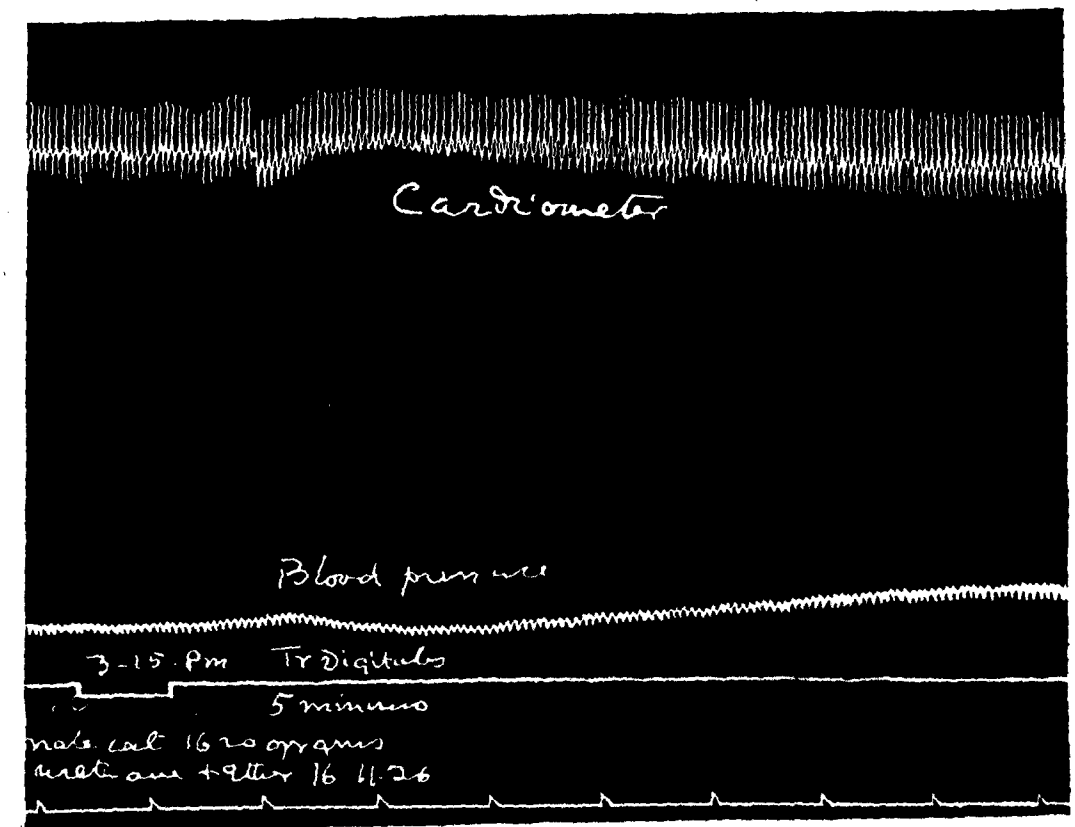


Fig. 6.

Intravenous injection of 5 m Tr. digitalis causes prolongation and increase of diastole followed by increased force of contractions and increase of systolic amplitude. (Upstroke diastole, downstroke systole) B. P. rises mainly because of increased cardiac output. (Time—3 seconds).

Archipelago, *Erythrophloeum guinense* of Madagascar &c; *Helleborus niger*, which has been mentioned by Hippocrates; *Cerbera odallum*, the fruits of which can be seen floating in the tank at the Madras Zoo; *Thevetia nereifolia* and *Nerium oleander*, the common garden plants; and lastly the toad---this being of interest as an example of the formation in the animal kingdom of bodies possessing digitalis action.

The chief and representative member of this group is *digitalis* and the actions of squill and strophanthus are similar. We shall therefore consider the mode of action of digitalis on the heart.

Digitalis

The chief active principle is a glucoside called digitoxin. Digitalin acts less strongly on the heart. Digalen is a solution of impure digitalein from leaves and is not superior to the tincture. Digitoxin is soluble in alcohol. The official infusion fails to extract the leaf completely. The seeds are not official and are said to contain digitalein with some digitoxin and digitonin, which resembles a saponin.

In the mammalian heart digitalis and its allies affect the muscle directly but the inhibitory mechanism is also stimulated to some extent. The direct action is shown in increased strength of contraction and greater excitability. The action of digitalis on the healthy mammalian heart may be divided into three stages. The second stage may not be always noticed but is present in poisoning.

In the first or therapeutic stage, the rhythm of the heart is distinctly slower, for the inhibitory apparatus is set in activity. The slowing is accordingly due to a prolongation of the pause in diastole. The ventricles empty themselves more completely than they normally do, due

to a direct action on the cardiac musculature. If the heart is weak and dilated, this dilation tends to be lessened. But in a normal heart the relaxation is augmented—this variation depending upon two opposing factors, the inhibition and the muscular action. The inhibition is always central for after section of the vagi digitalis hardly slows the heart. Each beat of the heart expels more blood under digitalis than before, and as in this stage the slowing is not great enough to counter-balance the increased output, a larger amount of blood is driven into the circulation causing a rise of blood pressure (see figure 6).

Two stages of poisoning by digitalis are known. If an excess of inhibition overshadows for the time being the muscular effort, the heart beat is irregular and slow. The rhythm becomes so slow and irregular that the output per minute is less than usual. Very often the impulses have difficulty in passing from auricle to ventricle (heart-block) owing to inhibition of conducting fibres. The ventricle then beats at a slower rate than the auricle or it may beat independently of the auricle. The auricular contractions are also much weaker. This is the second stage and indicates poisoning. If the inhibitory mechanism is paralysed by atropine this stage need not set in.

The third stage sets in when large quantities are injected or absorbed. The ventricular rhythm becomes very much accelerated often beyond the normal, due to increased irritability of the heart muscle and not paralysis of the vagal endings. The auricles also increase their rhythm, though at a different pace due to heart block. This auriculo—ventricular arrhythmia continues for some time leading to other irregularities. Extra-systoles appear culminating in fibrillation of both auricle and ventricle. Finally the heart dies in systole.

The blood pressure may be raised. But more often a fall is noted. This is a result of the improved action of the heart; for when the circulation is weak and the supply of the blood to the brain is insufficient, the vaso-motor centre is aroused to improve the condition by contracting the peripheral vessels so that the supply to the vital centres may be assured. When the cardiac efficiency is improved the centre relaxes its activity and permits more blood to circulate in other vessels. The fall in blood pressure is therefore an evidence of the general acceleration of the circulation and of the relief of the anaemia of the brain.

Digitalis relieves the accumulation of ascitic fluid by augmenting renal secretion. It is an indirect effect of the improved circulation. Interchange of blood and lymph is promoted and any accumulation in the body tends to be reabsorbed and excreted into the kidney.

Digitalis is used in therapeutics for different kinds of cardiac diseases, functional and organic. *Auricular fibrillation* is a condition where the auricle is in inco-ordinate activity and impulses descend to the ventricle causing it to respond by irregular and weak contractions. This though compatible with normal health may lead to signs of failing circulation with its concomitant clinical symptoms. Here digitalis helps to tide over the danger and improves the heart by lessening conductivity. But digitalis does not arrest the underlying process and the auricle continues to beat irregularly. It only prevents exhaustion whereas quinidine arrests the irregularity of the auricle.

In *auricular flutter* the auricles assume a regular rhythm of about 300 per minute. The ventricle responds but owing to a certain amount of heart-block, its rhythm is only about one half that of the auricle and quite

regular. Digitalis in full doses of 1 drachm a day changes the regular flutter to fibrillation and reduces the conductivity of the bundle of His so that the ventricular rhythm is slowed. On now stopping treatment both flutter and fibrillation disappear and the heart beats normally. The digitalis by increasing the irritability of the muscle changes the flutter to fibrillation and fibrillation of recent development tends to revert to normal; and when the digitalis action passes off the flutter does not return but the normal pacemaker resumes its sway. Here there is a definite cure.

The beneficial action of digitalis in deficient circulatory conditions with malnutrition of the heart, dilatation, congestion of lungs, and dropsy, is quite familiar to all. The heart, being better nourished owing to the acceleration of circulation, now hypertrophies. The action of digitalis is more pronounced in mitral than in aortic incompetency. It is sometimes stated that digitalis is dangerous in aortic regurgitation because of diastolic prolongation but in many cases this does not happen. The benefit of stronger contraction in systole counter-balances the danger of regurgitation during diastole even when slowing occurs.

In acute febrile conditions with dilatation of the heart and a small fluttering pulse e.g., pneumonia and typhoid, digitalis is indicated. It is of no use in fibrous or fatty degeneration of the heart.

When administering digitalis one must always keep in mind the dangers of cumulative action and look out for danger signals in the heart. But the tendency to err too much on the side of caution should also be combated. Poisoning with digitalis is very rare as nausea and vomiting supervene quickly even before toxic dosage is reached. As much as 1 minim of the ordinary tincture per pound

weight i.e. 2 drachms for a man weighing 120 pounds can be given in a single dose if therapeutic effects are desired without producing untoward symptoms. It has been calculated that an average healthy adult destroys about 22 minims of the tincture in 24 hours and this quantity passes out of the body without producing any therapeutic effect. The balance accumulates in the heart muscle till sufficient concentration is reached to produce its effect. After the therapeutic effect is produced the dose can be reduced to 10 minims t. d. to keep the heart under digitalis effect. This dosage is particularly important as it has been shown that digitalis loses its potency and deteriorates quickly in the tropics. Within three months of a consignment landing in India, a certain percentage of potency is lost. The same holds good for tinctures made locally. A series of such tinctures was assayed biologically and tested clinically by Chopra, Bose and De (1925) and with doses of 20—30m. thrice a day, patients could not be got under digitalis effect inside of 12 days. What will then be the effect of such cautious doses as 5—10m that are given by practitioners in India? We also see the importance of getting the preparations of this group assayed chemically and biologically in a reliable pharmacological laboratory as well as clinically. Eggleston (1915) has calculated that the average amount inducing full therapeutic effects within 36 to 48 hours in an adult man, who has not received digitalis previously, is about 1.5 grams of the leaf or 15 cc. of the tincture (or 4¼ drachms) per 100 lb body weight, the tincture being given in divided doses at intervals of 4 to 6 hours. The biological assay is most conveniently carried out on cats by Hatcher's method. In this method, the anaesthetised cat is given tincture digitalis diluted 1 in 10 or 1 in 20, through the femoral vein allowing the fluid to

flow in at a steady rate of 1 or 2 cc. every 5 minutes. The heart rate is counted every 5 minutes and any difference in the character and rhythm noted. The minimum lethal dose per kilogram weight of the cat gives what is called 'the cat unit'. This is usually 1 cc. for a standard tincture. From the data thus obtained the strength of the tincture is calculated. This method must be supplemented by clinical trials especially in the case of toxic tinctures, the M. L. D of which is smaller though they are therapeutically inactive.

In this connection it is interesting to learn that P. D. & Co., have imported into this country a tincture called *digifortis*. This is 50 per cent. stronger than the standard tincture and is free from fat and is sold in convenient one-ounce bottles, being further protected from oxidation by the use of CO₂. This also undergoes deterioration, but being a stronger tincture its potency is at least equal to that of the standard tincture even after allowing 30 per cent. deterioration. With such a tincture it is possible for patients to be digitalised with the usual doses of 4—6 drachms per day in 4 to 6 days.

Strophanthus is much more potent than digitalis. It is best administered alone as it decomposes quickly in mixtures. *Squill* is used more for its diuretic effects than as a cardiac stimulant. Its actions on the heart are similar to those of digitalis.

Caffeine

We follow up the discussion of digitalis with that of caffeine as it is often considered by clinicians to have an action like digitalis. Its chief action is on the central nervous system. It stimulates the vaso-motor centres tending to raise the blood pressure. The initial effect is therefore to raise the blood pressure, in which action,

its direct effect on the heart also helps. But the dilatation of the blood vessels peripherally counteracts this and the resultant effect is a fall of blood pressure. The pulmonary, coronary and cerebral vessels which have no nerve supply of practical significance are dilated by caffeine, no matter what the condition of the peripheral vessels is. Caffeine should therefore improve the nutrition of the lungs, brain and heart.

On the cardiac muscle, it exerts a stimulating effect, causing acceleration of the heart beat. The heart contracts better and the diastolic pause is shortened. This is quite independent of the inhibitory mechanism for it occurs even after the vagus is paralysed by atropine. Caffeine differs from digitalis in having an unfavourable effect on diastole. While the heart under digitalis may be compared to a force pump whose piston makes larger strokes, the effect of caffeine is never to increase the stroke but its strength so that it overcomes a greater maximal resistance. A favourable effect would therefore only be shown if the resistance in the circulation were abnormal.

Thus the action of caffeine consists of a descending stimulation which begins in the excito-motor area at the junction of the auricle and great veins and extends into the auricles and finally to the ventricles.

Toxic doses produce arrhythmia and fibrillations and finally diastolic arrest follows.

Sparteine

An alkaloid derived from the broom. It has been used in heart disease. Small doses produce vagal paralysis and a preliminary quickening of the pulse. But a more constant effect is a slowing of the pulse-rate due to a direct action on the heart muscle. Thus experiments give a confused picture of its actions. The blood pressure

also falls. Slowing of the heart rate without an accompanying tonic action on the heart is of no use and here it differs from digitalis. Therefore most clinicians consider it useless.

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The Clinical Physiology and Pathology of Cardiac Affections

BY G. V. SATYANARAYANAMURTHI.

Final Year

The fertile and far-reaching interpretations of the modern cardiologists have proved to be of such a thoroughly innovating nature, that to-day there are but few clinical phenomena in the field of cardiology that have not changed in their significance. It is therefore proposed to review, in these pages, the clinical physiology and pathology of the heart in the light of recent advances.

The Functions of the Heart Muscle

There are five fundamental functions of the heart muscle. (1) *Stimulus Production* or the power of originating a stimulus that can excite the heart to contract. (2) *Excitability* or the power to receive a stimulus (3) *Contractility* or the power of contracting when stimulated. (4) *Conductivity* or the power of conveying a stimulus from fibre to fibre. (5) *Tonicity* or the property which keeps the heart in a state of tonic contraction during diastole. To these may be added two other significant features. (1) The *All or Nothing Law* by which the strength of response of the cardiac muscle does not vary with the strength of the stimulus and (2) *A Long Refractory Period* by virtue of which the cardiac muscle remains in a state of inexcitability for a definite time. This state of inexcitability is most marked during systole and passes gradually as the heart passes through the diastole, so that the heart is absolutely irresponsive to any stimulus during and immediately after a systole and gets more and more res-

ponsive as it passes through the diastole. Thus, the amount of a contraction does not depend upon the strength of the particular stimulus employed but varies according to the time at which the stimulus is applied.

The Basis of the Working of the Heart

The function of stimulus production though shared by the whole cardiac musculature is, however, most highly developed at the sino-auricular node, which is a node of specialised tissue situated at the junction of the superior vena cava with the auricle. Normally the stimuli originate here and the heart muscle being excitable and contractile the auricles contract. This contraction constitutes the auricular systole which lasts $1/10$ second. Now, this contraction is conducted from the auricles to the ventricles by the auriculo-ventricular Bundle of His resulting in the ventricular systole lasting $3/10$ second. During these systoles the most important part is played by the function of conductivity, by virtue of which each stimulus is conveyed from fibre to fibre so as to result in an orderly and organised contraction of the chambers of the heart, fulfilling the requirements of the normal cardiac cycle. After this systolic period there follows a period of total diastole of $4/10$ second during which the whole heart muscle remains in a state of perfect rest but is maintained in a state of tonicity. It is during this period of diastole or rest that the heart is renewed of its nutritive material and is prepared for a fresh contraction. Rest is essential for efficient normal action and the more it is cut off the more abnormal the heart tends to become.

The most stable part of the cardiac cycle is the ventricular systole while it is the diastolic interval that is subject to and capable of variation, so that when the heart beats unusually quickly it is the diastole that is

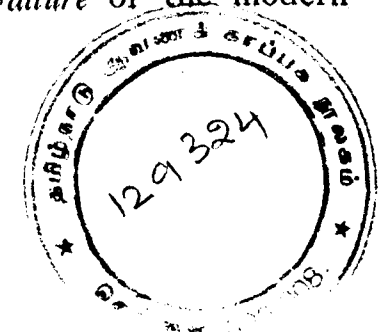
particularly shortened with the inevitable derangement of the efficiency of the cardiac action.

Rest Power, Reserve Power, Heart Failure

Were the human heart capable of merely maintaining an efficient circulation, we, as dependents on such a heart would have been condemned to live the existence of a mass of vegetation incapable of any varying activities. Fortunately however, the heart is capable of responding to very widely variable activities indeed—the activities of the mind, the body and—the heart!

We have then to carefully discriminate two distinct functions of the heart. First, the capacity of the heart to maintain the circulation of the body at rest, which is known as the *Rest Power*. Secondly, the capacity of the heart to respond adequately to the varying needs of the body, which is known as the *Reserve Power* of the heart—the reserve cardiac energy that is held in store to be manifested when called upon by the force of effort and action on behalf of the body.

When the heart is diseased or degenerated, the earliest sign of its inefficiency is a fall of its reserve power. As the inefficiency progresses the heart begins to fall short of even its rest power. Thus, quite early, the heart fails to adjust itself and respond to that degree of effort which the individual was capable of before; while later, the heart in addition to its resolute failure of response to effort, fails even in its primary duty of maintaining the circulation of the body. It is this failure of the reserve power and rest power of the heart that constitutes the essential phenomenon of *Heart Failure* of the modern cardiologist.



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The Signs and Symptoms of Heart Failure

The enthusiastic youngster that enters the mile race for the first time offers us an excellent example, in which a healthy exertion carried beyond physiological limits sets up an acute exhaustion of cardiac energy resulting in a veritable cardiac failure. The youngster does well in the first quarter of his course but very soon he finds he is fast running short of his breath; but, he persists in his effort, feels heavy on his legs, perhaps dazed in the head, and if he is still fool-hardy, falls heavily on the ground to remain unconscious for some time. Analysing the case from a physiological stand-point we realise that all exercise involves an accumulation of waste products in the system, to excrete which, the heart and lungs respond to an extent depending upon the previous training of the individual. But, when that limit is passed, the waste products accumulate in the system resulting in a depression of the extremely sensitive respiratory centre leading to breathlessness, a depletion of the higher centres in the brain presenting as a feeling of exhaustion and incapacity for any further effort, and later a temporary paralysis of those higher centres ending in unconsciousness or syncope.

Just the same sequence of events occurs even in a pathological heart failure, only it is insidious and inappreciable in its onset, slow but sure in its progress, permanent and far-reaching in its effects. In an early case of myocardial involvement the patient comes complaining of breathlessness on exertion, and a feeling of exhaustion or even perhaps actual attacks of syncope, all pointing to failure of reserve power. Clinically, one can investigate the reserve power of the heart by the *Exertion Test*, on which one of our eminent physicians lays much emphasis. The test is carried out as follows: the patient's

pulse is carefully counted; he is then asked to stand erect and to bend forward to touch his toes with the tips of his fingers without bending his knees, and that for 20 to 30 times in 30 seconds; the pulse is again counted and if the heart does not regain its rate within 2 minutes after the test it indicates a definite involvement of the heart. It is not applicable to people over 40 years of age and barring that limitation it is one of the most practical tests we have at our easy command, and it has to be utilised with prudence as certain hearts may be so much involved as not to withstand even the little effort which the exertion test demands.

The later manifestations of cardiac failure are as plainly objective as the early manifestations are vaguely subjective. The heart may be likened into a dynamo eternally propelling the rejuvenating blood through the minutest arterioles even to the remotest corners of the body, collecting it back partly at any rate by its own effort, sending it into the lungs to be replenished with oxygen, and redistributing it for the tissues. The consequences of the failure of such a dynamic centre may be very well conceived. The vessels farthest from the body are the first to suffer, little blood is sent through them and what little is sent is not taken back into the system; the blood accumulates and being improperly oxygenated acts most deleteriously upon the endothelium of the blood vessels; the endothelium sags and degenerates, loses its normal healthy degree of permeability, allows the serum of the accumulating blood to escape in abnormal amounts into the surrounding tissues resulting in *œdema of the extremities*. The inadequate oxygenation of the blood gives to the patient a *cyanotic hue* which can be particularly appreciated in the lips. As the blood gets dammed up in the portal circulation there is a *congestion of the whole alimen-*

tary tract manifesting itself as loss of appetite, gastric or intestinal flatulence, constipation or diarrhoea; later there is an *enlargement of the liver*, which because of its intimate relation to the right auricle may even derive pulsations from it. The impaired renal circulation leads to *congestion of the kidney* with scanty, high coloured urine containing albumen or even blood; while impaired pulmonary circulation leads to *congestion of the lungs*.

Sinus Irregularity

The term sinus or respiratory irregularity implies a variation in the rhythm of the heart. On auscultation one learns that the heart beats rapidly during an inspiration while it slows down during the expiration; it is most marked in deep, slow breathing and may be appreciated even by radial palpation.

The chief characteristic is a variation in the diastolic period of the cardiac cycle, the systolic remaining constant. This instability in the rhythm is attributed to an undue susceptibility of the vagus centre, the vagus impulses derived from the normal act of respiration constantly disturbing the sinus, which is the controller of the rhythm. But an undue susceptibility of the vagus centre should necessarily mean disturbance in other spheres besides the heart, and as none of them are found one may venture to suggest that the essential lesion in sinus irregularity is not in the vagus centre but in the sinus itself, the vagus merely acting as a conveyer and conductor of the impulses derived from the respiring lungs to that hypersensitive centre of rhythm.

As for its clinical significance it is of no importance whatever in the young—in fact it is called the *youthful type of irregularity*, but it has to be borne in mind as it is not unfrequently puzzling. Further, when found in

association with any existing cardiac condition it certainly adds gravity to that malady; and when found in persons over 35 to 40 years it is a certain sign of myocardial degeneration.

Extra Systole

Normally, it has been said, it is the sinus that is the seat of stimulus production and the whole heart is controlled by its rhythm, but under abnormal conditions—as in a disintegrating monarchy—other sites get unduly excitable and utilising their dormant inherent property of stimulus production set up an abnormal rhythm, a premature contraction or an extra systole. There are three varieties of extra systole, the ventricular, the auricular and the nodal, according as it is the ventricle, the auricle or the auriculo-ventricular node that is the seat of this abnormal rhythm.

Clinically one can appreciate the extra systole either by palpating the radial pulse or auscultating the heart. Due to the prematurity of the extra systole the diastolic interval or the pulse period immediately preceding it is shorter than normal; further the extra systole renders the heart inexcitable for the next normal contraction, to which it would have responded in the normal course, resulting in a *compensatory pause* or a prolongation of the diastole or of the pulse period immediately succeeding the extra systole. On auscultation one hears the two sounds of the extra systole coming in quick succession with the two sounds of the immediately preceeding normal systole, that is, a set of *quadruple sounds*.

Among the morbid conditions giving rise to this clinical condition the most important are myocardial degeneration and valvular disease. High blood pressure,

neurasthenia, tobacco poisoning, digestive disturbances, an overdosage of digitalis are among the other causes responsible for it, the last being of very practical significance.

Heart Block

Heart block is a condition in which it is the function of conductivity that is at fault. No less than three varieties can be differentiated; the impulse from the auricle to the ventricle is (a) delayed (b) does not reach at every contraction (c) does not reach at all so that the ventricle sets up its own contractions, the ventricular rate being about 30 a minute.

It is difficult to detect the first variety of heart block while the other two types are within reach of easy detection by their manifest evidence of *dropped beats*. Two points are of practical utility. The jugular pulsation when available is an index of the auricular rate so that an eye on the jugular vein and a finger on the radial artery is an effective means of comparing the auricular and ventricular rates and thereby detecting the presence of any heart block. The other point is that the dropped beat is the consequence of a failure of the ventricular systole so that we can neither palpate the cardiac contraction nor hear the cardiac sounds during the dropped beats, and this helps us to differentiate the true compensatory pause of heart block from the apparent compensatory pause of an extra systole that is too feeble to manifest itself at the radial pulse.

Pathologically, acute inflammatory changes in acute infectious diseases, sclerotic changes in chronic valvular affections and gummatous infiltration in syphilis are to be found in the auriculo-ventricular junctional tissue.

Auricular Fibrillation

If the normal heart is likened unto a kingdom in which the sino-auricular node is the ruling monarch, the condition of extra systole may be compared to a state in which the auricle, the ventricle or the node is playing the revolutionist, while the condition of auricular fibrillation exactly resembles a veritable revolution, an absolute chaos, in which each individual auricular muscle fibre is acting rapidly and disorderly, thoroughly devoid of coherence and harmony. The result of such a profound disturbance is, the heart contracts at irregular intervals with as widely varying force giving rise to a pulse which is remarkable for its irregular pulse period as well as its varying pulse wave. This condition is met with in the young as a consequence of chronic valvular disease due to rheumatism, while in the old it is a sign of myocardial degeneration.

Auricular Flutter

This signifies a morbid condition in which the rate of auricular contraction is extremely rapid. The rate is something like from 180 to 300 per minute; but rarely is each auricular contraction transmitted to the ventricle and to what extent it is blocked depends on the integrity of the auriculo-ventricular bundle. Thus with an auricular rate of 216 it is possible to have a perfectly normal rate of 72 per minute at the wrist, the heart block being 1:3 but one can easily detect the fallacy of such a rate by noting the jugular pulsation. The points of practical significance are, in a case of auricular flutter the pulse is generally 120 or more per minute and is not altered in rate either by exertion or by posture and further it is devoid of any irregularity, at any rate the complete irregularity of auricular fibrillation.

The morbid conditions inducing auricular flutter are obscure. It may signify grave myocardial or valvular involvement, an impending or fatally advancing heart failure, or may mean nothing whatever. It may be the early sign of a fatal termination or may be a harmless and transitory disturbance. Thus auricular flutter is the most elusive in cardiac symptomatology.

Valvular Affections

The diverse manifestations of valvular mischief may now be viewed under a single focus. A valve is either sclerosed or bound down by adhesions, either very effectively drawn apart from its other segments or very closely drawn together by fibrous adhesions, and the result is either a stenosis or an incompetence of the valve. In attempting to deal with this feature of cardiac pathology one avoids the terms like compensatory hypertrophy, complete or incomplete compensation, failure of compensation, or back pressure, which, according to the modern cardiologists are fit only to be relegated to the museum of archaic thought.

The stenosis or incompetence of a valve acts as a mechanical impediment as far as the chambers of the heart are concerned. Thus, in a case of aortic stenosis it is an impediment to the left ventricle in its efforts to force the blood through the aortic valve, while in a case of aortic regurgitation it is again an impediment in the sense the blood once driven, instead of escaping past the aortic valves, regurgitates, distends the ventricle, calling for more and more effort at each systole. The result is increased work to the cardiac muscle. When any muscle is overworked and if its nutritive material is sound it hypertrophies and that is what happens to the heart chambers in certain cases.

But sooner or later or even at the outset the tragic element of this drama in cardiology sets in. The heart gets more and more embarrassed depending on the progress of the lesion and the integrity of the cardiac musculature, the diastole is lessened, the fundamental basis of cardiac action is damaged, the tonicity is lost, the heart dilates, takes up an abnormal rhythm, fails even in its rest power, and ultimately collapses in the eternal peace of death.

On the Systematic Examination of the Heart

BY CAPTAIN P.N. BASU, M.B., M.R.C.P., D.P.H., I.M.S.

These few pages I like to devote mainly to the complete investigation of the cardio-vascular system, which has not attracted much attention in this part of the country. This may be due to the want of a properly equipped cardiological department and it is hoped that this defect will be remedied at no distant date. Much of the material which I have used in this article has been based on one of the discussions of the Royal Society of Medicine.

Each case suspected to be suffering from any cardiac disorder should be examined in three separate positions, viz, lying, and, if possible, standing and after exercise. Many of the symptoms on inspection will explain a great deal. Thus, the well developed, overgrown, robust appearance of the young aortic, with his pale, throbbing neck, and over-development of muscles, &c; the small undergrown red or reddish blue "congenital mitral stenosis"; the "pinched" patchy face, with the tortuous temporal arteries, and the often wasted body, typical of cardio-vascular degeneration; the yellowish anxious face of infective endocarditis; the large white face of renal disease; the blue face of congenital or failing mitral disease; the worried appearance of the patient with angina, or the distressed pale face of pericarditis, can often be recognised at a glance.

The respiratory rate, depth and rhythm, cyanosis, engorgement, pulsation or otherwise of the jugulars, the presence or absence of carotid pulsation, thyroid enlarge-

ment, clubbing of the fingers and, if present, whether blue (congenital heart disease) or white (infective endocarditis) can all be noted before the patient has reached the examination chair.

Should the patient be confined to bed, particular attention should be directed to the position in which he lies or that which he assumes.

When the chest has been exposed, its shape and movements, any bulging of the præcordium (cardiac disease in early life before the chest has ceased growing) should be noted, also the apex beat, its position and character, whether it is heaving (the true sign of cardiac hypertrophy) or slapping in character which means a poorly contracting ventricle, and this occurs under three sets of conditions, viz: (1) When the muscle is poisoned (toxic myocarditis); (2) when the muscle has degenerated (myocarditis or cardio-vascular degeneration); (3) when the ventricle is badly filled, badly stretched, and so contracts badly, e.g., mitral stenosis. Systolic recession, indicative of adherent pericardium, should be looked for, not only in the region of the apex, but in the region of the epigastrium and also in the back (Broadbent's sign).

The rate should be carefully noted and compared with that of the pulse. If any irregularity is present, frequently the nature of the irregularity can be made out with the greatest ease. It is very often possible to diagnose auricular fibrillation, etc., by palpation. The presence or absence of thrills should be noted. If present they should be timed with the carotid, their exact position noted, and also whether they are constant or intermittent in character. The commonest thrills of all are:—

(1) The apical presystolic thrill of mitral stenosis, which may be either constantly present as it is during the stage of full "compensation", or an intermittent pre-

systolic thrill, with a regular rhythm which occurs very early in mitral stenosis, before the auricle is fully hypertrophied; or with an irregular rhythm which is found at the commencement of failure.

(2) A systolic thrill at the apex (mitral regurgitation), pulmonary base (pulmonary stenosis), aortic base (aortic stenosis or aneurism) or a pericardial friction may be present.

The abdomen should be examined for distension, as this sometimes causes serious cardiac embarrassment. The presence of engorged veins, absence of respiratory movement (pericarditis) and the presence of ascites should all be observed. Special attention should be directed towards the liver, while the spleen should also be palpated.

Regarding the arms and hands, the condition of the brachials is of great importance. Note whether they are visible, or thickened: if the latter, note whether the thickening is uniform or otherwise, bearing in mind that if moniliform in character, this usually indicates involvement of the muscle coat as well as of the intima. The locomotor artery signifies two conditions, viz., a rigid vessel and a hypertrophied heart. At this stage the pulse should be investigated as to the following:—

(a) *Rate*: whether abnormally fast, or abnormally slow; a pulse rate below 40 means either heart-block or physiological bradycardia; the latter occurs in well trained athletes or after certain debilitating conditions. Which of the two conditions is present can be ascertained by exercise, if the patient is well enough. The heart-block pulse accelerates little, if at all, whereas the athlete's pulse doubles its rate on exertion and does not "climb" like a normal pulse.

(b) *Rhythm*: Whether regular or irregular; if the latter the nature of the irregularity should be investi-

gated. For the sake of convenience this may be divided into (1) regularly irregular or (2) irregularly irregular. The most common regular irregularities are:—(i) *pulsus bigeminus* or *pulsus trigeminus*, indicative of myocardial irritability; (ii) *sinus arrhythmia* (where the pulse speeds up during inspiration, and slows down during expiration), indicative of a healthy myocardium; and (iii) *pulsus alternans*, indicative of failing contractility. This is a sign of very grave prognostic significance.

The commonest irregularities are:—(i) The perpetual irregular pulse due to auricular fibrillation. Here the beats not only follow one another at irregular intervals, but are of unequal length and volume. In addition the pulse-rate differs from the apex rate while the irregularity is increased by exercise. This condition may be due either to mitral stenosis, myocardial degeneration or myocardial toxaemia (Graves' disease). (ii) The irregularity due to irregularly occurring extra-systoles. This is indicative of myocardial hyper-irritability, which may be the result of either fatigue, inflammation, degeneration or toxaemia.

(c) *Force*: estimated by the impact against the finger and depends upon the condition of the myocardium, e.g., in aortic regurgitation, where the left ventricle is hypertrophied, the force is considerable, whereas in mitral stenosis, where the left ventricle exercises but little force, the impact is very feeble.

(d) *Volume*: estimated by the lift and the duration of the wave which equals the output of the heart.

(e) *Tension*: estimated by the obliteration force and the blood-pressure.

On auscultation:—attention is first directed to the heart sounds at different regions; at the apex the first sound in a healthy heart is long, dull and booming, and is due to two factors, namely, the contraction of the ventri-

cular muscle and the vibration set up in the auriculo-ventricular valves and chordae tendinae. Any interference with the contractility of the muscle, on the closure of the auriculo-ventricular valves will necessarily modify the character of the first sound, which may be (1) shortened, indicating a poorly contracting ventricle, due to either inflammation, degeneration, toxæmia, or non-stretching (e. g., mitral stenosis); (2) reduplicated, due either to non-synchronous contraction or closure of the auriculo-ventricular valves; (3) weak or suppressed, due to pericardial effusion, emphysema, myocardial degeneration, &c.; or (4) modified or replaced by a murmur or adventitious sound.

Likewise the second sound at the apex, due to the closure of the aortic and pulmonary semilunar valves may be (1) distinct; (2) reduplicated, when the normal relationship between the pulmonary and systemic are altered, or when the aortic and pulmonary valves do not close simultaneously; or (3) modified by the presence of a murmur as in mitral stenosis.

At the base the aortic second sound is normally short, sharp, and flapping, and is due to the closure of the aortic semilunar valves. This may be (1) accentuated—a high peripheral resistance and a high blood pressure; (2) ringing, indicative of atheroma of the aorta usually with dilatation and rigidity of the valves. This condition may, or may not be, associated with high blood-pressure. (3) Absence of the aortic second sound means either that the aortic valves do not close owing to injury or destruction, or that they close so quietly that they do not produce an audible sound. This latter condition sometimes occurs in a more or less acute aortitis; (4) modified by the presence of a murmur which replaces it partially or entirely, and this if present should be listened for in three diffe-

rent positions: (a) over the lower part of the sternum. This murmur is usually to and fro in character and is found typically in those cases of aortic regurgitation in which the whole valve is more or less damaged. (b) Over the junction of the second right costal cartilage with the sternum. Here the murmur is harsh, loud, and just beneath the stethoscope. This is particularly associated with damage to the anterior cusp which is the lesion most frequently liable to be connected with pains in the chest (angina). (c) Over the pulmonary base (third left costal junction). Here the murmur is soft, blowing, but distant, never harsh in character. It is indicative of damage to the left posterior cusp which is always secondary to a mitral lesion. This murmur should be carefully listened for in any case of mitral stenosis, where the left ventricle is large, where the pulse is medium or large in volume, or where the blood-pressure is high.

The pulmonary second sound, due to closure of the pulmonary valves, is also short, sharp, and sudden, and in young adults less distinct than the aortic second sound, but generally the reverse in children. It, in turn, may be accentuated (high pulmonary tension) as occurs in mitral stenosis and various lung conditions, reduplicated, as also occurs in mitral stenosis and other pulmonary defects, or modified by a murmur.

Auscultation thus provides one with accurate information regarding the state of the myocardium and the functioning of the different valves. In a healthy heart the intensity of the first sound at the apex bears a definite relationship to the intensity of the aortic second sound at the base. This relationship can be easily ascertained by means of a differential stethoscope. In a healthy heart the ratio is 2 : 1. Should the myocardium be degenerated, there is a ratio approximately of 1 : 1. The differential stethoscope

is thus an additional means of investigating and assessing the condition of the myocardium.

The significance of the different murmurs is too well known to need description, but if a cardiac-phonograph is available their character may be fully analysed.

A special type of murmur, the atonicity murmur, is worthy of mention. This murmur, which may be heard over either apex or base, is soft and blowing in character and very variable. It may be more or less constantly present, standing, lying and after exercise. If present at the apex it may be local or conducted towards the axilla. It may be absent at rest and only produced by exercise. On the other hand, it may be present at rest and disappear after exercise. This so-called atonicity murmur, indicates lack of tone in those rings of muscle which support the mitral and other valves, and it is the degree of atonicity present which determines the presence or absence of this murmur.

As above mentioned, each case must be examined if possible after exercise, so that one might well here consider the more important effects of exercise on the heart.

(a) *The Rate*.—The normal heart responds to exercise by a gradual increase in rate. The increase is more or less uniform, the heart climbing up as exercise is increased. The normal heart rarely speeds up to over 150. It rapidly returns to normal on ceasing the exercise. A soft atonic or poisoned heart responds to exercise by undue acceleration, and very slowly settles down to its normal rate; while, in certain diseased conditions of the heart one gets impaired acceleration, the rate practically showing no alteration at all. This may occur in very fast hearts (e. g., auricular flutter), or in very slow hearts (e. g., heart-block). Lastly, in this connection one might point out that in a well trained physiological heart, such as one meets with

in young, well trained athletes, the rate does not increase on exercise, but suddenly doubles (e. g., at the commencement of the exercise, the rate may be 42, and on exercise suddenly becomes 84)—the so-called athletes' reaction.

(b) *Rhythm*.—On exercise the rhythm of the heart may be profoundly modified. (1) An irregularity may be produced, and it may be mentioned that any heart that becomes irregular on exercise is a damaged heart. The most common irregularities which are brought out by exercise are extra-systoles (indicative of myocardial fatigue), auricular fibrillation (indicative of inco-ordinate auricular contractions secondary to degeneration, toxæmia etc.), alternating (indicative of failing contractility) a sign of very grave significance.

(2) An existing irregularity may be abolished. Practically speaking, the only irregularity which is abolished by exercise is the irregularity due to extra-systoles, *when they are not due to fatigue*.

(3) An existing irregularity may be increased. This is true of auricular fibrillation or fatigue extra-systoles.

(c) *Sounds*.—Under the influence of exercise, normal heart sounds may be reduplicated or modified by the production of adventitious sounds or murmurs. In early mitral stenosis, and in soft hearts, atonic murmurs may either appear or disappear according to the underlying condition of the myocardium.

(d) *Thrills*.—Thrills may be actually produced. This occurs in early mitral stenosis, when increased filling of the auricle results in increased stretching, and increased contraction, and so produces a thrill presystolic in time. An existing thrill may be increased under similiar conditions or abolished by exhaustion.

In conclusion, I may add that electro-cardiographic

records should be obtained as these provide invaluable information as to the condition of the myocardium. X-ray examination of the heart enables one to see the form, position and size of the heart; and also enables one to judge the condition of the pericardium, the state of the great vessels, and of the mediastinum generally.

The Cerebro-Spinal Fluid

BY P. RATNASWAMY

Final Year

Preliminary anatomical details.—The cerebro-spinal fluid occupies the ventricles and the sub-arachnoid spaces in the brain and spinal cord. The ventricles communicate with the sub-arachnoid space by the foramen of Magendie at the roof of the IV ventricle and by the foramina of Luschka at the lateral recesses of the same ventricle. The sub-arachnoid space contains a spongy net-work of areolar tissue so that the C. S. fluid fills these like water in the meshes of a sponge. The sub-arachnoid space is continuous with the perivascular lymphatic sheaths, which accompany the cortical vessels and capillaries. These perivascular sheaths, according to Mott, are continuous with the spaces around the nerve cells, so that we have a system of canals continuous on the one hand with the perineuronal spaces and on the other with the sub-arachnoid space.

Of greater pathological importance is the fact that the sub-arachnoid space is continuous with the sheaths of investment of the various cranial and spinal nerves and through these communicate with the peripheral lymphatics. This fact explains how peripheral toxins can reach the sub-arachnoid space and perhaps offer an explanation to the degeneration characteristic of Tabes.

A third route by which the C. S. fluid leaves the sub-arachnoid space is by way of the venous sinuses of the duramater. Experimentally it has been proved, that saline solution coloured with methylene blue, when injected into the sub-arachnoid space at a pressure above that of

normal venous pressure, can be seen passing straight into the venous sinuses and the blue colour can be seen in the stomach and bladder 10-20 min. after the injection. Some however hold that the escape is *via* the Pacchionian bodies.

Physiology. The C. S. fluid is secreted by the choroid plexuses. This secretory function is stimulated by certain agents as volatile anæsthetics, pilocarpin and by extracts of the choroid plexus itself. Though the choroid plexus offers resistance to the passage into the C. S. fluid of most substances, yet urotropine, CHCl_3 and alcohol are among the chief exceptions. The C. S. fluid is being continuously secreted and is at the same time continuously being absorbed. Normally, it does not exceed a few ounces, none of the figures being quite accurate. If there is some external outlet for the fluid it is secreted more copiously, often amounting to several litres per day.

The C. S. fluid under normal conditions is a colourless fluid, alkaline in reaction, sp. gr. 1005-1007. It contains salts as sodium chloride traces of carbonates, phosphates, urea and dextrose. Besides the above mentioned salts it contains a trace of globulin and few mono-nuclear leucocytes akin to lymphocytes. Lastly it has been shown by Cushing that it contains a small amount of pituitrin, the secretion of the posterior lobe of the pituitary gland. Experimentally he has shown, that injection of concentrated C.S. fluid produces effects similar to an injection of pituitrin. The tension of C. S. fluid is on an average 100 mm. of water, expiration raising it and inspiration lowering it.

It acts as a medium of exchange between the blood and nerve cells in the brain and spinal cord, it acts as a distributor or rather equaliser of pressure inside the

cranial cavity and some think that it acts as a water cushion to protect the brain against shocks.

Pathology.—Quinke in 1891 introduced lumbar puncture to remove C. S. fluid and the examination of the fluid for diagnostic purposes came into vogue. The rate of flow, the colour of the fluid, its chemical and microscopical characters all play a part in the diagnosis of a disease.

Increased rate of flow is found in all cases of increased intra-cranial pressure as in intra-cranial tumour, meningitis of various types, etc. In severe trauma causing a sudden and intense increase of pressure inside the skull, as happens when a high velocity bullet traverses the brain, the C.S. fluid is displaced from the lateral ventricles with such force as to rupture the walls of the iter and roof of IV ventricle, this disruptive pressure on the medulla causing stoppage of respiration and death in such cases. In cases where the intra-cranial tumours and especially those that obstruct the circulation of C.S. fluid there is a certain amount of passive œdema of the cranial nerves and this is well illustrated in the papilloœdema of cerebral tumours. Another interesting observation in cases of cerebral tumour is that degeneration occurs in the posterior columns of the spinal cord simulating Tabes. The explanation is perhaps due to the injurious traction exerted on the posterior roots by the distension of the arachnoid due to increased fluid pressure. In some conditions as in congenital hydrocephalus, serous meningitis etc., the C. S. fluid is either secreted more rapidly than it can escape or its escape is prevented by blockage of the foramina of Magendie and Luscka. Consequently the tension of C.S. fluid is raised with resultant atrophy of the brain, enlargement of the cranial cavity, etc.

The colour of the fluid is turbid in most cases of

meningitis and even flakes of lymph may be found floating in it. It is blood-stained in cases of fracture of the base of skull and spinal column, injuries to the surface of the brain and cerebral haemorrhage.

Increase of protein contents occurs in all inflammatory affections of the meninges. Increase of globulin occurs in cerebro-spinal syphilis, tabes, G. P. I., spinal tumours, encephalomalacia and other diseases.

The cellular contents are increased in some acute and chronic affections of the cerebro-spinal meninges. Thus in acute microbic infections by staphylo-, strepto-, pneumo-, and meningococci there is an increase of polymorpho-nuclear cells. In chronic affections of the meninges as in tuberculosis, trypanosomiasis, tabes G. P. I., and syphilis the mono-nuclear type of cells predominates. A similar increase of lymphocytes are found in herpes zoster, Landry's paralysis, sub-acute combined degeneration and occasionally in disseminated sclerosis.

In a few instances the causative organisms of the disease can be isolated. Thus the staphylo-, the strepto-, the pneumo-, and the meningococci have been isolated as also the tubercle bacillus, *Trypanosoma gambiensi*, etc.

The C. S. fluid, like blood, gives certain reactions as the Wassermann test in cerebro-spinal syphilis, Lange's colloidal gold test in G. P. I., and a few others.

Lastly, the withdrawal of C. S. fluid with or without the introduction of drugs into the sub-arachnoid space through the lumbar route has come into vogue during the past few years. Withdrawal of C. S. fluid is beneficial in cerebro-spinal meningitis, hydrocephalus, serous and other forms of infectious meningitis and in some cases of cerebral tumours. This method of treatment is rather risky in sub-tentorial tumours and tumours about the IV ventricle, because of the injurious pressure which these

exert on the vital centres in the medulla. Withdrawal of C. S. fluid has relieved the headaches of chlorosis, migraine, syphilis, uræmia and also the symptoms of Meniere's disease.

The injection of cocaine and more recently of stovaine and glucose into the spinal sub-arachnoid for the purpose of producing paraplegic anæsthesia is now very popular. This method is commonly used in urogenital surgery and operations on the lower extremities. Various drugs have been injected intrathecally. Thus sodium bromide for delirium tremens, magnesium sulphate and anti-tetanic serum for tetanus, and urotropine for a few cerebral conditions, have been used and found efficient. Lastly may be mentioned the injection of salvarsanized serum in parasymphilitic lesions.

Editorial

Teaching Units

At the request of a number of our readers, we have attempted to obtain information from various Indian and Foreign correspondents regarding the origin and present condition of the above system, which was intended for teaching Medicine and Surgery in a better way. The information we have gathered may, we hope, be of some use to those who wish to try the experiment here, and also to those who are watching the spread of this idea. The idea of a "unit" for teaching is claimed to be American in origin, but the English and Continental nations are not very willing to abandon their claim to priority.

The first fact—a basic fact to note about these countries is that their Hospitals are run by an *honorary staff* generally, as contrasted with our hospital with its *paid staff*. The honorary staff was selected from among the best private practitioners, who necessarily were too busy to devote *all* their time and attention to these hospitals and also to the students working in these hospitals, specially as the methods of diagnosis and treatment became more and more defined and elaborate with the lapse of time. This resulted in the Senior consultants, and while giving as much time as was necessary for the patients, it allowed their juniors—younger men without large practice—to take up more and more of the teaching work. This practice continues more or less even now, though about a decade ago an attempt was made to improve the teaching by introducing a new system—the teaching unit. It was thought by co-ordinating the teaching of various subjects—each by a specialist—under one chief or director, an exhaustive and

more systematic teaching could be imparted to the students. It was also thought that by means of this unified control, greater and more fruitful research work might be accomplished, and that students also would be enabled to take part, however insignificant it might be, in research work and be thus enabled to obtain, very early in their life, a training and an insight into the methods of medical investigation, which might be of very great use to some of them at least in later years. Thus a great deal of advantage was expected to follow from this new arrangement to all concerned and the hospitals of London were encouraged by the University to adopt the system, and part of the expenses were borne by the University. It followed that those who agreed to work the system lost some of their leisure and freedom to teach as they liked, and conduct research as they liked, and were compelled by the University to carry out a certain amount of work for the monetary help given. The system has been tried in a number of hospitals in London during the last 10 years and it can not be said to be much of a success. Edinburgh was always against this system and has never tried it. On the other hand, of those that started the system, one by one, the various Hospitals *found the system unworkable and have given it up*. It lingers still, in a very much modified form, in one or two Hospitals. Thus a system which was inaugurated in other countries with a good deal of expectations has been quietly allowed to die of inanition. As such, are we going to start *now* when others have ended? Are we going to resuscitate in Madras what has died out in great Britain? We hope not. But is the teaching in Madras General Hospital, where a large number of medical graduates are trained, up to the mark and beyond bettering? No. We have always felt, that for the purpose of

better teaching, Madras needs a large number of enthusiastic young doctors of the Provincial service cadre, men specially chosen for their special aptitude for teaching, men who have specialised in various subjects and who should be encouraged to take tutorial classes for which a small fee may be levied. We have also felt that the continued increase in the amount of clinical work that has to be performed by the Hospital staff ought to be lightened by a reduction in the number of beds allotted to each member of the staff. Then they can be expected to devote more time for teaching students. We have also felt that the steady increase in the number of students attending the wards is also partly responsible for the present unsatisfactory state of affairs. The existing congestion can be relieved only by the provision of additional beds for teaching purposes. For this purpose, we would suggest in all earnestness that, if necessary, the Hospital at Royapuram might be affiliated for University purposes. In the best interests of the public and of the profession, one might even abolish all the medical schools and start a few more colleges with adequate staff. If the Royapuram Hospital with its 400 beds could be utilized for the College students, the Hostel would also pass over for the benefit of the College students and would meet to a certain extent the long felt need for a hostel for Medical College students. If the authorities could see their way to transfer the L. M. P. students now attending Royapuram Medical School to the various mofussil Schools, and instead appoint a larger and suitable clinical staff for teaching University students, and convert the hostel into a College hostel, the government would be rendering the cause of higher education a signal service and would be solving many of the long-standing problems of

medical education in a far-sighted and statesmanlike manner.

The crying need is therefore for men, good and enthusiastic men, more men—to devote themselves wholeheartedly to the cause of teaching and research. There is also a pressing need for up-to-date treatment and the great demand is for more beds in the Hospitals, so that thousands more may be benefitted by modern medicine. We are not convinced, therefore, of the wisdom of re-shuffling the existing staff and giving such administrative re-arrangement—to wit, the inauguration of a teaching unit—an importance far in excess of those received by such questions as the above, which are of more immediate concern to the public and the profession alike.

* * * *

Special Lectures

The College had the benefit, during this Session, of a number of interesting and thought-provoking lectures. One delivered, under the auspices of the British Medical Association, by Lt. Col. Mac Carison, we hope will have the effect of stimulating the spirit of research that lies dormant in our College youths. But for coming in contact with living examples of the spirit of research under most depressing circumstances, the dormant capability might be lost under the tread of the implacable struggle for existence and never sprout into life. Another noteworthy series of lectures were under the auspices of the British Social Hygiene Council, on whose behalf Dr. Lees gave most illuminating expositions on the correct diagnosis and treatment of venereal diseases. Not that we are content to accept the treatment as expounded by him as the last word in that line, but they place before the student the best that has been reached by man, in

his patient and persevering search after a remedy to overcome the fruits of his moral lapses. Our thanks are offered to Dr. Lees and the League for the splendid work they are doing.

Academic Council Elections

We congratulate Lt-Col. E. W. C. Bradfield, I. M. S., Dr. M. R. Guruswamy Mudaliar and Dr. Subramaniam on their election to the new Academic Council as representatives of the teaching staff of this College. Dr. Guruswamy Mudaliar has worthily represented this College on the Council that has just been dissolved, since 1923, has done good work in re-organising medical instruction under the University, particularly in connection with the abolition of the L. M. & S. We hope, that ail will continue to co-operate and strive to improve Medical Education imparted in the University and bring it into line with more progressive Universities elsewhere. Our Medical Regulations are a confusing mixture of old and new Regulations, and we fervently appeal to the Board of Studies to boldly undertake this work at an early date. Dr. Subramaniam's election by a large number of votes indicates the great interest evinced by the Assistant-Surgeon Branch of the Provincial Medical Service in Academic matters and we hope and trust that he will courageously support his colleagues in all measures to ameliorate the condition of the long-suffering medical students of this College.

The Final M.B.B.S. Examination

It gives us pleasure to chronicle the efforts that have been strenuously made by the members of the Academic Council just dissolved to lighten the burden of the Final

year M. B. B. S. students. It is a well-known fact that the M. B. degree of this University is the stiffest and hardest of all tests conducted by the University. In this respect it has beaten all records, past and present all over the world. For, do we not know that the average percentage of success in the final M. B. B. S. Examination is between 15 and 20 per cent? It is stated that proposals are being brought forward to increase the length of the medical course from 5 to 6 years. If such a change is brought about, as seems likely, in the near future, the lot of our medical students would become harder still. We are therefore glad to know that a motion was recently brought before the Academic Council to permit the final M. B. B. S. degree to be taken in compartments of one or more subjects as may be chosen by the candidates, and in the event of the candidates passing in some subjects and failing in others, re-examinations to be held in those subjects only in which candidates fail. We are particularly gratified to be informed that, in all the steps that are being taken to lighten the burden of the students, there is no intention whatever to reduce the standard of learning in any manner, for, with our intense interest in the progress and reputation of our University, we should never countenance any measure which might lower the name of our Alma Mater in the eyes of other Universities, in India and abroad. The proposals suggesting compartmental examination for the Final M. B. B. S. have been referred for opinion to the Board of Studies in Medicine, and we hope, that the members of this Board, a large majority of whom are engaged in the preparation of students for University degrees, and who therefore thoroughly understand the students' difficulties, would view the matter dispassionately and render justice to a large number of suffering medical students.

* * *

Sir P. C. Ray's Lecture

We are happy to record that one of the most eminent sons of India, and a chemist of world-wide reputation, Professor Sir P. C. Ray, F. R. S. of Calcutta, paid us the honour of visiting our College and addressing a crowded and enthusiastic audience in the Library Hall. The chair was appropriately taken on this occasion by Sir R. Venkataratnam, the Vice-Chancellor of the University. Sir P. C. Ray spoke generally on the glorious achievements of the Ancient Hindus, particularly with reference to Chemistry as it was then understood. He showed with the help of lantern slides, how the Hindus of old knew and practised methods of purifying metallic substances like mercury, zinc and iron, and were able, by elaborate processes to prepare caustic alkalies in a pure state. He threw on the screen a beautiful picture of the Kutab Minar at Delhi, and that unique and imperishable monument to the ingenuity of our fore-fathers--the iron pillar which stands not far from the Kutab Minar. We listened with rapt attention and wonder, to the narrative which depicted the doings of our great ancestors, but we left the meeting with a sense of sadness that the fame which was ours in the centuries gone by has now been replaced by scorn at the decadence of our present-day Indians.

The University Training Corps

BY LT. M. G. KINI, M. C.,

Officer Commanding, "B" Company

As was to be expected under the circumstances, the "B" company has not fared very well this year in the Inter-Company competitions. Held in the midst of the mid-sessional Examinations, and, what was worse, on the eve of the University October Examination, our men found it particularly difficult to attend the Poonamallee Camp to win our Ashes *viz.*, the Willingdon Shield, which we lost in 1925. The 25 regulars who attended the camp at great sacrifice of time and considerable expense of energy, are indeed to be congratulated on the amount of work turned out, work that the training for the competitions necessarily entailed. Our thanks are, in great measure, due to Sgt. Major Hanumantha Rao who trained all the recruits, making very smart soldiers of them indeed.

We regret that we were only runners-up in the Company Drill competition and in the Guard Mounting competition, and, further we lost the much-coveted Willingdon Shield by the narrow margin of two points. Had it not been for the fact that we were so handicapped in athletics, we should have won the shield, for we were practically leading in all real Military events. I sincerely hope that all the athletes who won laurels for the College last year in the Inter-Collegiate Sports will enrol themselves and help to maintain the reputation of the Medicoes as all-round men.

Since its inception, eighteen N. C. Os and men have left the company, and we have found it very difficult to fill up the gap with equally efficient men, as most of those

that left us were "old soldiers" and were partly responsible for all the achievements of the "B" company. In this connection Sgts. Vaidynathan and Venkataswami, to whom the Company ought to be thankful for their valuable services need special mention. Will all the "B" Company men emulate their example?

We thank the Principal and Professors of the College for allowing the students to absent themselves from the examinations.

In Lighter Vein

English as she is Comprehended

Babu: "Sir, I beg that you will transfer me from this place. I am home-sick."

Deputy Commissioner: "But am I not correct in supposing that this is your home?"

Babu (with conviction): "Yes, sir, it is—and I am sick of it."

* * * *

An Application for Employment—

Honored Master,

Understanding there are several hands wanted in Your Honor's department, I beg to offer my hand as to adjustment. I appeared for the Matriculation Examination, but failed, the reason which I shall describe to begin with. My writing was illegible: this was due to climatic reason, for having come from a warm to a cold climate found my fingers stiff and disobedient to my wishes. Further, I had received great shock to my mental system, in the shape of death of my only fond brother; besides, most Honored Sir, I beg to state that I am in very uncomfortable circumstances, being the soul support of my fond brother's seven issues, consisting of three adults, and four adultresses, the latter being bairns of my existence owing to my having to support my own two wives, as well as their issues, of which by God's misfortune the feminine gender predominates.

If these humble lines meet with your benign kindness and favourable turn of mind, I, the poor menial, the despicable brute and unwilling father of babies, shall pray for the long life and prosperity of yourself as well your Honor's posthumous alive branches.—*Punch.*

A rather irritable inspector, visiting a provincial school was worried by the noise of the scholars in the next room. At length, unable to bear the uproar any longer, he opened the door and burst upon the class.

Seeing one boy taller than the others talking a great deal, he caught him by the collar, hustled him to the next room, and placed him in a chair, saying, "Now sit there and be quiet!"

Ten minutes later a small head appeared round the door and a weak little voice said,

Please sir, you've got our teacher!"

Cricket Reform

Now that the cricket season is in our midst, vicarious sportsmen of all classes are calling for reform in certain departments of the game and nowhere, I think, is the necessity more apparent than in the procedure which marks the return of batsmen to the pavilion at the conclusion of their innings. Surely it is a short-sighted policy to allow a popular century-maker to stride rapidly from pitch to pavilion, finishing up at a run, and thus deprive a generously paying public of a suitable opportunity of recording their hero-worship.

On the other hand, however appreciative of success, the public never wants to hit a man when he is down, and I am only voicing a national demand when I say that an end should be put to the sufferings of the blob-maker who under present conditions must cross that interminable stretch between the scattered bails and seclusion, seeking painfully to disguise his torture under a sickly smile.

I therefore propose that every big scorer be escorted from the wicket by two officials in uniform (not necessarily ambulance men) and required to make a circuit of

the ground just inside the ropes, halts being occasionally made for the benefit of amateur photographers. Not only will this enable spectators to get into personal touch with their heroes, but it will cure the nervousness of the incoming batsman, who, unheeded by the crowd, may hit out at once with ease and freedom. I also propose that a man who gets out before his eye is in should be gently conducted by the bowler's umpire to a turf-covered trap door situated under cover-point, and there dropped into an electrically lighted subterranean passage leading from the publicity of the pitch to the privacy of the pavilion.

I speak feelingly about both these reforms, as I never score anything between 0 and 100.—*Punch*.

Adjutant (on seeing second button of tunic unfastened): "Damn it all, sergent-major, this fellah's nearly half-naked! make him a priz' nar!"

Sangfroid

[In the practical examination of Majors for promotion to Lieutenant-Colonels great importance is attached to coolness of demeanour upon receipt of information.]

Excited Staff Officer (reading urgent message from Headquarters): "Your main attack has failed, your cavalry has been annihilated, two batteries have been captured, and the enemy have cut off your communications!"

"Fed-up" and Weary Candidate: "Oh! they have, have they? well, just hold my map while I blow my nose!"

Soapoids.

(An anticipated development in lightning cures.)

Do you wash? It is a well-known medical fact that scrubbing the face and hand with chemical detergents is absolutely ruinous to the delicate outer fabric of the skin. You would not pour a can of petrol on the side of

an aeroplane to make it go, would you? Why then open the pores of the cuticle and keep them working by the external application of saponaceous tablets and other inferior frauds of that kind? Beware of these as you would of a poison.

Water is equally dangerous. Why is it that you meet so many people every day in the street with grey smut-stained faces and toil-begrimed hands? Simply because they abrade and destroy the elegant envelope with which Nature has provided their bodies, instead of treating it rationally from within. The only way to be clean is to swallow *soapoid*, with their wonderful internal operation on the fibres and nerve tissues. However dusty or gritty you may be, one dose of *soapoids* will set you right. The pores will spring open and shed off the unnatural accretion of foreign substances as a snake sloughs its skin.

Think, too, of the time and money you will save. No more tedious ablutions and ruinous water-rates. You can swallow your *soapoid* as you walk to the office, and be as bright as a new pin.

Our final word is if you have been washing, stop it. If you have not, don't begin. Spare your epidermis, and swallow *soapoids*. Try Nature's way, and be clean. —*Punch*.

Medical Examinations

The following is the list of successful candidates at the Medical Examinations held in October 1926 :—

First M.B. & B.S.

Rank.	Register number and name of candidate.	Where educated.
1	38 Siva Ayyar, S. V.	Medical College, Madras.
2	10 Chacko, Anna W.	Do.
3	52 Venkatasul rahmanyam, V.	Do.
4	28 Parthasarathi, K.	Do.
5	29 Raghavendra Nayak, P.	Do.
6	68 Subrahmanyam, P.	Medical College, Vizagapatam
7	45 Sundaram, T. P.	Medical College, Madras.
8	30 Rajaratnam, T.	Do.
9	60 Krishnamurti, P.	Medical College, Vizagapatam.
	8 Bower, Enid M.	Medical College, Madras.
	15 George, K.	Do.
	17 Hart, Florence M.	Do.
	24 Madhusudan, G.	Do.
	26 Narayana Menon, N.	Do.
10	31 Ramachandran, A. K.	Do.
	59 Hariharaswami, K.	Medical College, Vizagapatam.
	67 Srirama Rao, A.	Do.
	*58 Jacob, C.	Medical College, Madras.

Second M.B. & B.S.

1	123 Sankaran, N.S.	Medical College, Madras.
2	154 Kameswara Rao, D.	Medical College, Vizagapatam.
3	162 Ramaswami Ayyar, P. S.	Do.
4	112 Raman Pillai, K.	Medical College, Madras.
5	135 Verghese, Anna K.	Do.
6	79 Durairaj, G.	Do.
7	122 Sankaran, C.	Do.
8	92 Lakshmanan, R.	Do.
9	87 Johnson, A. S.	Do.
	142 Venkatarangam, M. P.	Do.
	143 Aiyaswami T. V.	Do.
	144 Arumugam Pillai, K.	Do.
	145 Ganesvaran, S.	Do.
	146 Kesava Menon, C.	Do.
	147 Narayanaswami Ayyar, A.	Do.
	148 Pudma, A. S.	Do.
	149 Sundaram, N.	Do.

* Appeared under Regulation 2 of Chapter XXVIII.

Third M.B. & B.S.

Rank.	Register number and name of candidate.	Where educated.
1	184 Koshi Rebecca	Medical College, Madras.
2	187 Narayanamurti, K.	Do.
3	198 Vareed, K. P.	Do.
4	189 Paul, C. P.	Do.
5	181 Eapen, A. J.	Do.
6	178 Chandrasekharan, T.	Do.
7	203 Thomas, I. Z.	Medical College, Vizagapatam.
8	175 Bhaskar Rao, R.	Medical College, Madras.
9	190 Ramachandran, R.	Do.
10	188 Narayanaswami, B.	Do.

FINAL M.B. & B.S.

Medical College, Madras.

PART I.

Register number and name of candidate.
207 Kesava Menon, U

PART II.

The following candidates have qualified for the M.B. & B.S. Degree:—

Rank.	Register number and name of candidate.
1	213 Govinda Menon, A.
2	226 Pinto, W. J.
3	217 Koland, Frederick.
4	236 Sankaran, G.
5	250 Venkataswami, P. V.
6	245 Vasudeva Rao, P.
7	242 Sundararajan, M.
8	247 Venkatachalam, S.
9	227 Rajamanikkam, N.
10	253 Vittaldasai Pai, K.
11	233 Ravi Varma (Prince of Cochin).
12	238 Seshagiri Rao, V.
	256 Narayana Pai, M.
	257 Natesan, P. S.
	259 Suryanarayanan, K.
	260 Vaidyanatha Ayyar, N.
	261 Sadasiva Rao, R. S.
	263 Sitaramaraju, C.
	264 Chandrasekharayya, Tomkur.
	269 Seshadri, T. K.
	270 Subbaji Tagat, K.
	271 Subrahmanyam, K.
	272 Umanatha Rao, K.
	273 Vareed, C.
	274 Venkata Rao, P.

FIRST L.M. & S.

Medical College, Madras.

Register number and name of candidate.

56 Damodaran Nambiyar, N.

SECOND L.M. & S.

Medical College, Madras.

81 Ganapati, C. K.
* 86 Jagannatharaju, M.

* Obtained passing marks required for the Second M.B. & B.S. Examination.

FIRST L.M. & S.—cont.

Medical College, Madras. cont.

Register number and name of candidate.

88 Kanniyappan, K. G.
94 Madhavan Nayar, K.
* 99 Narayana Nayar, V. R.
†101 Nilakantan Nambiyar, M. P.
†121 Samuel, Marim P.
124 Sankararama Ayyar, R.
†132 Sundarayya Chetti, V.
†136 Verghese, M. Rachel.
†137 Virayya, P.
140 Madhava Menon, K. V.
141 Ranganathan, A.

Medical College, Vizagapatam.

*150 Raghavan, N.
151 Chummar, A. V.
152 Gurulingaprasada Rao, B.
156 Itoop, K. I.
157 John, K. K.
*159 Ramachandra Rao, K.
160 Ramakrishnayya, C.
*163 Ramaswami Sarma, V.
†165 Sarvesvara Rao, K.
*167 Sivarama Sastri, K.
*169 Venkatakrishna Rao, M.
170 Venkatakrishna Rao, V.
171 Venkataramachandramurti, K.
†173 Yajulu, N. T. S.
174 Krishna Rao, G.

THIRD L.M. & S.

Medical College, Madras.

180 DeRozario, C. F.
185 Marthandan Pillai, P.
195 Somaskandan, T. S.

* Obtained passing marks required for the Second M.B. & B.S. Examination.

† Obtained exemption in all the subjects except Physiology for M.B.

‡ Obtained exemption in all the subjects except Anatomy for M.B.

FINAL L.M. & S.

Medical College, Madras.

PART I.

§205 Guruswami, P.
§206 Karunakara Menon, C. R.
§208 Narayani, N. K.

PART II.

The following candidates have qualified for the L.M. & S. Degree:—

Register number and name of candidate.

214 Hari Sankar.
219 Krishnaswami, T. K.
224 Narayanan, M. S.
229 Ramaswami, K.
232 Rangachari, T. E.
†239 Subramanyam, K. V.
240 Subramanyam, P. S.
248 Venkatachalamayya, G.
*252 Venkoba Rao, K. R.
258 Ramaunni Mannadiyar, C.
265 Gopalakrishnan, T. S.
266 Parankusan, M.
267 Parasurama Ayyar, P. R.
268 Ramachandra Nayudu, K.

The following candidates who appeared for the various examinations for the M.B. & B.S. Degree have qualified for a pass in the corresponding examinations for the L.M. & S. Degree.

FIRST L.M. & S.

Medical College, Madras.

Register number and name of candidate.

1 Alagasingari Nayudu, P.
3 Balakrishna Marar, P. V.
*4 Balakrishna Menon, P.
5 Balakrishna Nayar, M. K. R.
7 Booth, A. H.
9 Cama Freany, A.
11 Damodaran, K. K.
*13 Dharmapalan, P.
16 Harivittal Rao, P.
18 Isaac David, J. E.
*19 Kannankutti Menon, E.
20 Krishnaswami, N.
22 Lakshmi Ammal, T.
23 Madhava Menon, P.
27 Padmanabhan Nambiyar, K. T.
*32 Ramachandran, K.

§ Obtained passing marks required for Part I of the Final M.B. Examination.

|| Obtained passing marks required for Part II of the Final M.B. Examination.

¶ Obtained exemption in Surgery and Midwifery for M.B.

** By combining the results of the examinations of March and October 1926.

* By combining the results of the examinations of March and October 1926.

FIRST L.M. & S.—cont.

Medical College, Madras—cont.

Register number and name of candidate

33 Ravi Varma (49th Prince of Cochin).
35 Seshagiri Rao, A.
39 Srinivasan, R.
40 Srinivasulu Reddi, N.
41 Subbaraman, A. N.
42 Subrahmanya Ayyar, K.
43 Subrahmanya Ayyar, V.
*47 Thomas, V.
48 Thomas, T. C.
49 Thomas, T. S.
51 Venkatasubba Rao, K.
53 Vittappa Kamath, M.
54 Zachariah, V. O.
55 Krishnaswami, C.

Medical College, Vizagapatam.

61 John, P.
62 Kunjukrishna Pillai, M.
64 Madava Menon, C.
65 Rajasekhara Rao, D.

SECOND L.M. & S.

Medical College, Madras.

72 Cartner, Dorothy, E. L.
73 Chacko Mariam, W.
74 Chatlu Achan, V. N.
75 Cotelingam, J. D.
77 Dharmalingam, C.
78 Dharmarajan, C. K.
85 Jagannadhaswami, D.
*89 Kondalarayadu, K.
91 Kuppuswami, P. R.
98 Narayana Menon, V.
102 Oommen, P. K.
104 Parthasarathi, N.
108 Rajagopalan, S.
109 Rajagopalan, T. R.
118 Robert, G. W.

Medical College, Vizagapatam.

153 Gurunatha Rao, V.
155 Kanakaraju, T.
161 Ramamurti, P.
164 Rukmangada Rao, S.
168 Suryaprakasam, C.
172 Venkataramanamurti, Y.

THIRD L.M. & S.

Medical College, Madras.

179 Chokkalingam, P. M.
183 Jesudoss Florence K.
191 Ramayya, B. J.
193 Savarirayan, J. C.
194 Sitaramaraju, C.
196 Subramanyam, N.
197 Sudarsanam, R.
199 Venkatachalam, A. S.

* By combining the results of the examinations of March and October 1926.

*Medical College Magazine**Medical College, Vizagapatam.*

- 201 Marthanda Sastri, E.
202 Perraju, B.

FINAL L. M. & S.

Medical College, Madras.

PART II.

- 209 Akhila Bai, S.
210 Pail, M. R.
212 George, C. T.
215 Jesudasan, Dhairyam.
216 Joseph, P. J.
221 Lewin, B. F.
223 Narayana Menon, V. R.
225 Padmanabhan, R. V.
228 Ramachandran, M.

FINAL L. M. & S. -cont.

Medical College, Madras -cont.

Register number and name of candidate.

- F 230 Ramaswami, S.
231 Rangachar, P.
234 Sambandam, K.
235 Sambandam, K. M.
237 Sankararaman, S.
241 Sundaram, T. A.
244 Vaidyanathan, C. V.
249 Venkataramayya, Y.
254 Madhavan, Oyitti C.
255 Jayaram, B.

† By combining the results of the examinations of April and October 1926.

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