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THE MADRAS MEDICAL COLLEGE MAGAZINE



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1835

Vol. XX
No. 2
JANUARY 1941

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Sir Henry Head, M.D., F.R.C.P., F.R.S., 1861—1940.

Early in his career he wrote a thesis in 1892 on "Disturbances of Sensation, with special reference to the pain of visceral disease".

"HEAD'S AREAS"

In 1893—6 there appeared serially in *Brain* the classical paper elaborating the subject-matter of his M.D. thesis. Several years before writing his thesis he had been led to examine the positions occupied by pain in disorders of the stomach, and soon came to the conclusion that the usual description was incomplete. He therefore investigated the pain and accompanying tenderness consequent on disturbance of the viscera and found that these sensory disturbances followed definite lines. After James Ross's most suggestive paper on "Segmental Distribution of Sensory Disorders" (*Brain*, 1888), it seemed probable to Head that these areas bore some definite relation to nerve distribution, and he investigated this in herpes zoster in the hope that a skin lesion of notorious nerve origin might throw some light on the meaning and significance of the tender areas in visceral disease. To his surprise he found the areas occupied by herpes zoster closely corresponded to those with which he was familiar in visceral disease. He then determined to what level of the nervous system these areas belonged, with the help of cases in which gross organic lesions were present. In this way he found that each of these areas represented the distribution either of a single nerve root or of a single segment in the spinal cord. The areas supplied by the various segments of the cord on the surface of the body having been thus mapped out, it became apparent that certain of these areas were never affected in visceral disease. Head therefore examined the innervation of the viscera by the sympathetic system. He extended his investigations into tender areas which occurred in anaemia, in febrile diseases, and in hysteria. These opened up the question of sensation in its various forms, but at this time he only touched on the relative distribution of the sensations of pain, heat, cold, and touch. His observations were very extensive, and he tabulated the results in charts which showed the distribution of the various segmental areas in the cutaneous tenderness of visceral disease, in the eruption of herpes zoster, and in the analgesia accompanying organic disease of the spinal cord and sensory nerve roots.

He wrote the articles on herpes zoster and on trigeminal neuralgia in Allbutt's *System of Medicine*, 1899. These had an important bearing on the problem of the parts of the nervous system which are concerned with sensation. Herpes zoster, he showed, might arise as a symptom of some pre-existing disease of the nervous system, as an acute disease probably as specific as acute lobar pneumonia, as acute poliomyelitis, and that it occurred in epidemics. With Campbell he investigated the nature of the lesion in order to determine the central representation of the affected areas of the skin. They obtained twenty-one necropsies at all periods, from a few days to a year and a half after the eruption. In the most acute cases they found hemorrhages, generally small, into the ganglion surrounded by a considerable amount of inflammatory exudation. The ganglion cells were destroyed to a varying extent, and in later cases sclerosis was present. There was also definite degeneration of the peripheral afferent nerves and in the posterior spinal root connected with the affected ganglion, as shown by selective staining by the Marchi method. In this way they traced the root supply of several cervical, dorsal, and lumbar nerves, and deduced others from the information thus obtained.

SELF-EXPERIMENTS ON SENSATION

In his classical researches on sensation in man Head had his own left radial and external cutaneous nerves cut and sutured, so that he could carefully map out the effects of their section and regeneration. Even this was not enough precaution to take to satisfy himself that he would be getting accurate enough information. He felt that the distractions of a busy life were fatal to the detachment required by the sensory tests he wished to apply. He therefore decided to carry the work out at St. John's College, Cambridge, where a set of quiet rooms were put at his disposal. As a rule he travelled to Cambridge on Saturday, after work at the London Hospital; or on the Friday if he found his hospital work had tired him too much for mental detachment. Between April 15, 1903, the date of the operation, and the last sitting with Dr. W. H. R. Rivers, December 13, 1907, 167 days were devoted to the investigation. Full details were given in the paper published by Rivers and himself in *Brain*, 1908, and reprinted in *Studies in Neurology*. The paper is a most interesting and a wonderful record of a most unusual line of scientific research. He was then, he states, 42 years old, in perfect health; he had not smoked for two years and no alcohol was taken during the time of observation.

After the nerves had been exposed small portions were excised and the ends were united with silk sutures to facilitate regeneration of the sensory fibres. It was found that all forms of superficial sensibility were lost over the radial half of the forearm and the back of the hand. There was no interference with deep sensibility, as this is subserved by afferent fibres in the motor nerves. Head recognized two forms of superficial or cutaneous sensibility and called these "protopathic" and "epicritic." Protopathic sensibility, which was found to return about seven weeks after the nerve had been cut, includes sensory response to pain, heat, and cold of a crude nature. Epicritic sensibility, which returned later, was finer and more discriminating; degrees of temperature could be distinguished, light touch was appreciated, and the subject was able to locate accurately the point touched.

Sir Henry Head had immense vitality; his enthusiasm was contagious, he would have been a very dull student whom Head did not stimulate to work.

He convinced those who regarded "Science" as an affair of laboratories rather than words that they were wrong. It was in arranging clinical experiments on Scientific lines and in combining observations into hypothesis rather than as an astute observer that Head excelled.

—B. M. J., Oct., 19, 1940.

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No. 2.

“ War Surgery ”.*

BY N. S. NARASIMHAN, L.R.C.P. (Lond.), F.R.C.S. (Eng. & Ire.),

Govt. General Hospital, Madras.

The British Medical Association and its organ the *British Medical Journal* and the *Lancet* have within the past two years published papers and organized lectures in co-operation with the Minister of Public Health and the Medical Officers of the Army and thus have trained the medical profession in England to be fit enough to shoulder the responsibilities in relation to war.

The British Post-Graduate Medical School has organized a series of lectures and demonstrations mostly by teachers, who had served in the last war on treatment of fractures in war conditions, war surgery of the abdomen, surgery of the nervous system, war surgery of the extremities with the help of specimens obtained during the last war available in the museum of the Royal College of Surgeons.

The Army Medical College in Millbank keeps their own medical officers and personnel up-to-date and trim.

It is a well known and accepted fact that in 1914—1918 war, Surgeons in Casualty clearing stations in France had to learn their jobs from very bitter experience. Had they been able to apply in 1914—1915 the knowledge they had gained in 1918, there would have been an appreciably smaller number of graves in France. The object of this lecture is to give an insight to these problems to our young friends in Madras.

Surgery in the last war was divided into 3 water-tight compartments Casualty clearing station, Base Hospital in France and Base Hospital at Home.

The consulting surgeon should be a liaison officer, between all departments.

“ The use of armour ”.

This war is unlike its predecessor in two important respects; first the degree of mechanisation that has been reached and secondly the velocity attained by some of the tiny particles

* “ Elaboration of a lecture delivered before the South Indian Branch of British Medical Association, Madras on 31st October 1940 ”.

that are causing wounds. Looked at on the surface, these wounds are of a trifling nature, but beneath the tiny entrance hole, are tissues reduced to a state of pulp. An armour may so reduce the velocity as to prevent the widespread disorganisation of the deeper tissues. The helmet is a real protection and a light armour is a great desideratum.

The machine gunner must be protected from missiles that have even the high penetrating power of bullets.

The service gas mask may be strengthened.

A study of the types of wounds caused by projectiles of different velocities and also the resistance offered to projectiles of different materials is required to protect the soldier with a suitable armour.

Ordinary rifle bullet sheathed with nickel and fired at less than 200 yards distance with a muzzle velocity of over 2,300 feet per second causes a large ragged wound of entry because of the terrific force of impact. This may resemble the effect of a dum-dum bullet. Soft nosed bullet, in which the sheath is not continued to the tip fired with a low velocity fire arm may produce a similar effect.

There are variations in size, shape and the weight of rifle bullets.

The destructive effect of the pointed bullet compared with that of the conical form previously used is much greater.

Wounds sustained in the open, long range fighting of the South African Campaign of 1899—1902 were very different from those met with in the Entrenched warfare in France in 1914—18.

Wounds inflicted in Naval Engagements present different characters from those sustained on land.

Many months and even years lapsed in the war of 1914—1918 before the best methods of collecting and evacuating the wounded and of caring for them so as to avoid infection, gangrene and tetanus were learnt and before specific methods were perfected and applied to the various types of wounds.

In previous wars also the proportion of shell and shrapnel wounds was small when compared with that which occurred in last war.

In the present warfare of rapid movement, ruthless attack and frequent air raids with dive bombing and machine gunning it is found that everything learned from the experience in the last war had to be forgotten. The delusion of a stationary war of defence lines and trench positions and forts had vanished in this war.

The keynotes of successful organisation are fluidity, elasticity and rapid improvisation.

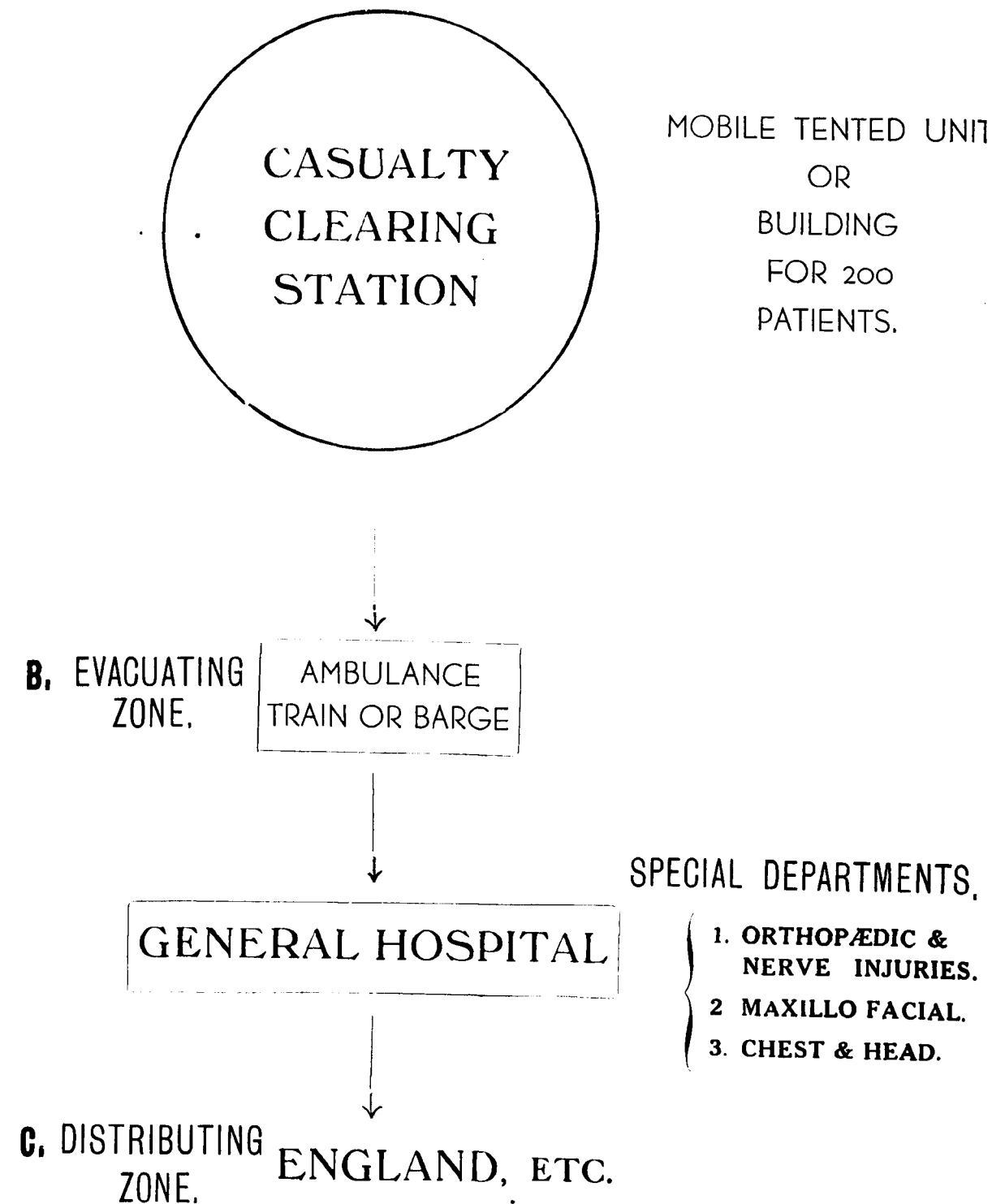
Medical Air Raid Transports.

The contra-indications for carrying surgical cases by the method are shocked cases.

The British Red Cross Society's air ambulance organisation was started in 1931.

The Germans transferred their head injuries from Poland by air ambulances.

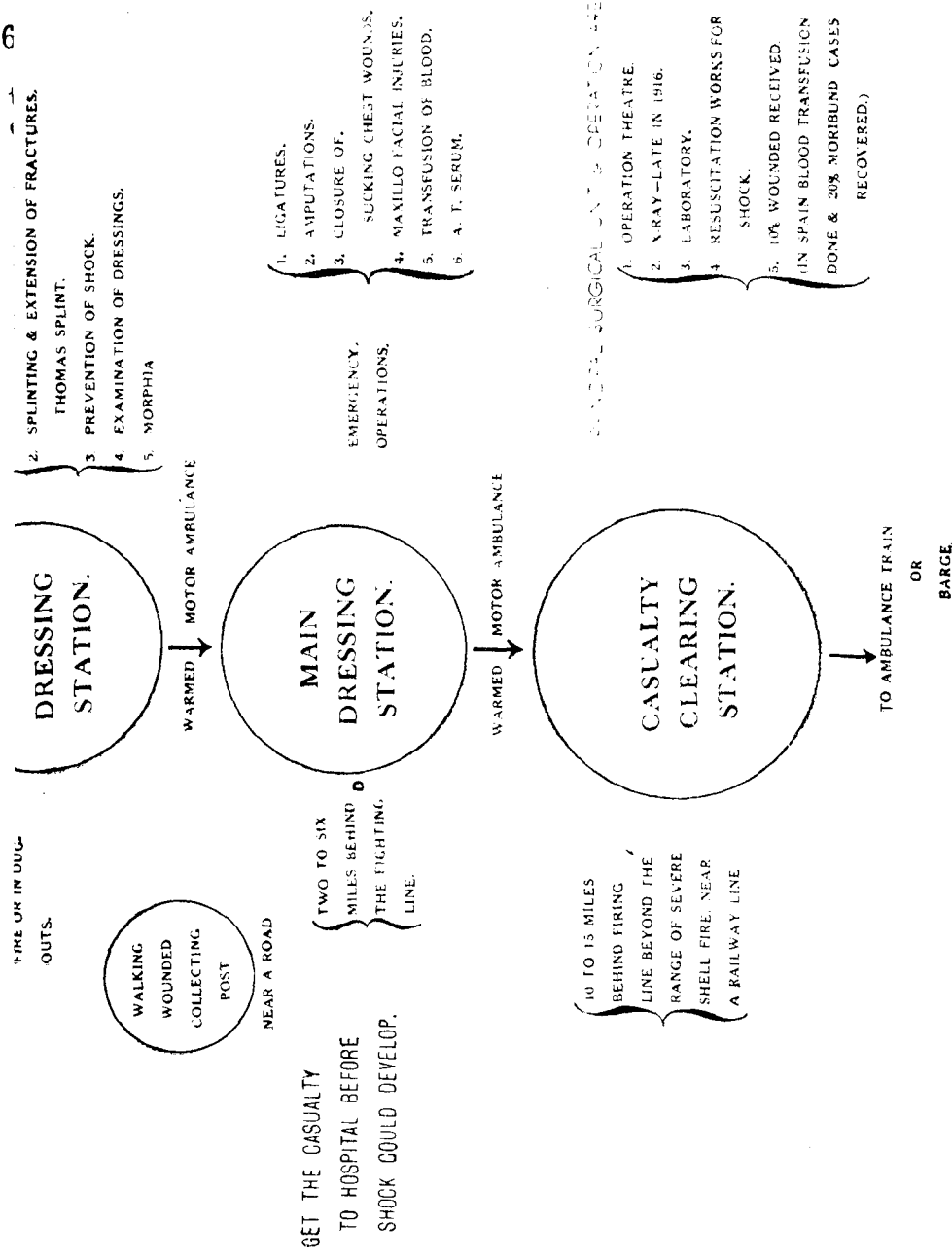
The History of War is in one sense largely a race between the development of instruments of physical destruction and the advancement of



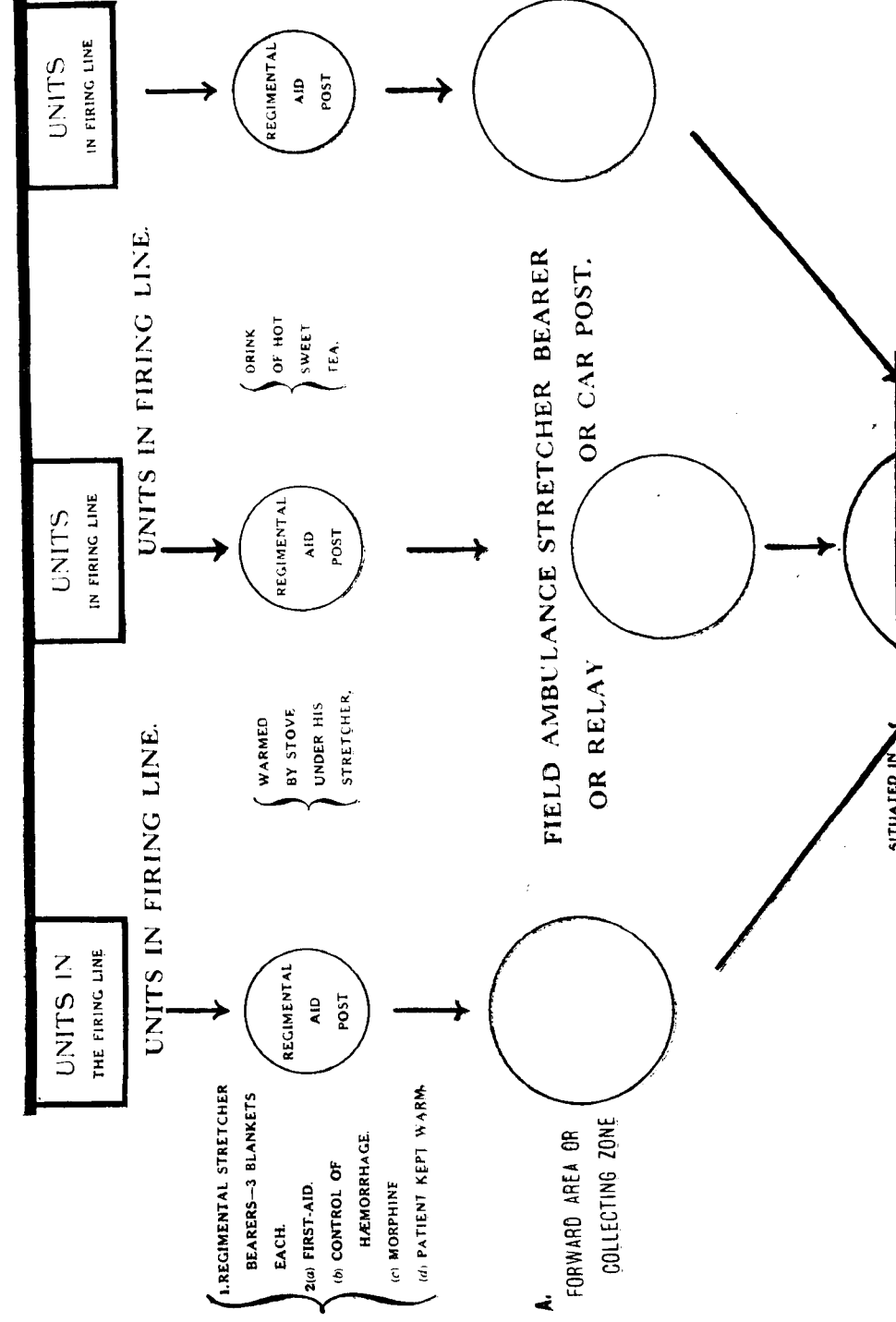
In the Battle of Somme in July '16, 13 C. C. S. of the Fourth Army dealt with 37,000 wounded in 3 days.

TYPE OR IN DUG-
OUTS.

6



MEDICAL ORGANISATION IN THE FIELD IN FRANCE IN 1914-18 WAR



medical knowledge for saving the life of the wounded and the sick men.

Modern Field Ambulance has been entirely motorised now, whereas the whole of the R. A. M. C. had at their disposal only 7 motor Ambulance cars at the beginning of the last war.

Forward evacuating units of mobile ambulances, Light two stretcher type of motor ambulances, Motor cycle stretcher carriers as in the French army are in need during the present war.

Centres for decontamination of gassed cases have been instituted.

The following scheme is adopted.

(1) Stretcher party ; (2) Mobile First-aid post, Lorry, 1 doctor, 6 nurses and 2 attendants ; (3) First-aid post or Hospital.

Another doctor will be required to classify as to who should receive attention first.

Every first-aid party carries 3 Thomas Splints and each ambulance carries two suspension bars.

Air raid wardens have to provide the following:—Anæsthetics; Runners; Stretcher bearers; Reception Room; Resuscitation, Gas decontamination and Fire fighting-anti-fire squads.

FIRST-AID.

Instead of Hook-Grip (*Vide* Page 200 of the First-aid book (St. John Ambulance) "Rope Ring" for short distances is useful; men posted at first-aid post should have undergone training in the following:—

Treatment of Dressing of Burns; Arrest of Hæmorrhage; Synovitis; Injuries to the Eye; Fire drill;

Method of applying Thomas Splint; Method of carrying; Fitting respirators; Loading and unloading the ambulance; Stretcher drill; treatment of Shock caused by falling into cold water tanks; Gas treatment of casualties.

An organisation of field and Mobile First-Aid posts was kept in readiness since April 1939 in England for an emergency with one doctor for each post. The number of personnel in congested areas being 60 and 40 in the rest.

The principles of First-aid treatment are:—

(1) The control of hæmorrhage.

(2) The application of a protective dressing to the wound and the immobilisation and extension of fractures.

(3) The prevention and treatment of wound shock. (Warmth; Restoration of fluid; Relief of pain).

Transport of wounds of the spine is carried out in the prone position, with the exception of wounds or injuries of cervical Vertebrae in which cases the patient should be on his back with a stiff pillow or support under the neck to avoid flexion. In paraplegic cases do not pass a catheter but allow to distend and overflow or expression may be tried. Suprapubic drainage is the best.

Transport of wounds of the jaws.

The wounded man should be placed on the stretcher in the prone position with the head hanging downwards over the end of the stretcher. It is essential to keep the tongue forward in these cases, and many lives might be saved in this way.

Emergency Tracheotomy.

Has been much employed in the dressing stations by the Japanese surgeons in China; this enables the oral cavity to be packed so as to check hæmorrhage; they have a special emergency tracheotomy appliance.

Transport of lower limb fractures.

From the front line to the casualty clearing station, the original Thomas Splint is applied over the foot and clothing, and the ring is packed anteriorly and laterally with tow or wool to retain it against the tuber Ischii; the fracture is supported with gough splinting or cramer wire; Extension is obtained by means of a Skewer through the waist of the boot or a clove-hitch round the ankle and tied to the distal extremity of the splint. The splint is suspended to a bar fitting over the stretcher.

The method of transport in an ambulance.

Should be in the semi-erect position at the first possible moment after he was hit and should be so kept.

The ambulances are not so constructed at present.

Posture of the wounded.

Every one hit in the belly or the lungs should be put in the semi-erect position forthwith. They must be kept in that position till dead or well. It needs stretcher chairs of a uniform pattern—In air raids *back seats of private cars* are good.

In 1916 the casualty.

Clearing stations were authorised to organise and equip so that every wounded man could be given the finest of surgical attention and nursing care at the earliest possible moment after being wounded.

The **Medical Research Council** or Committee came into being at the beginning at the last war. The early work of the M. R. C. was directed to the solution of medical and surgical problems immediately affecting the health and welfare of armed forces in the theatre of war and later of munition workers at the Home Front. A Committee of "War wounds" has been appointed by this Council now.

Surgical Centres for war casualties in the United Kingdom are as follows:—The area around London is divided into ten sectors and in each centre there are special departments for

- (1) Facio-Maxillary cases
- (2) Head injuries
- (3) Chest injuries
- (4) Orthopædics;

Convalescent Homes under the management of the British Red Cross have been arranged the Order of St. John having 10000 beds for NCO's and ranks.

TOURNIQUETS.

The instructions given to St. John Ambulance men regarding the use of tourniquet require amplification. Undoubtedly the rubber bandage is the ideal pattern. A satisfactory form can be made of an *old bicycle inner tube*. *The instructions regarding the usage of Tourniquets should include its dangers, its painfulness and its being used as a last resort, that the elevation of the limb where possible with the usual methods of Digital Pressure (Direct and indirect), a pad and bandage, will succeed in most cases; further that the Femoral Artery is the most principal artery where the Tourniquet is indicated.* The Tourniquets should not be kept for more than half an hour by first aiders. Releasing after 20 minutes is good.

"War Surgery"

First-aid books teach against the use of elastic bandages as it stops the return flow of blood through the veins.

Samway's Tourniquet, which is the present service pattern must be replaced by elastic bandages. In the last war the results of frequent resort to tourniquets were so disastrous that instructions were issued in a circular by the authorities forbidding its use, unless, medical aid was easily accessible. It was considered that the risk from Hæmorrhage was much less than those arising from the application of a tourniquet under the conditions, obtaining on the battle field, where it could not be known how much time might elapse before the wounded man would reach a dressing station or field Ambulance. The proper first-aid treatment for most cases of hæmorrhage is pressure on the bleeding spot by means of a bandage over a dressing of good thickness.

"The Modern Teaching on keeping the Bloodless Limb Cool".

When a limb has no circulation the only way to stop metabolic process and the onset of putrefaction is to cool it as quickly as possible and if there is an open wound the multiplication of bacteria is also kept down in this way.

A dog's hind leg will stand a tourniquet for 2 days if the leg is kept just above freezing point and the leg will be undamaged and we can do all that is required for the dog's leg. If the dog is kept "*nice and warm*" the usual *stinking gangrene* develops and the leg is lost. *This refrigeration of*

the tissues is comparable with the refrigeration of the blood, which survives three weeks at a temperature of 4°C.

"Incidence of injuries and disabilities in the last war."

The really important surgery is done, if possible at casualty clearing stations and not at the base. The treatment does not differ from peace injuries except greater delay in transport occurs; Evacuation necessitates changing the patient's doctor probably several times.

Wound infection was probably the largest single cause of death among men reaching hospital in the last war. The following statistics give an account of the various casualties in the last war 1914—18 especially for the American Army.

Lacerated wounds	46,549
Penetrating wounds	42,374
Fractures	25,272

Deaths.

Number of deaths from wounds received in action	12,470
Enlisted men	11,881
Officers	589
Penetrating wounds	4,976
Multiple wounds	2,751

Discharges.

Discharges for disability by battle injuries.	
Enlisted Men 21,822	} 22,330.
Officers 508	
by penetrating wounds	4,982
Multiple wounds	3,130
Fractures	11,740

	Total men killed in action.	Wounded.
A. E. F.	36,780	153,537
France	1,357,800	2,052,984
Britain	464,049 320,944 Prisoners	2,036,750
Germany	789,400 968,197 Missing	3,088,749

The ratio of dead to wounded was 1:4; of 1,239 cases totally disabled on first examination 337 cases improved in the first 6 months (27%).

In the next 6 months 416 (34%) 199 or 16% improved after 30 months. Among the totally disabled cases examined by the U. S. veterans' bureau within an year after injury a re-examination five years after injury revealed that 1,124 or 91% improved. Only 70 or 5% showed no improvement.

Gas gangrene. Total 464 cases.

In 91 cases. 55 of which was streptococcus 1.5 of bacillus Tetanus.

10 by Anaerobic bacillus.
14 by Several varieties.
67 cases by aerobes and anaerobes.
of the 91 cases.
Streptococcus 40%
Diplococcus 33%
Staphylococcus less frequent.

Tetanus:

Of the total 176,132 battle injuries

Only 36 cases were tetanus, i.e., .014 per thousand.

Causes of Physical disabilities.—
Total 19,768 (Physical)—Total discharged for disability.—25,187
5419 cases were not tabulated.

Amputations—4,403.
Thigh—11
Both legs—9
One arm—3
Eye sight—66 men (44 cases partial) (Both).
One eye—644.
Ankylosis of joints—4,970.

Fractures: } (Fatality rates)
 } From gunshot wounds:—

Femur 25.22%
Fibula 13.2%
Humerus 10.17%
Radius 4.77%
Tibia 14.04%
Ulna 3.53%

Gun shot wounds, kind not specified } 7,280

Total No. of battle injuries 174296

Gun shot wounds of the
Head:—10,452 5.99%
1,146 cases were fatal 10.89%

Abdomen.—Gunshot wounds of the abdomen comprise a small and indeterminate % of the total wound but is estimated to be about 3.3% (No account being taken of those killed in action.)

Hand.—85 per thousand of the total number of injuries 8.5 %.

Joints—

Elbow 5%
Foot and ankle 12%

"War Surgery"

Forearm, wrist, hand 20%
Knee 2.5%
Leg } 5% Leg—10% (With
Thigh } fracture) Nerve injury.
Upper arm 7.5%
Neck 5 per thousand
Shoulder 5 per thousand
Head 5 per thousand
Hip 1%
Femur 7.5%

Nerves—

Spine 1%
Brain 1111 (Abscess—11)
Ulnar nerves—8.5%
Neck with nerve injury—5 per thousand.
Thigh and leg with nerve injury 5 %.
Peripheral nerves

(1) (wounds of the head and spine):
—28.5% mortality.

B. E. F. . . . in 1917. In an American Hospital 45 % mortality.

Spanish War of 1936—1939.

Treveta published his results on the victims of aerial bombardments; Col. D. J'Harcourt, Foleth and Oriol published results of "closed method treatment" regarding the Republican army.

There were 7,500 Fracture Casualties, and they followed up a further 17000 cases treated in other centres specialising the Fractures.

The closed method of treatment was extended to injuries of the soft tissues. It can be applied within 6 hours or the wound has begun to granulate. Although the total number of casualties is not available, the following are some type of results:—

Out of 120 casualties in one unit 5 required amputation and in all these

cases there was very extensive total damage.

In Barcelona out of 5000 wounded in one year (almost exclusively fractures) only 26 amputations were performed and very few serious complications were encountered. There were 20 cases of **Gas Gangrene**, 12 of which showed vascular lesions. In the course of the year the number of deaths amongst the 5000 was 37, 15 of these being due to **Gas Gangrene**: 17 to **Septicæmia**; and the remaining 5 to **Secondary Hæmorrhage**.

There were only a few cases of non-union of the bones of the fore-arm, which was due to extensive loss of substance due to the shattering of the bones.

There were cases of **Osteo Myelitis** associated with Fracture. These have not been serious but they were persistent. The closed method of treatment has not had any marked effect, on this complication, which is a well known sequel of gunshot wounds.

The difficulties of Royal Air Force Men.

Fatigue which is common in Air craft crews is due to various factors as the **Stress** of taking off and landing at high speed, the effect of noise and vibration, the mental anxiety and disorientation due to night flying or flying through cloud and fog, discomfort of confined and cramped positions and vitality lowered by cold at altitudes.

Physiology of High Altitude Flight.—The dietary constituents which favour or depress resistance to oxygen deficiency.—A high protein content is generally unfavourable to resistance an exception being the Zein protein of MAIZE, which has a protective effect.

The resistance is promoted by decreasing the proportion in the protein diet and increasing that of carbohydrates, and particularly of vegetable substance and fruit fibre.

The Royal Navy and the R. A. F. are bearing the brunt at the moment. The medical services have not been tried out.

Mobile Neuro-Surgical Unit.—The R. A. M. C. has organised a mobile Neuro-surgical unit with equipment and operating teams. It can work in forward areas.

Casualty clearing sections and Base Hospitals.

Prophylactic Treatment Against Tetanus.

The prophylactic inoculation of man against Tetanus was until recent years performed by giving a subcutaneous or intramuscular injection of **Tetanus Antitoxin**—3000 Units during the incubation period of the disease, soon after the receipt of a contaminated wound. The injections had to be repeated weekly as the immunity conferred was short lived.

10 to 15% of cases showed Serum sickness where sera concentrated with ammonium sulphate method was used and about 2% with the modern refined and concentrated sera.

The main draw back to this type of prophylaxis were:—

(1) The immunity was only passive, partial and temporary lasting merely a few weeks.

(2) Common occurrence of serum sickness.

Use of Tetanus Toxoid is not mentioned in text books as Rose

and Carless—1937 and Romanis and Mitchiner, Thompson and Miles 1939.

Since 1936 France, Germany and U. S. A. are using the Tetanus Toxoid, the British army and R. A. F. since 1938. Inoculation with Tetanus Toxoid had the power to produce an active and relatively permanent type of immunity to **Tetanus**. The British army uses 2 doses of 1 c.c. at intervals of 6 weeks; France used 3 doses.

Toxoid produces no general or local reaction.

Out of 61,042 individuals inoculated in the British Army, 2 had anaphylactic crises and this was treated successfully with adrenalin Hydrochloride.

The amount of anti-toxin adequate to protect man against Tetanus is 0.01 unit per ccm. of blood serum; the minimum protective quantity is present in the blood of man in the majority of cases for a period of over 2 years after immunisation, extending up to 5 years. This requires further confirmation.

Of particular importance is the fact, that, when a basal immunity has been established by a primary immunisation with the toxoid, a small injection given after a long interval as two years will produce a rapid and large increase in the Tetanus anti toxin circulating in the blood.

Effect of Toxoid treatment during the present war.—On 23rd May, 1940 casualties from France and Belgium arrived in England; of these 75% had only field dressings and most of the men had been wounded for periods between 24 hours to 4 days. Yet there was only one case of true tetanus and one of true gas gangrene

(Guy's Hospital Gazette, dated 10th August, 1940).

Army Blood Transfusion and Surgical Research Service.

Was initiated by the Royal College of Surgeons of England. 14 of the College staff were engaged in their Laboratory in France with the B.E.F.

Equipment.

Splints.—No wooden splints are used now. Cramer's wire splints are good.

Braun splint is a direct descendant of the double inclined plane, which dates well back into the 19th century. Though **Thomas Splint** originated in the preantiseptic age, its use in various forms of fracture was not generally developed till 1915. In Somme Battle, when 300 splints were ordered, they seriously considered a court martial of the Medical Officer. The first place at which a Thomas Splint is available is not at the site of casualty but perhaps at the Regimental first-aid post or if active operations are in progress it cannot be had until an advance dressing station is reached in most cases.

The 1914—1918 war forced a quickened interest in the treatment of fractures, especially that of the Femur. Contamination of the boots by mustard gas necessitates their early removal for the urgent treatment of the boots or the local skin. When the boot may be left on the foot, one of the methods described in the First-aid manual as a Skewer or clove hitch is used. The introduction of the skewer may rotate the fracture. A clip called the "Mill-bank clip" is slipped on to the boot, the lateral expansion of the clip rests firmly on the bars of the splint and in so doing hold the foot dorsiflexed and comfortably steady without the addition of a foot piece.

Bohler's leg Splint may be of wood

The knee is kept in a flexed position and the elevation of the lower limb improves the circulation and reduces the swelling.

The misuse of straight Thomas' arm splint was responsible for more damage, if less distress, than the guillotine amputation. Extension to fingers and thumb must be condemned.

Surgical Indications for Oxygen Therapy.

With 8 litres of oxygen per minute entering the lower part of the mask, the oxygen pressure in the lung alveoli of patients is kept at about 60 % of an atmosphere. With such a mask there are no mechanical complications such as the valves or springs which always impede or embarrass the respiration of weak patients.

For suspended respiration:—

- (a) A portable and modified **Woilez** apparatus or
- (b) a simple Thoracic band or girdle which exerts compression or decompression

is useful.

AIR ATTACKS.

Air attacks will be made by three kinds of bombs:—

1. Incendiary bombs
2. Gas bombs
3. Highly explosive bombs.

Incendiary Bombs:—These weigh from 2½ to 60 lbs., and are made of an alloy of Magnesium, aluminium and zinc with a central highly inflammable core such as thermite. On impact with any hard surface the thermite is ignited and burns for about a minute with

a temperature of 3500 degrees Fahrenheit, which effectively sets fire to the bomb-casing, whereafter the whole material burns at 2300 degrees F, spurting out fragments of burning metal in all directions and setting fire to the surroundings by

i. spluttering (or throwing out balls of fire in a violent manner)

ii. Direct heat of the molten mass of metal

iii. Heat radiating to a distance of several yards from the conflagration.

Gas bombs:—There are two kinds of gas weapons used:—

1. Artillery Gas Shells and
2. Gas bombs (dropped by hand).

An Artillery Gas shell have a thicker case to withstand the shock of being fired by a gun and has a large bursting charge to fragment the shell. Hence the noise made is a sharp ear splitting crack and makes a crater of greater or less depth according to the size of the shell fired.

Gas bombs dropped by hand from air crafts are thin shelled and have an internal charge just sufficient to burst the container as soon as it comes in contact with the ground and makes only a dull thudding noise. No marked crater will be present, except perhaps a small depression and the fragments will not be scattered to any considerable distance like the artillery shells.

They vary from $2\frac{1}{2}$ to 60 lbs. A 50 lbs. bomb will have $17\frac{1}{2}$ pints of gas. *The gases used may be:*

1. **Lung irritants** such as Chlorine, Phosgene.

2. **Nose irritants** made of Arsenical compounds.

3. **Tear gases** such as Chloro acetophenone, Ethyl Sodo acetate and Bromo Benzyl cyanide.

4. **Blister Gas, e.g., Mustard Gas** (British), German Yellow star and Lewisite (American) first prepared in 1917 and not yet used in this war.

Sometimes high explosives and gases may be combined in the same bomb, when the effects produced will be that of *fragmentation and gases*.

The methods of distribution of gases are more effective in this war. Of all gases used, *Mustard Gas and Lewisite* which form the *blister* gases require consideration for surgical purposes.

Action of Mustard and Lewisite gases:—Their effect is latent and effects from a minimum period of 2 hours to 6 hours usually. Eye Lesions form the gravest danger. The eyes become inflamed, swollen and painful, the conjunctivæ may be shed and severe ulceration of the cornea like X-ray burns may occur. 10% of cases developed such Corneal lesions and 15 became blind.

Treatment of eye cases.

1. Lavage with 2 per cent Boric acid or Hypertonic saline solution for 10 minutes.

2. Then 1 per cent atropine ointment or atropine solution or lamellæ every 12 hours. It is necessary to persevere with this treatment if cornea is affected.

3. As cocaine has got only temporary relief and encourages ulceration it should not be used.

4. 2 % solution of Argyrol can be used for cases with mucopurulent discharge.

5. Oroil can be used for corneal cases.

Skin Lesions.—Contact with vapour or the liquid gases cause blister of the skin. *The preventive treatment* consists in rubbing for a minute or two over the affected part an ointment made of 2 parts of bleaching powder with one part of **White vaseline**.

Then the ointment is removed with a rag and the whole body is washed with soap and water.

For mild Erythematus cases an antiseptic dusting powder can be used.

The blisters can be aspirated by a hypodermic syringe and then covered with dry dressings.

Lint soaked in Cod Liver oil or Tannic acid solution can be used for confluent blisters after evacuating the fluid and clipping away the pellicle.

High explosive bombs.—They are meant for the destruction of forts, ships, utility service institutions, important civilian buildings, electric power houses, water works, munition and aircraft factories. These have heavy steel casing and less chemicals, whereas those meant for the destruction of mankind have more chemicals and thinner casing.

Action of bombs.—Bombs detonate by percussion or by delayed action fuses. Delayed action bombs are likely to be used in Industrial and munition works. When a bomb drops from a great height it will either penetrate into a building through several floors or into the earth according to the nature of the area struck and then it will explode. The bursting bomb will scatter the fragments radially with great velocity,

killing persons within 400 yards and knocking off portions of buildings in the neighbourhood. It causes vibration of the earth and will cause buildings to crack and collapse. A bomb bursting in a street with houses on both sides will cause more destruction than the one which falls in a less enclosed space or into a softer and yielding substance like sand and earth when the impact becomes diffused and absorbed. Therefore casualties generally occur as follows in relation to the site of explosives:—

1. Within 40 feet all will be generally killed.
2. From 40 to 100 feet they may be killed by the *blast* or by collapsed buildings.
3. Within 750 feet the damage to buildings will be great but casualties may be caused by blast, splinters and the collapse of buildings.

A word about Blasts which is one of the curious effects of explosions may be interesting at this stage.

"Experimental work on blast".

Experimental work carried out during the last few weeks by the Civil Defence Research Committee with the aid of delicate apparatus has upset many pre-conceived ideas and popular beliefs. A blast is not so terribly destructive as was generally held, but that was so in cases only because the effects were merely local. It creates in the immediate vicinity of explosion a wind six times as violent as a tornado created in America with the air speed of 500 miles an hour, but the wind which is really gas from the bursting explosive is very involved. Beyond the distance of 30 feet it is almost innocuous so far as the destructive

effect on buildings is concerned. Splinters from the bursts will still have a velocity of 4000 feet per second at 50 feet, nearly four times the speed of sound. Within a radius of ten yards, the blast exerts its full force and from the point of view of effect anywhere in that circle it counts as a direct hit. The blast alone, however, is not believed to be lethal except at very close range. *It might kill through shock to the heart but not through the mere velocity of gas.*

Effects of blast.—The modern heavy bomber can fly at a height of 20,000 feet at a speed of 250 miles per hour or more and carry 2 to 4 tons of bombs. One of the effects of high explosive is blast. The effect of blast on brick buildings is momentarily to push the walls in and then to suck them out. It is not therefore surprising that blast will kill people without their being actually wounded. During post-mortem, the lungs are found to be torn and the hollow abdominal viscera ruptured.

Professor **Holst** reports on the nature of casualties in Finland "that they are remarkably severe and his opinion in the field is more weighty because he took part as a surgeon on the Western Front in the last war and in Finland's war of Liberation in 1918. The severe cold has had a profound influence both on the character of the lesions and on the work of the surgeons dealing with them.

Wounds may be caused by pistols, revolvers, air guns,

Sporting or scatter gun,
Rifle bullets,

Shells and as a result of explosions.

With all calibres at all ranges except actual contact, the wound of entrance is smaller than the bullet.

When the bullet perforates, the exit wound is usually larger and more extensively lacerated than the wound of entrance.

Pistol wounds produce dangerous effects, only when fired at close range.

Wounds caused by Explosions.—Blasting operations from the discharge of dynamite, bursting of steam boilers or pipes, breaking of machinery.

Wounds have the same general characters as shell wounds met with in warfare.

Limbs are concerned in 76 % of all War Injuries.

Treatment in Air Raid Casualty.

Routine.—Use of hot water bottle, blankets, morphia injection, raising of the foot of the bed and injection of 2000 units of A. T. Serum are the routine.

Plasma transfusions were given to the more severely shocked cases. Supra Renal cortical Extract injection is useful. Cases with tourniquets are dealt with quickly.

Treatment of Wounds.

Operation.—Under general anaesthesia with open ether. Solution of detol in spirit 50 % is used after the skin around the wound is shaved. In recent cases excision of skin edges and of all the deeper structures is done. Wound is packed with sulphanilamide powder. In wounds 48 hours old, clean and leave the wound

open. The limb is encased in plaster casing.

Sulphanilamide—Two 15 grain tablets every 4 hours by mouth for 24 to 48 hours is given.

In cases of compound fractures after excision of wound, Vaseline gauze packing and closed plaster treatment is instituted.

Extensive and prolonged operations for the removal of metallic fragments are not justified in the initial stages but efforts should be made to remove those pieces, which are readily accessible.

Instruction to the population.—Lie flat as soon as the scream of a falling bomb is heard; because twice the number of injuries occur above the hips.

Where to treat the Air Raid casualty in a civil population?

Rescue parties of trained men put the casualties in ambulance wagons and they are conveyed as quickly as possible to large hospital of 1000 beds, not more than 4 to 5 miles away. First-aid is limited to arrest of Hæmorrhage, steadying the limb by sand bags or fixation to the opposite side and bandage—Bandage a pad of sterile dressing over head wounds. Do not undress the patient. Casualties are received at the hospital by a classification team and are distributed.

The Hospital do not receive any gas contaminated cases. *The decontamination process must be done at the first-aid ambulance room.*

The difficulties with which ambulance men—with their gas masks, protective clothing, and clumsy gloves have to do their job of collecting the wounded have to be borne in mind;

they are not able to render enough first-aid till the injured are collected.

Gonorrhœa in the B. E. Force in France.

Gonorrhœa cases are treated at one of the Divisional Field ambulances and the average duration of treatment is 28 days.

With the new treatment with sulphopyridine 90 per cent of cases can be cured within a week, whereas the time previously needed was often 5 months or more.

Anæsthetics in War Surgery.

(1) Gas and oxygen for severe cases is required.

(2) Ether is the standard for majority of cases.

(3) Employment of Barbiturates (Sulphonal, Veronal, Trional, Luminal and Luminal sodium) for patients in a condition of shock is definitely dangerous.

(4) Also spinal anæsthetic and Chel₃ are contra-indicated in shocked patients — (regarding spinal anæsthetic there is difference of opinion based on experimental evidence).

Intravenous anæsthetic in the clearing and evacuation Zones to prevent bleeding in safe—**Pentothal 3** to 4 c.c.

Boyle's apparatus was standardised in last war.

Anæsthetics for Gas Casualties:—

There is no contra-indication for the use of intravenous anæsthetics. Some form of gas poison cases need all the air they can get; oxygen, chambers

are good, Mortality under ChCl_3 or ChCl_3 and ether from amputations through the upper half of the thigh was over 90 % in the clearing stations. Mortality under gas and oxygen was reduced to less than half the figure.

Cyclopropane.—A cylinder holding 75 gallons will last for 50 hours. Double yoke for Cyclopropane and oxygen plus two flow meters—Ideal for more or less moribund patients.

Vinesthene.—Anæsthetic mixture of $2\frac{1}{2}$ c.c. vinesthene with $2\frac{1}{2}$ c.c. of Ethyl ether is good for induction.

First-aid in cases of injury to the lower limb.—All working at first-aid posts in Air Raid areas should realise that prevention of shock and immobilisation of the lower limb followed by quick evacuation to an operating centre will save both lives and limb.

The apparatus is limited to the **Thomas Splint** and 3 bandages.

The equipment consists of Thomas' arm and knee splints, plaster bandages and Crammer's splints.

Method of traction in cases of injury to the lower limb:—

(a) **In first-aid unit** is a spring foot-clip which replaces the old skewer: This spring foot clip is standardised now.

(b) **In casualty clearing section.**—Sinclair glue or Elastoplast is used.

(c) **At the base.**—Bohler's stirrup and pins, Kirschner stirrup and wire with Braun, Bohler and Thomas splints are the standard methods.

Shock.

The word "wound shock" was used in 1917.

Cannon (of Harvard) Baylis and Dale of the 'Shock Committees' classified shock into primary and secondary. The secondary shock was common and was of slow onset and occurred in the presence of cold, pain, Hæmorrhage and toxæmia. From experimental evidence they decided the toxæmia shock was due to Histamine.

Experimental work was continued in the laboratory of the Royal College of Surgeons, England and in Edinburgh. The present views are different.

Toxic Shock.—All the official reports of the last war and observations of Baylis, of Cannon and of Moon recently supported the Toxic theory of shock; the evidence collected in the last war appeared to show very conclusively that this was a common variety of shock.

Previous to 1925, it was a general impression that the toxic substance was histamine because Dale and Laidlaw produced shock on anæsthetised cats and dogs by injection of minute quantities of histamine.

Dale now agrees that histamine is not the substance: Histamine can be estimated in the blood and it cannot be found that it is increased; while it has been shown that anæsthetised man and unanæsthetised cats can cope with quite large quantities without shock being produced. Except in the skin, histamine is present in very minute amounts in the tissues of the body. Cross circulation experiments do not show that the blood of an animal suffering from traumatic shock is toxic. If it is not histamine it may be some other toxic substance; the exact nature of toxic substance has to be found out.

Moon, Dale and Laidlaw found in experimental shock produced by histamine a similar concentration of the blood. This concentration of blood is the most important finding in cases of shock before the blood pressure has actually fallen, i.e., in the stage of early rise of Blood pressure. This concentration of blood has been noted since 1893. **Concentration of blood does not necessarily indicate toxic shock**; because concentration occurs in shock produced in other ways as:

(a) minced muscle put into peritoneum.

(b) in strangulated Richter's Hernia.

(c) in septic conditions generally.

Why shock does not occur in infraction and absorption of blood clot is not known.

Adrenalin and Pituitrin are found to have harmful effects in that they produce dilatation of the vessels of the muscle. Transfusion of 6 per cent gum acacia solution is given up now.

Post-mortem appearances.—In traumatic shock the organs are pale.

The problem of lost blood is only half: peripheral resistance of circulation is reduced. While transfusion is of great value in hæmorrhage it was of little value in established shock. There is no drug which will raise the peripheral resistance without constricting the vessels of the muscles of the heart.

Findings in wound shock.—(Keith 1919).

Blood volume 52—85 per cent.

Plasma reduction 62—90 per cent.

Practically speaking there is a time factor in the development of shock; the gradually damaging effect of persistent low pressure is of the greatest consequence in both understanding and treating shock. When the Vaso-motor centre has lost its capacity to maintain vascular tone, there is no remedial agent that will bring back the blood flow to its normal condition. Even blood transfusion leads to no permanent gain. A pressure of 80 m.m. or lower, if not raised within 4 hours will have a fatal result.

A falling hæmoglobin indicates the need for blood transfusion whereas a rapidly rising value shows the need for anti-shock measures such as "forced fluids" by mouth or rectum.

The earliest sign of impending shock is a rising concentration of the blood as revealed by Hæmoglobin estimation, by red cell counts and by determination of the specific gravity of the blood. Hæmoconcentration takes place even when the blood pressure is rising. Warmth, warm fluids, relief of pain by morphia, transfusion of blood, plasma or serum, adrenal cortical extract are required.

The use of adrenal cortical hormone has some effect over capillary permeability and salt balance of the body. Because of this its use has been strongly advocated in shock with a view to increasing the capillary permeability. It cannot be expected to be efficacious in every type of shock.

Rationale.—The removal of adrenal cortex results in a condition very much like that of shock and such a procedure greatly enhances the sensibility of animals to histamine.

The restoration of blood volume by an agency of osmotically adequate

solution of biologically acceptable constituents which would reduce tissue fluids is indicated. Concentrated blood serum fulfils all these requirements and has the additional advantage, that, unlike whole blood, it may be kept indefinitely without deterioration:

The effect of 20 % dextrose in 3 % NaCl Solution is inferior to that of Serum. All hypertonic solutions have better effect than isotonic solution.

In shock.—Blood potassium is a guide to prognosis and treatment. When blood potassium is increased to 100% all patients died, whereas there were no deaths when the increase was under 25%.

There is essentially an excessive and harmful increase of sympathetic activity in shock. Rapid administration of preserved blood stored too long is contraindicated in shock because of its high potassium content.

Bad effects of 6 per cent gum acacia solution.

- (1) Improperly prepared solution gives severe and fatal reactions.
- (2) With carefully prepared solutions, deleterious changes in the quality and behaviour of the blood are met with.
- (3) Acacia solution may interfere with the gaseous interchanges in the red blood corpuscles, leading to severe or fatal anoxæmia.

Effect of transfusion of blood in traumatic shock.

- (1) Blood transfusions will increase the already present hæmo-concentration.

- (2) Lyophile serum is better as by this means the blood protein and blood volume are restored without an increase occurring in the viscosity of the blood.

Concentrated serum was prepared by evaporating dogblood serum to 1/3 its normal volume by placing the serum in closed cellophane sacs and these are exposed to dried air, which removes water from the surface of the sac.

Typed human serum prepared by this method has produced no harmful reaction in patients in the limited experience of Thalhimier.

Concentrated blood serum may be kept indefinitely without deterioration.

Grouping is unnecessary in the case of plasma and serum.

Plasma could be given intramuscularly as well as intravenously.

Indications for blood transfusion.

- (a) to replace blood loss.
- (b) to combat surgical shock.
- (c) to help the bactericidal properties of the blood.

Replacement by total blood is required for straight erythrocyte deficiency while in shock the aim is to increase the blood volume to normal and not to increase the number of red cells.

Blood Transfusion.

Since the last war, there is an international nomenclature of blood grouping; Preserved blood has been used in Russia and Spain with success. Lot of work has been done on the

methods of preservation on the periods of storage, potassium loss, etc., of preserved blood; plasma and serum have been used: continuous intravenous drip method has been introduced.

Plasma and serum can be kept for a year, no blood testing is necessary and are of great value also.

Blood Groups.

1928—A new alphabetical nomenclature was introduced as follows:

Jansky 1907.	Moss 1910.
O I	O IV
A II	A II
B III	B III
AB IV	AB I

The following are the methods of designate test sera.

Testserum A (Anti—B) Kept in white glass.

Testserum B (Anti—A) Kept in Brown glass.

New nomenclature is accepted by the British Red Cross Society since January—1939.

Methods of Blood Transfusion.

- (1) 2 or 3 way syringe.
- (2) Robertson, air bottle (introduced at the end of last war).
 - (a) by positive air pressure (Positive pressure in some form is required to overcome venospasm in a shocked patient.
 - (b) improved by Keynes (1920).
 - (c) Modified by Macartney 1933 Syphonage.
 - (d) by Rotary pump.

3

- (e) Gravity method is the simplest and safest method of transfusion for general use.

For transfusion at a drip rate, i.e., in the majority of transfusions, there is no need to heat the blood in the container above room temperature level; In the cases of rapid transfusion the blood bottle should be kept in a bowl of water at 104°F. every half hour for a moment or two.

Blood Transfusion.

Marriott and Kekwick practised drip transfusion in 1935; the old method was to give one or two pints of blood in 30 to 60 minutes irrespective of the condition of the patient or his hæmoglobin level. A pint of blood will give a rise of 10 % in H.B. Level. If an increase of more than 33 per cent H.B. is desired they consider the transfusion is best divided into two parts separated by at least 2 days. *Rate of transfusion is one of the chief advances made in transfusion methods in recent years (in the treatment of anæmia in civil practice).*

The rate per hour is 1 c.c. per pound of body weight but with a H.B. of 25 % only ½ c.c. per pound of body weight per hour.

Slow transfusion minimises risks of cardiac failure and reactions. Are these principles to be acted on in the severe anæmia of acute hæmorrhage of the war casualties?

Storage of Blood for Emergency.

Maximum duration is 27 days at Temperature at 2° C.:

400 c.c. with appropriate anti-coagulant fluid is stocked with a adequate portion kept under 15 lb. pressure of nitrogen and periodic sampling is done.

The remainder of the blood was fully oxygenated and stored similarly under 15 lb. pressure of oxygen.

Sources of Blood for Storage.—(a) from placenta—small only 80 c.c. is available.

(b) from cadavers—Spanish workers found this source satisfactory. (In persons dying a sudden death spontaneous fibrinolysis occurs and it is not therefore necessary to use any anti-coagulant.)

(c) Stored blood from adult donors has been an almost universal success. This is used in Russia, Spanish war and in England now. Rate of reaction is not more than with fresh blood. Rise in R. B. C., H. B., and improvement in the clinical condition are satisfactory.

Blood is withdrawn, stored and distributed from special centres equipped for the purpose with trained personnel.

(In Spain donors gave blood every 3 weeks 500 to 600 c.c. there is no harm if the donors had been recently fed).

In Spain they stored only blood from Group IV (Moss-o-international).

The withdrawal, storage and administration of blood require apparatus; there are many methods. They should fulfill the following conditions.

(1) The whole apparatus must be autoclaved in one piece ready for use without further manipulation if sterility is to be secured.

(2) Blood must be collected without exposure to the air for the same reason.

(3) All glassware must be strong.

(4) The container should be completely filled to reduce movement of blood to a minimum. Even slight shaking of blood after storage for longer than 24 hours is found to increase hæmolysis so that any technique that reduces agitation to a minimum is to be diminished.

(5) No glass tubing should be left in contact with the blood after connection, as it is found to favour clot formation.

(6) The technique of collection and administration should be as simple as possible.

N. B.—Red cell fragility is not greatly increased in the first 24 hours storage.

500 c. cm. blood is collected in 4 to 7 minutes; various autocoagulants as Sodium citrate 3.8 % physiological citrate 1.25% with NaCl 0.85%, Glucose citrate 4 % and 1 % were tried. The institute of Hæmatology and blood transfusions at Moscow used I. H. T.

i. e. Sodium chloride 7 grammes.
Sodium citrate 5 "
Pot. chloride 0.2 "
Mag. sulphate 0.04 "
Distilled water 1000 c.cm.

It is mixed volume for volume with blood. All are agreed that considerable dilution of blood for storage is an advantage. Hæmolysis occurs less readily; dilution facilitates administration. As much as 2600 ccm, mixed blood and I. T. H. have been given to a patient with no ill-effects.

Hæmolysis occurs if blood is frozen.

Blood begins to deteriorate after the 15th day of storage—but may be stored for 32 days. Red cells remain unaltered for 15 days.

Re-sterility of blood withdrawn for storage was required in Spain as there

was a high rate of contamination in Spain; with a very careful aseptic technique, contamination is slight.

Method of Administration.

(a) Ordinary gravity.

(b) Some form of pressure apparatus.

(c) Continuous drip.

N. B.—It must always be filtered either through sterile muslin when it was given by the continuous drip method, or passed through a round glass bulb, containing glass wool before it reached the patient's circulation when gravity or pressure apparatus was used.

It is essential to mix and warm the blood before administration.

40 c.c. of glass shot (diameter 2—3 mm.) is added to each bottle before auto-claving. It is essential to mix and warm the blood before administration. This can be done by standing the container in water at 40°C. for about 15 to 20 minutes and rotating it gently at intervals. Have a closed container for keeping the blood warm during administration.

Special care is needed in cross matching since there is some evidence of a definite decrease in the agglutinin content of preserved red cells.

N. B.—The stored blood should be kept at a low temperature until immediately before use. Blood that has once been warmed even for a short time tends to deteriorate more rapidly than blood kept at a steady low temperature. Special refrigerator vans were used successfully in Spain for the transport of stored blood upto front line hospitals.

Indications for Transfusion of Blood.

(1) In war, primary indication is 'recent severe blood loss.'

The indications are mainly clinical; restlessness, pallor, dyspnoea, a systolic B. P. of 70 m.m. Hg. or less, and a rising pulse rate are indications that blood transfusions are needed.

(2) Fresh blood is used in prolonged sepsis and anæmia. Experience in Spain suggests that possibly stored blood is not so effective in such cases.

Immediate effects.

(1) Increase in blood volume, plasma proteins, hæmoglobin, concentrations, blood platelets and other factors concerned in blood coagulation. In some instances it may act as a stimulus to blood regeneration.

Blood Plasma and Transfusion.

In blood transfusion, it is the plasma element that produces the desired effect; the red cells play a secondary part; the main constituent of the plasma is the plasma proteins, and it is the administration of these, combined with fluid, which appears to be responsible for the resuscitative action in wound shock, post-operative shock and burns. Further advantages of plasma are that it will keep indefinitely as compared with stored blood—which has a useful life of 14 to 28 days and that for the administration of plasma no grouping of the recipient is necessary.

Normal plasma contains 6.5 to 8.5 grammes of protein per 100 ccm. The function of the proteins is to maintain the osmotic pressure of the blood. If the amount of protein in the plasma is experimentally lowered by replacing the plasma with Ringer's solution a

condition is produced resembling very closely that of surgical shock.

The reformation of albumin and globulin after any loss from the circulation is slow and some days may pass before the normal level is regained.

Plasma.—Withdrawal:—

(a) From donors—keep undisturbed for a period of 3 to 4 days to allow the maximum separation of plasma and red cells to occur.

(b) from bottles of citrated stored blood of 14 days:—clear plasma can be withdrawn.

From a pint of citrated blood, 250 to 300 ccm. of plasma is obtained.

Storage.—Keep in a refrigerator at 4°C.

The plasma will keep indefinitely 2 to 3 months. This must be filtered off before administration.

The plasma is warmed to 37°C. and given by the standard gravity method.

Use of dried plasma.

- Advantages.**—(1) Storage at room temperature.
- (2) Transportability to the field.
- (3) Possibility of bacterial growth absent.

Plasma is heated and dried—it is renewed later under aseptic conditions and can be stored in ampoules.

100 cc. of citrated plasma gives about 8 grammes of the dried product, which is a pale yellow crystalline powder that dissolves readily in warm water.

20 grammes in 500 c.c. of 5 % glucose solution is useful in cases of shock.

The protein value of dried plasma is unchanged after a period of two months.

Group A B (1) and O. (IV) are good for administration.

Indications.—Wound shock, post-operative shock, and burns.

For plasma transfusion preliminary typing is superfluous. Plasma may be stored for a year or longer.

Blood becomes unstable in 4 to 6 weeks owing to hæmolysis of red cells.

Value of plasma.—It would keep for years when dried and sealed in vacuo: it could be collected in large amounts and reconstituted as needed with distilled water; it could also be filtered bacteriologically and its sterility guaranteed before drying.

Death from blood transfusion.—It might occur within a few minutes or hours or after some days. Incompatibility produces immediate ill effects, the patient becoming distressed with a rise of temperature and lumbar pain. Exactly how these effects were produced were uncertain. He might survive this stage but die later from renal failure. In this there is suppression of urine with progressive nitrogen retention. The delayed deaths were due to blockage of renal tubules by blood pigment precipitated during the excretion of hæmoglobin. The lesion of the kidney (Hæmoglobin infarction) is known for a long time particularly blackwater fever, where a uræmic death might be caused by it. The mechanism here (Dodd and Baker 1925) is "HB, being of lower molecular weight than the serum proteins, was excreted by the glomeruli when

its concentration in the plasma reached at 0.3 grammes per 100 c.c. Rapid hæmolysis of about 1/40 R. B. C. of HB. from 50 to 100 c.c. blood would give the threshold value: The HB was excreted in solution in the glomerular filtrate, but this became concentrated in its passage through the renal tubules. If the salt concentration exceeded about 1 % of NaCl with a pH of 6 or less, hæmoglobin was precipitated as a granular deposit of hæmatin which might block the tubules. If the urine is acid it becomes blackwater, while in neutral or alkaline urine it is red.

N. B.—Keep the urine alkaline during and for 24 hours after transfusion.

HEPARIN.

Heparin had the advantage of being a very active natural anticoagulant but was expensive. Transfusion with heparin could be performed (1) in "vivo" giving 1 mg. per kilo to the donor and bleeding 8 minutes later—the coagulation time was increased 8 to 10 times and the blood remained fluid for 60 to 90 minutes. (2) in "Vitro" heparin replacing citrate. 1000 units of heparin kept 100 c.cm. of blood fluid for one or two hours. It had few advantages over citrate; within an hour leucocyte and platelet agglutination was occurring.

ACUTE SPRAINS.

Treatment of Acute Sprains by Procaine (Novocaine) Infiltration.—The conception ordinarily held that a sprain is a tear in the ligament is probably wrong; it is a nervous reflex following trauma, giving rise to vasomotor disturbances in the injured region. Treatment consists in infiltrating the peri-articular tissues of the injured

joint with a solution of procaine $\frac{1}{2}$ to 2 per cent without adrenalin; 10 to 15 cc. is enough: Immediate relief from pain, cessation of swelling, and restoration of almost complete mobility of the joint follow the injection: Some hours later the pain returns: this after-pain is often great and is the only drawback to treatment: the average period of incapacity is 2 to 3 days.

"Treatment of War Fractures by the Closed Method."—The dose of sulphanilamide should never exceed 6 or 7 grams a day and should be reduced as soon as it begins to produce beneficial effects. No measures against infection, such as antisepsis of the wound or the use of sera, is employed to-day without first excising all damaged tissues, especially those deprived of circulation. Contrary to opinions held during the last war, the greatest danger of infection lies not in the bone but in the muscle. The bone plays an almost passive role in infections, while dead muscle tissue is favourable soil for anærobic infections and for that reason must be excised meticulously. Simple hæmatomata in the inter-muscular spaces are good culture media which should be followed up systematically. Skin, if it has a good blood supply should be preserved. A factor now seen to be of importance is the time elapsing between the production of the wound and the removal of devitalised tissues. In the last war eight hours was considered to be the limit before infection of the wound occurred but the limit is not exact. Several patients have been operated in the Spanish war provided they were but little contused. On the other hand in wounds from shrapnel, and especially those produced by aerial bombs, infection takes place much earlier, even in less than 4 hours.

When operation is undertaken immediately, secondary shock commonly does not occur, nor do generalised infections develop. If true shock is to be avoided, compound fractures with extensive wounds should be operated on within two hours.

In cases of severe trauma of the lower limb when there is doubt about the possibility of saving the limb, employ open treatment after immobilising the limb correctly by continuous traction in a splint such as Thomas's or Braun's.

Rigorous immobilisation is certainly one of the most effective means of preventing and combating infection.

Skin tight plaster was used; making a window in a plaster cast neutralises, all the value of plaster treatment. Vaseline was not used in the Spanish war as it diminishes absorption.

The smell is disagreeable; in some cases yeast from the brewery was applied on the wound and this made the smell less pronounced.

In 1914—1918 war Haemolytic streptococcus was a much more important enemy than gas gangrene organism.

Perforating type of wounds have been very much more in evidence during the last few weeks in France than in the earlier fighting in the Maginot Line.

The system adopted is as follows :—

(1) A thorough excision of all contaminated and damaged tissue, especially muscle together with the removal of all foreign bodies unless inaccessible and the opening up of adjacent cellular spaces.

(2) Reduction of associated fractures.

(3) Packing the wound firm with dry sterile gauze.

(4) Limb is encased in plaster of paris, which in the absence of complications is left in place for 2 or 3 weeks.

(5) No suturing of the wound.

90% good results and 0.5% deaths in over a thousand cases of open fracture were the results obtained in the Spanish war.

Alleged disadvantages of the closed method of treatment are :—

(1) Progress of the wound cannot be watched.

(2) Gas gangrene may be diagnosed late.

Such complications seldom arise if the debridement is perfect and thorough.

If any of the **Danger Signals** as rapid pulse, local pain and oedema of the extremity beyond the plaster, deterioration of the patient's condition, is noticed the plaster is removed and the wound is inspected.

Methods of Traction.

(1) Kirschner's wire is good.

(2) Traction through the tuberosity of tibia is good; it does not strain the knee.

(3) Transfixation through the condyles of the femur leaves a stiff knee.

(4) weight of 10 K. G. is not always required especially if there is acute or progressive infection.

(5) Skeletal traction and overpulling may lead to delayed union.

In the course of the Spanish war the Braun-Bohler splint for the lower limb entirely replaced all the others.

Hodgen splint is not used now.

Tank corps suffered considerably from comminuted fractures of the femur.

On the Home front all *fractured femurs* should be evacuated at once on a Thomas splint to a specialised Base Hospital, which they should reach within 12 hours without a change of stretcher.

Immediate skeletal traction is applied at the specialised Base Hospital through the tubercle of the tibia with a Kirschner wire and Stirrup in compound fractures for 2 to 3 months—the foot of the bed is kept elevated by 50 c.m.

For closed Fractures of the Shaft of the Femur : which normally does not require more than 4 weeks of skeletal traction, traction through the crest of the tibia with a pin is good.

In Compound Fractures of the Thigh :

(1) After excision of the wound removal of small fragments of bone particularly when in muscles is required.

(2) If articular cartilage is broken as a large piece, the piece should be removed, as otherwise the joint will be infected. Large fragments with peri-osteal attachments may be left alone.

(3) Even if only $\frac{1}{3}$ of the circumference of the bone is left, new bone may form from the fragment.

Streptococcal Infections of Gunshot Wounds of the thigh and calf often

give the muscles the appearance of a solid yellowish mass—At this stage surgical intervention should be minimised unless the indication is to amputate.

The difficult cases are those when the upper third of the thigh is affected and the upper part of the leg has a wound extending into the knee joint—In the latter amputation is a life saving measure.

The extensive opening up of fractures of the femur during the inflammatory period has been followed by disastrous results.

Gunshot wounds of the thigh with fractures were a menace during the last Great War.

Open methods as :—

Transfixation nails and metallic loops were used by Italian and French during the last war and are bad. Sinclair glue was popular and useful for extension.

For fractures of leg.—Double pinning for 3 to 6 weeks and plaster immobilisation is successful. For open fractures of the leg Braun's frame is the ideal. Skeletal traction through the Os calcis has been used for the last 20 years. Non-union of the Tibia seen after the last war necessitated many bone grafts. Overtraction must be avoided.

Limb injuries of all kinds have become far more frequent and sooner ambulant now than during the War of 1914—18. Atrophy and oedema of the leg injuries have disappeared. Metatarsal fractures are treated by ambulant plasters.

Upper Limb Injuries.—Generally there is no necessity for amputation;

if the neuro-muscular bundle is intact a very good result can be expected.

The surgeon must be conversant with the non-padded plaster technique.

The obvious solution lies in the systematic peace-time training of future war Surgeons in modern methods of TRAUMATOLOGY.

There are two methods of splinting the upper-extremity:—

(1) Thoraco—Brachial plaster with homolateral shoulder strapped and arm abducted to 45°.

(2) Bohler's abduction splint—with homo-lateral shoulder raised. *Operation for severed Tendons*:—Do not suture tendons; if a primary union of the skin, is achieved the tendon ends can be subsequently fixed and sutured.

Gunshot Wounds of Joints.—In the forward area:—Simple dressing, immobilisation to the trunk, or to the opposite limb or splinting is done. In the casualty clearing section:—Radiogram is taken and the operation of cleaning skin, excision down to and including synovial membrane, removal of foreign bodies with irrigation of 1 in 2000 flavine solution, and suture of synovial membrane and Skin in one layer is performed.

Immobilisation with extension is important and must never be omitted.

These cases are kept in C.C.S. for 5 to 7 days.

If pain and fever persist—amputation is required.

A special indication for amputation is spread of sepsis outside the joint cavity into the surrounding muscles.

Carrel.—Dakin treatment is of no use. The introduction of drainage tubes into the joint is to be avoided as they do more harm than good.

Arthrotomy—followed by active movement, originated in Belgium in the last war. In British hands it was not a success. Primary excision of the knee joint is not practised by British Surgeons for suppurative conditions.

Injuries of the Foot.—Amputation through the lower third of the leg is performed for severe injuries:

Injuries of the Knee Joint.—(1) Small or moderate sized wounds with fractures of the knee involving the joint with the missile in situ careful immediate debridement is required; unless there is intervention death ensues in 2/3 of the cases due to Gas Gangrene or articular septicæmia. (2) In fractures of the bones forming the knee joint due to penetration of a condyle there is always the danger of septic arthritis and amputation soon becomes necessary. This is exemplified by numerous specimens of WAR COLLECTIONS. (3) In cases of complete crushing of the knee joint—there is considerable shock and the patient is in danger as gangrene occurs quickly.

Wounds.

In the last war 60% of the wound arriving at the casualty clearing stations were put out of action by missiles other than bullets. Small missiles entered the chest and ripped up one of the great blood vessels or the heart. Hence an armour or some protection is required. Bakelite and compressed fibre would protect against shrapnel.

“War Surgery”

At the first receiving station of a semi-permanent hospital as C.C.S., the first officer who sees and classifies the casualties and orders the order of priority of treatment should be an experienced clinician. This classification is essential. This was practically done in the Spanish war and is being done successfully now. **Classification of cases was the first essential and all cases should be put into 5 Groups.**

(1) Those patients who required immediate operation and would not be fit for evacuation afterwards.

(2) Those who required immediate operation and could be evacuated soon afterwards.

(3) Those who required admission but no operation and could be evacuated later.

(4) Those who needed only first-aid treatment, after which they could be sent to the base.

(5) Those who could go home after first-aid treatment.

(1) Those always requiring immediate operation:—

(a) Hæmorrhage.

(b) Open chest wounds.

(c) Great bruising and destruction of limbs.

(d) Small penetrating abdominal wounds.

(2) Those requiring immediate operation:—

(a) Major wounds of the head.

(b) Compound fractures caused by small bomb splinters.

(c) Penetrating wounds of joints.

(3) Those who could be evacuated to the base without operation:—

(a) Penetrating wounds of skull caused by small splinters.

(b) many compound fractures caused by small splinters (when there is no hæmorrhage, with efficient immobilisation, no shock and the base is less than two hours journey away).

(c) many injured by fallen masonry when there is no great shock.

(d) wounds of the face.

(4) Those who should remain at the clearing station without operation:

(a) Severe shock.

(b) Closed penetrating wounds of the chest.

(5) Those who may be operated on if things are quiet and if other more deserving cases are not kept waiting, for example abdominal wounds caused by heavy bombs.

Only those cases should be operated upon in which there was a reasonable chance of recovery.

In the recent Spanish War.

32% were major injuries to limbs, and Injuries to head and abdomen were only 8 to 9%.

Open chest wounds were always serious and difficult to manage; these patients were very shocked and also often needed partial pneumonectomy: Spinal injuries were frequently associated; chronic infective sequelæ such as bronchial fistula were common.

Characteristic Features of Injuries produced by Light Bombs.—The external wounds they often inflicted were often small and out of

all proportion to the serious internal damage inflicted, especially on muscles and nerves. In fractures there was often gross displacement and very little pain but an anæsthetic is always required. **Open wounds of joints** are more serious than compound fractures and almost always some degree of ankylosis resulted.

In **abdominal injuries** the discrepancy between the size of the external wound and the extent of the damage of the viscera was very great many coils of intestine might be torn or the liver disrupted by one small fragment of a bomb. In abdominal injury the time factor was of the greatest importance.

Injuries to the chest with a small external wound were often best treated expectantly by morphia and immobilisation. If operation became necessary the patient should be left with a pneumothorax as a help in controlling hæmorrhage.

Head injuries.—Transport straight away to the neurosurgical centre.

Treatment of wounds.—Up to the year 1914, there was little exact knowledge of the changes involved in the healing of wounds, or how wounds might be disinfected. Four years of war surgery brought an enormous means of experimental data. In spite of the successes of many chemical substances—as bipp, or eusol, of the hypochlorites, of the aniline dyes and of essential oils—and in spite of the magnificent results of the Carrel treatment, the large scale experiment of 1914–1918 established the relative failure of antiseptics. It showed that the fate of a wound was the vital quality of the tissues exposed to infection, and not the use of this or that chemical product. Any wound, that was clean cut and free

from contusion, if left freely exposed to the air, healed of itself, without any antiseptic aid. On the other hand, an irregular rugged wound with separated edges and necrotic walls, suppurated for a long time, even when treated by appropriate antiseptics; while if the recent wounds were carefully excised it remained sterile and could be sutured. The essential point was that the excision should be carried through healthy tissues. Direct surgical action, then superseded chemotherapy. With it, success was generally assured. This was realised in 1917. Antiseptics are of some value in clinically infected wounds, if they are laid completely open.

What are the essential conditions of disinfection of infected wounds?

The injured area must be freely exposed and Carrel's method achieved success only when the initial and complete surgical operation was performed. The most valuable of all antiseptic agents is the surgeon's knife.

The second condition of disinfection is the complete and prolonged immobilisation of the wound and part. Movement in the case of infected wounds, gives rise to a transient septicæmia.

Experience of the Lyons School for 3/4 of a century, and the work of Winnett Orr, have demonstrated that immobilisation is the most valuable of all our therapeutic means of combating wound infection.

The action of antiseptic is only superficial; infection in the deeper tissues is unaffected by them.

In the **South African War**, the majority of wounds were inflicted by the high velocity small bore bullet of

the mauser type and relatively few by shell fire; with the application of the first field dressing and the sterilisation of surrounding skin, the majority of wounds in the South African War healed by first intention. In 1914–1918 War, wounds from high-explosive shells and shrapnel increased to an enormous extent, and wounds from missiles of relatively low velocity, such as the trench mortars, bombs and hand grenades, were attended, with exceedingly severe results. The modern pointed bullet is more unstable than the blunt nosed mauser type and inflicts more severe damage on internal organs in the way of laceration and disruption. The small bore bullet have great power of penetration; they do not tend to carry clothing into the wound. Explosive exit wounds are invariable at short ranges; Multiple wounds are uncommon, except when inflicted by machine gun bullets. The explosive does not affect the wound.

Shell fragments, and shrapnel often cause multiple injuries; they have a lower power of penetration and often lodge in the body; they frequently carry clothing and gross dirt into the tissues. Explosive exit wounds are rare; the effect of the explosive is as destructive as the fragmentation (that is blast). The high velocity rifle and machine gun bullets cannot carry clothing into the wound; shrapnel, shell fragments and fragments of missiles of relatively low velocity bombs, hand grenades, etc., very often carry clothing and gross dirt into the wounds and all such wounds must be regarded as heavily infected.

In wound treatment.—Elevation of the limb is useful and prevents œdema. Irrigation is of no use.

Enquire if the patient is in pain if he is, treatment has been inadequate and must be improved.

Sulphanilamide was effective; the dosage must be large; In Barcelona sulphanilamide was tried out on a large scale but the results are not known on account of the disorganisation of the Republican medical service.

No internal suturing under any circumstances either of nerves or of tendons or of fascial layers should be done.

Bipp treatment of wounds (Morrison) is not tried in this war.

In this war the method of closed plaster treatment has been decried by some because a number of wounded men treated by closed plaster method in France and Belgium have reached hospitals in England with wounds doing badly or miserable from extensive pressure sores. Probably the surgeons were imperfectly familiar with the method; Certainly their plaster work failed to stand the severe test of early evacuation and a long journey.

"Plaster of paris has been accepted with less thought and applied with less intelligence than any other device of war surgery". The chief purpose of a plaster case is to confer absolute rest on an injured part, it should be adequate in size, correctly designed and well applied; It is one of a series of processes all of which must be properly performed if the whole scheme of treatment to which they contribute is to be successful.

Infected wounds should not be sutured but should be left open. "Men have been lately received in the French Hospitals and English hospitals whose wounds have been

sutured 2, 3 or even 4 days after infliction."

Guillotine Amputation.—(Division of skin, muscle and Bone in one plane.) "This atrocity was banished from all armies in the last war but is rearing its ugly head again in this war also."

Trveta's impressions on patients who returned from B. E. F. from France.—With the wounded from France and Belgium have been most satisfactory; they were in good general condition, the local condition was satisfactory.

Skin tight plaster should be done except some padding over bony points. Iodoform guaze should not be used. There were some faults as too short a plaster; some in bad position, from the orthopaedic point of view the technique could sometimes have been improved.

Under conditions less difficult than those which prevailed in Flanders the results which will be obtained will be as good as that obtained in Spanish war.

There is collaboration between R. A. M. C. and the Medical Research Council at present.

One of the most satisfactory experience of the recent fighting has been the splendid condition of the wounded after long and trying journeys immobilised in a plaster case correctly applied.

Bacteriological Lessons of the Last War.—70 % of all the deaths due to infections of wounds was due to hæmolytic streptococci; (Fleming and Porteous 1919; Stokes and Tytler 1918-1919) medical history of the war 1923; (Hæmolytic streptococcus was responsible to most of the complications as erysipelas, cellulitis, and septicæ-

mia in 44 out of 49 septic compound fractures of the femur, the blood culture, showed pure culture of hæmolytic streptococci).

(We did not learn when and why these infections occurred, i.e., whether the organisms were carried into the tissues at the time of wounding or whether they were transmitted from case to case in the hospitals or whether they were due in large measure to dissemination of the microbe by dust or respiratory tract carriers.) In a series (Stokes and Tyler) 16 % of a series of 265 wounds were already infected by hæmolytic streptococci on admission to C.C.S., i.e., about 12 hours; while 90 % were found infected when examined after a few days at the base hospital.

Regarding the origin of infection not entirely from wounds but from hospitals "since the last war it had been clearly demonstrated (by Cruickshank 1935—White 1936) that wounds discharging hæmolytic streptococci disseminated that microbe through the air around the patient. Presumably the pus after drying on the skin, readily flaked off in minute particles of dust". Such particles remained viable and fully pathogenic streptococci for at least 10 weeks. The wounds become infected by dust particles in crowded wards at the time of heavy fighting or infection was transmitted from case to case in the process of daily dressing. The wearing of mouth masks and gloves in the wards for dressings are clearly indicated. Hæmolytic streptococcus was better adapted for establishing itself in wounds than any of the other common bacteria because the serous fluids of the wound provide an ideal culture medium for it.

Preventive chemotherapy and successful primary suture, are both required with immobilisation.

(The control and prevention of these infections).

Experimentally in mice, it seemed quite clear that if a certain small amount of sulphanilamide was present in the circulating blood at the time streptococci reached the tissues they were prevented from causing an acute infection. A single prophylactic dose given by mouth shortly after the injury would be almost all excreted within 10 to 20 hours, and it is essential that the administration should be continued for 4 days. By the end of that time, the injured tissues would presumably be walled off by the processes of repair and infection if did occur would be a much less serious matter. We did not know how the drug would be tolerated by men suffering from shock and loss of blood.

Fuller and James (1940) has advocated the following scheme.

1st dose.—1.5 grammes (3 tablets of sulphanilamide in 100 c.c. of hot citric acid solution 1 % or hot lemon. *2nd dose.*—2 hours later 0.5 grammes, i.e., one tablet wholly or only partially crushed in order to delay absorption. Subsequent doses: 0.5 gramme wholly or partially crushed, at 4 hourly intervals for 4 days.

Total 13.5 grams in 4 days.

The records should be complete as to the time of starting treatment, the total dosage given each day, the occurrence of gas gangrene and the laboratory findings.

Treatment of Established Infection.

Sulphapyridine is likely to be more effective than sulphanilamide for gas

gangrene and in order to expedite its absorption for the first 3 doses 1 gramme each should be given well crushed and as far as possible dissolved in about 100 ccm. of hot citric acid or lemon at an interval of 1 to 3 hours. 6 to 8 grammes should be given in the first 24 hours and the amount slightly reduced on the next day if the clinical condition was much improved. For hæmolytic streptococcal infections one gramme doses of sulphanilamide should be given 4 hourly for the first day or two and the amount reduced *pari-passu* with the clinical improvement. For exceptionally severe infections as much as 8 grammes should be given on the first day. The drug should be continued for 4 or 5 days after the temperature had dropped to normal and the clinical condition had become satisfactory, but it should not be continued after that time just because there were hæmolytic streptococci in the discharges.

Chemotherapy should be restricted to wounds known to be infected by Hæmolytic streptococci or by gas gangrene bacilli. The drug is to be given after examination of the film; a swab is sent to the Bacteriologist who would give an early report; the drug is to be stopped if there are no hæmolytic streptococci.

Agranulocytosis has a mortality of 50%; it is closely related to the amount of drug given and the duration of treatment; 2nd and 3rd courses are particularly dangerous. It is the general experience that if an infection did not respond to these drugs within 4 days it seldom did so later. Blood examinations for polymorphs must be done as a routine on the 7th day. Local application of sulphanilamide in a wound is tried; no conclusions can be drawn at present.

CLOSED METHOD OF TREATMENT AT A LATER STAGE.

Indication (a) after debridement and saucerisation; (b) in the later stages of fracture of femur.

Advantages.—(1) no ordeal of dressings.

(2) avoidance of the risk of secondary infections.

(3) absence of absorption of proteins from tissues devitalized by antiseptics.

(4) absence of absorption of toxic products distributed by constant movement during treatment.

(5) non-destruction of bacteriophages.

(6) absence of injury to granulation tissue or of formation of unhealthy granulations.

Complications following fracture wounds.

(a) Mild septicaemia with diarrhoea and dehydration. This is not due to treatment with closed method. Septicaemia does not occur when the granulations are completely impervious.

(b) The characteristic and unmistakable smell of putrefaction indicates the presence of a focus of necrosis (this is different from the sour and butyric smell of the plaster); the plaster must be removed.

(c) Glandular involvement, deterioration in the patient's general condition, followed by pain and a sensation of tension in the region of the wound.

COLLATERAL STUDIES OF CLOSED METHOD OF TREATMENT.

(1) There is always a small rise of temperature (2) Blood sedimentation

rate is increased throughout the whole period even though the condition of the patient is excellent due to persistent lack of blood proteins during the whole period of the healing, which causes an abnormal local metabolism.

(2) The granulations show a decreased permeability as seen by the methylene blue or phenolsulphonethalein tests: this necessarily reduces the absorption of toxins at the surface of the wound.

This is a factor of prime importance in demonstrating the physio-pathological mechanism of the closed method.

(3) The discharge is acid and varying from PH 6 to 5.6; the discharge has a high buffering power, as it resists vigorously and persistently all attempts made in vitro to modify the acidity.

(4) Bacteriology of the discharge:—Staphylo, strepto, and often the *B. pyocyaneus*; in no case was there only one type of organism.

Dr. Trveta emphasises in his book on the importance of the closed treatment being "employed only by those qualified by training to plan and undertake the first stages of the technique".

In the experience of several French surgeons who have had the opportunity of seeing many of the Spanish wounded treated by the closed plaster method, some of the dangers detailed by them are (1) the danger of reactionary oedema. (2) the difficulty of observing the wound under the plaster—suppurative arthritis, sloughing of the skin at pressure points, abscess formation. Then complications frequently develop silently, without

pain, without swelling and with little disturbance of temperature.

Precautions to be taken for adoption of closed method at an early stage.

(1) See that there is no tension in any of the wound strata; contused tissues tolerate tension very badly, soon become gangrenous and afford an excellent focus for infection.

(2) See that hæmorrhage has been controlled before the limb is enclosed. Hæmatomata, whether visible or concealed in muscular tissue afford an excellent site for the formation of a serious anærobic infection.

Secondary hæmatomata are avoided by early immobilisation and prevents the muscles from being damaged by the action of fragments of bone on the soft tissues.

Contra-Indications for the closed method.

(1) When there is extensive necrosis due to the severity of the contusion and inadequate circulation.

(2) When the wound is suitable for saucerization;

(3) When a vascular lesion or the slightest suspicion of the existence of such a lesion is present.

(4) When there is severe crushing.

(5) Extreme caution is required when dealing with wounds of the knee and in the buttock.

Martin and Petrie's Observation re-infection of bones due to gunshot wounds are

(1) From the surface of a divided or fractured bone exposed to infection bacteria may penetrate to deeper parts.

(2) In an untreated fracture penetration is apparently unlimited.

(3) If the dead bone on the surface of the fracture is removed early penetration is much reduced, and may not occur to all.

(4) Penetration particularly of anærobes, is greatly increased by reduction of the circulation through the injured bone.

(5) Penetration is increased by obstruction to drainage either for the bone or of the soft parts.

(6) The order of frequency and power of penetration of the bacteria found is: (a) streptococcus (b) staphylococcus (c) anærobes (d) *B. Coli*.

(7) The rate of penetration is at its maximum during the first few days.

(8) Bruising—an invariable accompaniment of projectile fracture does not appear to facilitate penetration if the surface layer of debris is removed and drainage established.

(9) In a septic fracture growth of the bacteria is progressive and may lead to infection of a distant part—for example—a joint. Dissemination of infection throughout a bone takes place by penetration from the walls.

Efficient drainage was made difficult by the laceration of muscles in addition.

The possibility of acute dilatation of the stomach was kept in mind in cases in which the plaster cast surrounds the pelvis and lower limbs.

Wounds from bomb-fragments were always septic (it was so in the Spanish civil war) because it could explode itself into or hit the ground.

Ligation of Arteries.

Incidence of gangrene was 28% when the artery alone was ligated but 19.7% when the vein was also included in the ligature.

For secondary hæmorrhage, arterial ligation alone was followed by 96% gangrene but with arterio-venous ligation it fell to 56% (Makins 1917-1918). Division of the vessels after ligation was a routine during the last war.

"It is hardly ever permissible to tie a main artery in continuity on the proximal side of the bleeding point at a distance from the wound." This practice throughout the whole history of military surgery has been fraught with disaster.

For arterio-venous aneurisms—"The vessels should be ligatured locally above and below the communication. Proximal ligation of the artery alone has been followed by gangrene of the limb and is not to be performed." Secondary hæmorrhage is more often met with in civil practice.

Amputations.

"They were taught to curtail limbs at the levels and through any joint by flaps of remarkable ingenuity." But no assessment of the relative value of these classical procedures was ever attempted and the surgeons had no guidance between the merits of several amputations or anything regarding the type of limb that could be fitted afterwards or the service that it could give. In 1914 the surgical outlook on amputations was very much that of Crimean War. The manufacture of artificial limbs remained a craft rather than a science. The prostheses were heavy, expensive and not always efficient. 42,000 men had to be fitted with artificial limbs in England and 20 years of experimenting have now given us clear ideas regarding amputation.

There are 4 ideal amputations at present.

Leave the head and neck for amputations of shoulder and hip.

For symes—A reamputation may be required after 8 or 10 years.

Guillotine amputation is rightly condemned—A few inexperienced surgeons have been doing it during this war also.

Ollier, early in the 19th century first described Neuromata. Nerves should not be crushed or ligated; The perineural flap method, the swing door or the reversed Voperation, crush and tie procedure have all been shown by Huter and Lewis not to prevent neuroma formation. In addition, one should not tie a nerve filament along with an artery; it is a cause of painful convalescence.

The problem of phantom limbs and the development of painful nerve bulbs remain to be solved.

Primary amputations were carried out in the war when there was gross injury not only to the bone but to the soft parts as well.

But Winnett Orr treatment might abolish sepsis now. So even now primary amputation should not be done. In the arm nothing can replace satisfactorily the loss of the hand.

Latest students' books give correct amputations.

Gas Gangrene.

Formed only a small % in Spanish war.

The primary suture of amputations is especially liable to lead to gangrene and it should not be performed under field conditions.

The conclusion is in agreement with the tendency in the great war.

"War Surgery"

Even a moderate degree of ischæmia favours the anærobies.

There is an extraordinary variable toxicity of anærobic infection varying from a localized abscess, or massive gangrene, or very localized infection with metastasis.

N.B.—Therefore amputate immediately a lower limb that has lost its blood supply.

Severe anærobic infections almost invariably involve bones: In fact if a localized anærobic infection develops in a wound diagnosed as of soft parts only, an unsuspected bone injury will often be found. Such cases are apt to be dangerous.

Amputation is not indicated except in cases, of massive gangrene in which type amputation must be performed without even half an hour's delay, with every precaution against shock as the blood pressure will already be very low. The wound is left open. The mortality rate was 15%. Anti-gas-gangrene Serum is used intramuscularly and locally. Incidence of gas gangrene is heavier in the lower limb than in the upper limb and is also more dangerous.

Even in last war they abandoned Guillotine amputation as the shock was too severe.

For massive gas gangrene of muscle:—combination of 1600 units of anti-gas gangrene serum; sulphanilamide and deep x-ray therapy is useful.

Kelly has been treating gas gangrene since 1928 with deep xray and has reduced the mortality to 10% in 413 cases. (B.M.J., Vol. II, P. 107).

Gas abscess if associated with a wound of the rectum spreads widely in the buttock and will prove fatal.

Nitch in Choyce: system of surgery states that gas gangrene is practically unknown in desert and mountainous regions. Trveta encountered only one case of gas gangrene in treating 1073 fractures during the Spanish Wars. Spain consists largely of mountains and of arid plains. Gas gangrene is common in low lying agricultural districts. It was very frequent in Madrid and Aragon fronts. Transport of wounded in Thomas' Splints without previous complete surgical treatment of the wound was responsible for many patients arriving at the base with developed gas gangrene.

That is why Trveta is not in favour of treatment at first-aid stations because they delay the proper surgical treatment.

X-rays in diagnosis and treatment of gas gangrene. (Brailsford)—By radiography it is possible within a few minutes to detect the formation of gas in the tissues before it has produced any clinical signs. When gas crepitation is detected clinically, radiography will give a good idea of the extent of the invasion and also a guide to the possibility of eradication by amputation.

In the penetrating wound the formation of gas bubbles around the foreign body will be the first indication of anærobic infection: Gas bubble may be the only evidence of the presence of foreign material in cases where the foreign bodies may not be revealed by the radiograph.

Radiographs will reveal separation of the muscle fibres by the interspersed of linear accumulation of gas. Cattle suffer from a condition closely resembling the acute fulminating type of gas gangrene in man; it is

called black leg, black quarter and quarter evil.

TETANUS.

The valuable prophylactic of tetanus toxoid in all the forms of the forces has been tested; whether a wounded man has had toxoid or not may not be available under field or air raid conditions; therefore it has been decided by the army authorities.

That the immediate administration 3000 units of A. T. S. is given is to be regarded as an additional safeguard against infection as soon after the infliction of the wound as possible.

Special case sheet has been introduced to assess the value of toxoid and the a. t. serum.

In the last war prophylactic injection of anti-tetanic serum was introduced in October 1914, and the incidence of Tetanus dropped from 9 per 1000 wounded to less than in 1915: it rose again in 1916 probably because of the more accurate diagnosis of local tetanus and fell again to less than 1 per 1000 in 1917 and 1918. The second fall coincided with the more general adoption of the early excision of wounds and the introduction of repeated injections of A. T. S. Not only was the incidence greatly reduced, but among cases developing tetanus, the incubation period was lengthened from an average of 11.8 days in 1914 to 48 days in 1917 and the severity of infection diminished, the fatality rate being 22.6% in the inoculated and 53.3% in the uninoculated. The proportion of local tetanus rose from 11% in 1914 to 23.4% in 1917.

Recently the French have introduced active immunisation by the use of Formol toxoid. This method has

long been used for the prevention of equine tetanus and for several years a combined active and passive immunisation has been employed in the French Army. Active immunisation is used along with TAB to the regular British Army and R. A. F. The course is two 1 cc. in doses of Formol-toxid at an interval of 6 weeks. This may be repeated after 2 to 5 years interval. The French advocate an immediate injection of toxin for the freshly wounded and already vaccinated soldier. If the patient has not been vaccinated he should receive first 1 cc. of tetanus toxoid followed by 3000 units of A. T. S. and then at 15 days interval two further injections of toxoid.

In Germany excision of wound with weekly injections of prophylactic A. T. S. in severe doses is the practice. There were only 4 cases of Tetanus amongst 40000 injuries.

For Established Infection.—The mortality rate of Tetanus itself is 50% in patients who have received a prophylactic dose of A. T. Serum, while it is 80% in unprotected cases.

"All drugs have been supplanted by **Avertin**" given per rectum in full anaesthetic doses. "Every 8 hours for 6 or 7 days if necessary. Avertin is the most useful drug for controlling reflex spasms; continuous warmed nasal oxygen should always be given with avertin to stop cyanosis and lessen the risk of respiratory complications.

Leslie Cole's method of 200,000 international units as a single large dose I. V. is cheap and effective.

Up to end of February 1940 no gas gangrene in this war has been noted.

4 In the evacuation from Dunkirk although the patients were evacuated only with field dressings only one case had Tetanus out of 700 in a batch.

OPEN G. S. W. CHEST.

Keep silkworm gut or heavy dermal sutures ready on large needles to suture immediately and seal hermetically all open G. S. W. Chest. It was not till 23 months of the last war and after losing practically 100% of cases, 72% were saved by this measure.

Collapse of Lungs.

It took nearly 4 years of war before we recognised the cause of death and what to do to avoid it in those who were dying and yet had apparently no fatal wound. They will be common as a result of aerial bombing and will account for a definite proportion of deaths of those close to the blast of bomb or shell. This type of wound will be common in bombs bursting on the surface—on pavement, stone, the deck of ships, etc.

They die without an apparent wound. These men have a rupture of the visceral pleura of the lungs or a complete collapse of the lungs from suction of air incidental to the blast or due to reflex or bends. The lungs are collapsed and are practically airless.

Immediately on finding such a case—and unfortunately there are many of them—place a handkerchief or piece of gauze over mouth, hold the man's nose, and blow hard into the lungs. Continue to exhale forcibly and inhale lightly till the victims begin to breathe; then when his lungs are expanded, and he is himself breathing, aid him by artificial respiration until the colour is restored to the face. A few breaths will save a life that is almost lost. In a small proportion of

cases of these men there are one or more perforations of the visceral pleura which cause passive pneumothorax and it is not enough just to inflate the lungs. They must be kept inflated, and it may in addition be necessary to inflate the pleural cavity or even leave a small needle in the chest wall until the minute opening more or less seal themselves over and a positive pressure within the thorax no longer occurs.

For this group of cases particularly, every advance dressing station should have one of the small inexpensive compact gas oxygen machines at hand to maintain positive pressure in the lungs until the respiratory function is safely restored. A well-fitting mask applied over the nose and mouth is sufficient; intratracheal insufflation while of course more valuable, is fortunately not necessary.

Transport.

Patients with penetrating wounds of chest should be submitted to as little movement as possible and transportation from one hospital to another in the earlier stages should only be sanctioned on some urgent plea. The probable contribution of posture to the development of contralateral collapse should be borne in mind.

Care of penetrating wounds of chest—in C.C.S.

In the last war 6, 12 or even 24 hours elapsed between the wound in the line and admission to the C.C.S.

Chest wounds should be under the primary care of the physician when no specialist in thoracic surgery is available, and the specialist surgeon should always have a physician attached to his service.

Ryle's classification of penetrating wounds of chest.

(1) Small penetrating wounds without hæmothorax 10 per cent—no deaths.

(2) Through and through wounds with sterile hæmothorax 9 per cent—no deaths.

(3) Small or medium wounds with closed sterile hæmothorax 40 per cent—deaths 6 per cent.

(4) 1, 2, 3 groups consisting of 60 per cent, surgery was seldom indicated.

(5) Small, medium or large penetrating wounds with closed infected hæmothorax anærobic or Streptococcal 14 per cent—23 per cent deaths.

Drainage of pleura and removal of F. B. was necessary.

(6) Large penetrating wounds with leaking hæmothorax or sucking wounds 19 per cent—56 % deaths.

(7) Through and through wounds with infected hæmothorax 5 per cent—70 per cent deaths.

(8) Penetrating wounds complicated by damage to diaphragm, liver, or spleen or by other intra-abdominal trauma 3 per cent—100 per cent deaths.

(9) Wounds of Heart and Pericardium 6 per cent.

Treatment :—Gunshot wounds of the Chest.

In the South African War and in the first two years of the Great War they were left alone; nothing was done except bed, morphia and cough mixture; if an empyema formed rib resection and drainage had to be done.

The mortality was great and in non-fatal cases the convalescence was often prolonged.

The general principles of surgery which govern the correct treatment of all wounds—namely early mechanical cleansing by operation followed by early closure was adopted.

The deaths in the battlefield or in a few hours is due to injury to large vessels or an extensive lesion which cannot be aided surgically. Deaths after 48 hours are always due to sepsis from the missile retained clothing, and wound.

A blowing chest wound should be sent up at the earliest possible moment in the advanced medical units or at the C.C.S. by a temporary skin suture.

Otherwise when a patient suffering from a chest wound is admitted to a C.C.S. he should be put to bed and allowed to rest undisturbed to recover from shock. X-ray examination is done to note the position and size of foreign body, existence and extent of hæmothorax and pneumothorax, condition of the opposite lung, cardiac displacement and movement of the diaphragm.

The principle to be aimed at is early mechanical cleansing of the wound, both of the chest wall and of the injured viscera; the evacuation of all foreign bodies and of effused blood from the pleural cavity, the repair or suture of the damaged lung; and the closure of the chest cavity by suture.

Indication for early operation :—

- (1) A ragged wound of the soft parts.
- (2) Bleeding from the parietal wound.

- (3) Compound fracture of the ribs.
- (4) Section of air into the pleural cavity.
- (5) Retention within the chest of a large foreign body.
- (6) Great pain due to in-driven splinters of bone.
- (7) Rapidly increasing pneumothorax due to a valve like opening into the pleural cavity which allows air to be sucked in and prevents expulsion.
- (8) A large hæmothorax which cannot be evacuated by aspiration.

Time for operation :—

- (1) After recovery from initial shock under a General anæsthetic but pressure chamber is not required.

Points in operation :—

- (1) Careful complete excision of the parietal wound.
- (2) Remove splinters of bone.
- (3) Remove all large missiles.
- (4) Receive blood by mopping.
- (5) Lung tissue may be excised and sutured without fear. Early operation within 12 hours after injury does not cause recrudescence of bleeding.

Abdomino-Thoracic Injuries.—Identify with from thorax side, suture diaphragm and deal with abdomen.

For uncomplicated Hæmothorax :—

- (1) Aspiration.
- (2) If infected, empty the chest of all blood and clots, by open operation, cleanse and suture.

Contra-indications for operation :—

- (a) Shock.
- (b) Collapse.
- (c) Small clean wounds without evidence of serious intra-thoracic injury.
- (d) Collapse of the opposite lung as indicated by inspirating retraction of the chest wall on the side opposite to the wound—in this case an anæsthetic on opening of the chest may be fatal.

The chest should be left dry, an essential factor in the early expansion of the lungs; close the chest always in layers.

EXPERIENCE IN THIS WAR.

The chest wounds that are seen from B. E. F. in this war are reported have done extremely well.

Foreign Bodies in the Heart.—109 cases have been recorded.

Immediate mortality after operation is 20%; the mortality in those not operated is about the same.

A large piece of shrapnel in the pericardium or a sharp one in any position must be removed; the latter is likely to produce a fatal perforation sooner or later.

N. INJURIES.

Sciatic Nerve sutures are often required in post-war surgery.

Maxillo-Facial Surgery.

Injuries of face and jaws—involving the nose and nasal sinuses.

(a) Early part of last war—nothing was done—they went septic.

(b) Later—Excision and wound primary suture if within 12 hours. With efficient drainage—no dressing—dusting with powder.

Injuries in the region of the orbit and nose with penetration of the dura were fatal. Cushing called them the "Cranio-Cerebro-nasal type."

"Through and through wound of both orbit and nose."

If the eyeballs were damaged remove the eyeball.

Frontal sinus injuries—establish drainage into nose.

The maxillary antrum, floor of orbit, and the infraorbital margin fracture should be replaced so far as possible.

Wounds of the antrum ethmoid, and sphenoid—free drainage is essential. A foreign body must not be left in the antrum or any nasal sinus. In orbital cellulitis—drainage of the orbit through its floor into the antrum and then draining the antrum into the nose has proved to be a simple and satisfactory procedure.

Fracture of Jaws.

Extract the teeth on each side of the line of fracture—capsplint—4 tailed bandage (K. Fry). Co-operation of the Dental surgeon has been provided for in the C. C. S: Fractures of the upper jaw—due to motor and aeroplane accidents—special splint or splint with mandible; immediate splinting. Hydrogen peroxide for gargling should not be used.

Head Injuries.

Head injuries are common and are produced by:

- (a) fall upon the street.
- (b) fall on the feet or buttocks.
- (c) fall upon the vertex.

In addition to gunshot wounds. They are common in civilian air raids and in battle.

Before the last war our knowledge of human cerebral pathology especially with reference to localisation, was based upon cases of local cerebral softening or haemorrhage and our knowledge was confined entirely to pathology of white matter. War wounds have produced cortical lesions and thus corresponded to lesions produced by experimental physiology.

Disorders of vision due to wounds of skull are more frequent than might be supposed. Cerebellar lesions and their localisation was effectively studied.

Wounds of the skull were operated on much too frequently, much too soon, much too near the front in the early part of the war. De Martil laid down. "In the ordinary way it is not urgent to operate on the wounds of skull, and, in my opinion, those surgeons who consider that they should operate on a skull as they would in an abdomen are mistaken. If the abdomen contained only solid organs, as does the skull, instead of hollow organs full of septic material it might be treated in the same way. The only cases where surgical intervention is really urgent are those of the digestive tract and of the circulatory system."

Hair is clipped, skin of the scalp shaved, cleaned with ether, painted with Tr. iodine and dry dressing put on first-aid post.

The Medical Conference of the 4th Army on 18th June 1915, reported a very early operation performed at the front, have under circumstances, neither been successful, nor protected the patients from later complications. One ought not to try to reduce the

intra-cranial pressure in the early stages for the increase of pressure opposes extension of the meningitic phenomenon that always exist at the level of the injury when the wound is a penetrating one.

After the injury the edges of the infected wound in the duramater apply themselves to the brain and adhere to it. During the next few hours cerebral oedema is produced in the damaged area, and the swollen brain applies itself more and more firmly to the duramater, and sometimes, even herniates outwardly. Owing to these adhesions the damaged area is isolated from the meningeal cavity, and there is meningo-encephalitis localised to the region of the wound.

So avoid introducing the jaws of large forceps between the skull and duramater; do not practise lumbar puncture at this stage.

The immediate danger is almost exclusively meningitis and the natural defences of the wounded men are much more effective against meningitis than the illusory help of surgery.

Anæsthetic.—Local.

Position of Patient.—Sitting or head raised if unconscious.

Brain Injuries.

Following the last war Wagstaffe (1928) made a critical study of the end-results in a series of soldiers who had received head injuries. He found that 1.6% of these patients became epileptic when the dura had not been penetrated, whereas 18.7% of those whose dura had been perforated developed post-traumatic epilepsy. Steinthal and Nagel (1926) concluded that severe injury to the brain resulted in Frank epilepsy in 28.9% and lesser

forms of epilepsy in 35.5% making a total of 64.4%.

If the brain is excluded from the superficial scar by the use of *amniotic membrane*, the scars may be prevented. Following the war, fat, fascia, celloidin and metal plates were tried to prevent scar but they all failed.

Wounds of the brain must be treated like wounds of other tissues by debridement.

Debridement thoroughly and carefully done is the most important procedure for the immediate preservation of life, prevention of infection and avoidance of subsequent focal epilepsy (Penfield 1936). Added to this aminoplastin should be spread over the wounded surface in order to prevent adhesions.

Co-operation with the psychiatrist in the after-treatment is essential and by the end of the last war 21 special units for soldiers injured in the head were established in Germany and Austria.

(a) In post-mortem examinations, most neurotic reaction cases showed gross cortical damage.

(b) Traumatic epilepsy may occur after penetrating or non-penetrating head injury.

(c) In some cases of penetrating wounds of skull, a circumscribed paralysis or a partial sensory loss is the only remaining sign.

Kocher described the four stages in a head injury. (1901) Cushing (1901—03) advocated that a high intracranial tension produces a progressive rise of B. P. and in man should be relieved by decompression.

Alterations in blood pressure and pulse rate are not reliable guides to the magnitude of intra-cranial tension and therefore to treatment in all cases; it is true in certain cases but not of many more.

It is now known that the symptoms and signs of the Kocher's 3rd stage (Capillary anaemia and arteriolar stasis) may exist with an intracranial tension that is subnormal.

By applying pressure to large defects in the skull in a number of patients and by injecting saline solution into the ventricles, it is proved that there is no alteration in the blood pressure, pulse rate, respiratory state or mental state.

Excepting the more clearly demarcated syndromes associated with sub- or extra dural hæmorrhage, the constitutional neurological and psychological conditions of patients suffering from severe trauma to the brain cannot then be attributed to raising of the intracranial lesion, and a decompression therefore is rarely required. Decompression operations in closed head injuries are unnecessary and subtemporal decompression has fallen into disuse.

The use of Hypertonic intravenous solutions came into practice to reduce pressure but in 60 to 90 minutes there was a secondary rise to an even higher level; in others the pressure rose and stayed up and in one severely injured patient the injection was rapidly followed by death. The effect of intravenous hypertonic salines on C. S. F. Pressure is unpredictable from case to case and in the same case at different times.

measures to reduce the intracranial pressure are not usually justified.

(1) During 1939 the dehydration treatment of head injuries has been steadily coming into its own, and with its increased use complications as sustained delirium (cerebral irritation) have been noticeably absent.

(2) for cerebral contusion 50 cc. of 30% glucose intravenously is useful.

When surgical intervention is decided against, the following conservative treatment is to be practised.

(1) Moderate Fowler position; turned on the side;

(2) Restlessness controlled by chloral and Bromides.

(3) Moderate restraint.

(4) Temperature to be kept below 102°.

(5) Fluid balance of the body must be maintained.

Immediate classification of head injuries with a view to transport cases whom surgery can save is essential.

The following conclusions were drawn from the experience of the Spanish Civil War. (1) The following 3 signs are of very grave import a continual discharge of cerebral matter; a very feeble pulse (the rate being less important), a continual fumbling with the genital organs. (2) a restless patient means a mid brain affection and beyond all help.

(3) a comatose patient with a low pulse may have extradural hæmorrhage and an early operation will save the case.

good even when the patient is deeply unconscious if surgical treatment can be promptly carried out.

In the first stage of the present war the open head wounds have been like those of the war of 1914—1918 but both French and German authors have found that operations may be delayed longer than was thought previously safe, even up to 48 hours after the injury. In their view there is no call to operate before shock has been adequately treated, and if the conditions of war, are favourable, wounded may be transferred before operation to the C. C. S. or even the Base, as in the Polish campaign where the Germans evacuated their wounded by air. All writers stress the importance of avoiding hasty and incomplete operations.

All scalp wounds should be surgically cleaned as soon as possible and in most cases the fracture skull should be dealt with. When the dura is reached, the rule to be aimed at should be that the opening in the dura should not be enlarged unless the surgeon is adequately equipped and prepared to go on and remove the necrotic brain tissue and clot to an extent that will leave the brain at the conclusion of the operation free from undue tension and from potentially infected material.

Primary suture of the scalp over brain wounds is looked on with disfavour by most authors. Primary repair of the dural defect is not regarded as a safe procedure in gunshot wounds.

Gunshot wound of Brain.

There is a cone of hæmorrhagic and necrosed brain tissue along the bullet track, widest at the entrance and narrowing as the velocity of the missile is diminished. Other fragments

of bone are distributed along this necrotic track. In these circumstances the head should be freely opened with the entrance point as the centre of exposure. In early cases the necrotic tissue can be removed by lavage and by suction. In older cases the track shows commencing organisation and can be dissected out from the healthy brain around it like a tumour. Removal of this damaged tissue diminishes the risk of infection and minimises subsequent cicatricial formation. The duramater should be closed again. If the bullet itself is retained within the skull, it will be some distance beyond the damaged zone and it is rarely necessary or advisable to remove it.

Sinus Injuries are patched with postage stamp patch of the thinnest of epicranial tissue or of the fascia lata if possible, but do not pack with gauze or plug with muscle.

Abdominal Injuries.

Transport of the wounded is effected in Fowler position in the ambulance. There are difficulties in diagnosis and early operation is the ideal to be aimed at, as most of the hospitals in U. K. are outside London now the principle of early operation and time factor must be very carefully considered; Blood transfusion is of great use:

The abdominal cases are complicated some of them may have been in water after the vessel had been sunk by a submarine. They are liable to succumb to petechial hæmorrhage and lacerations in the brain or lungs and rupture of the pulmonary alveoli.

The chief cause of death in the last great war was the inability to withstand the primary shock and the

move to the casualty clearing station and the hæmorrhage.

G. S. W. Abdomen.

It was well known from the war of 1914—1918 that there was no clinical syndrome indicating visceral penetration, and the symptoms produced were really secondary to the hæmorrhage and peritoneal irritation resulting from the escape of irritative contents. There was consequently nothing diagnostic of injury in one particular viscus except occasional hæmatemesis from stomach injury or hæmaturia from a kidney or bladder lesion.

Time Factor in G. S. W. Abdomen.

It was realised by early spring of 1916 due to Jhon Fraser's work that early operation as indicated in G.S.W. abdomen not later than 4 to 12 hours after being wounded.

Principles in Treatment.—Purse string or mattress suture of the bowel patching with omental tags rather than resection, end to end anastomosis rather than lateral anastomosis, vary rarely supra pubic drainage, and a posterior drainage upto peritoneum in resection of colon are guiding principles.

The temporary colostomy must be of the double barrel type in the transverse colon, *i.e.*, decompressive or exclusion colostomies.

A high jejunostomy, appendicostomy or calcostomy had some value. Deal conservatively with injuries of liver, spleen and kidney.

Pulmonary embolism after splenectomy was common in 1916.

Abdomino-thoracic wounds involving the left diaphragm are best treated by early operation—phrenic crush. Flat catgut or living suture is useful.

Peritonitis. Operate and suture the rent in the gut; then the Oschner treatment; continuous blood transfusion; warmth; morphia.

ABDOMINAL CONCUSSION INJURIES.

In cases with definite perforation—outlook is more favourable. The ileo-cæcal valve is the commonest site of occurrence. Other fixed regions as duodenum and duodeno-jejunal junction are important sites of rupture. Oxygen inhalation is useful for pulmonary complications.

WAR WOUNDS OF THE LARGE INTESTINE.

It was not realised that death is due to injury to the retroperitoneal tissues; immediate operation, free drainage of the damaged tissues, accompanied by a temporary colostomy reduced the mortality from 80% to 50%; it is better not to attempt too much. The principle of immediate operation for all war casualties is correct including civilian casualties due to air raids. Since most of the hospital units are out of London this time factor has to be seriously considered.

Many dreadful injuries as faecal fistulæ with comminuted fractures of pelvis and spine, complete blowing away of the anal opening and lower rectum are difficult to deal with.

Better results would be obtained in the Surgery of this War than in the last on account of the (1) Great advance in anaesthesia; (2) Blood transfusion service; (3) Reduction of infection by the early use of sulphanilamide; (4) Acceleration of operation by the use of suction for clearing the field of blood. The latest type of suction apparatus is provided now in the base hospitals.

“Burns”

Treatment of burns has been revolutionised since the last war in civil practice by the Tannic acid treatment; Daily dressings and frequent dressings have been abandoned; The use of Tannic acid correspond to the closed method of treatment leading to absolute rest, keeping up warmth, prevention of dehydration, prevention of infection and healing under a scab. The use of Paraffin No. 7 or Ambrine was in the last war a precursor of similar principles.

Incendiary bombs caused burns of 2nd and 3rd degree.

High explosive bombs cause multiple injuries and compound fractures.

Local Care of Burn.

Experience of a surgical team from Guy hospital sent to Dover to deal with the most severely wounded men at Dunkirk gives some conditions of burns, wound infection and abdominal concussion.

Burns is one of the commonest injuries of modern warfare—on land as well as at sea and in the air.

The burns seen at Dover were very extensive and for the most part superficial; the unusual feature was that they had received, no treatment, from the time of injury several days previously; Burns sustained in naval action are superficial and involve mainly the hands, forearms and face.

How best to deal with a burned area previously coagulated when there is evidence of bacterial infection beneath the coagulum?—many do not advise active separation of tanned areas, sulphanilamides have helped in removing the dangers of streptococcal septicæmia and pyæmia which

were once a grave menace throughout the course of extensive burns.

First-Aid.—Egg albumin white of egg (can be kept in a battleship plane or advanced dressing station). Pain ceases immediately. It can be applied to sclera and cornea.

For Tannic pus bag.—The coagulum was left alone, but the edges and holes that poured pus were liberally sprinkled with tannic powder from a pepper pot: the part was left bare under a cage:—and the results are very good.

Infected Burns should be treated with tannic acid after rapid cleaning under gas and oxygen and the method may be compared with the occlusive plasters for compound fractures.

Prontosil internally is also of great value.

(d) Burns of 4th and 5th degree in which the charred material remains firmly in situ are to be left alone. Since all the effects of tannic acid treatment are present.

(f) Carron oil and paraffin wax dressings are now discontinued. The liquid condition of the wax is not maintained and tissue penetration is not effected. Mere surface sealing is without value.

Effect of cod liver oil in small mustard gas burns is good. A coagulation in the form of a membrane occurs inevitably and instantaneously when albumin comes into contact with liquid fat occurs. The specific action of cod liver oil, if verified, is due to the immobilisation of toxic substances by specific absorption.

Shock in Burns.

Painful superficial burns are much more likely to give shock than deep burns which damage nerves; they may

be due to sympathetic stimulation. It may be that the toxins from the damaged skin are more poisonous than those from deeper structures.

Ether or C. H. Cl. 3 anaesthesia in harmful in shock from burns.

McDowell tried to find out if the pulse rate in burns gives any clue regarding sympathetic activity, but so far could not discover anything definite. Some patients are recorded as being severely shocked with pulses of 130 which suggests increased sympathetic action but others are also shocked with pulse of under 90. Practically all the patients who die are shocked from the moment they are admitted and that death occurs on the first or second day. 80% die in the first 2 days and only 20% are septic (The type of patient suffering from burns who was admitted unshocked and died about the 3rd or 4th day seems to have disappeared under

modern treatment, although there are still a few, especially old people, who die from pulmonary complications at the end of a week. So far as burns are concerned McDowell agrees with O'Shaughnessy that the old differentiation of primary and secondary shock is obsolete. Either the initial shock is fatal or evanescent.

Many pilots at present were coming down on account of superficial and strictly localised burns of the hands, forearms, face and neck.—Provision of emergency gauntlets or something that could be put on in front of the face is required.

Petrol tanks should be better protected: many men were burned by the petrol catching fire.

These notes may be of some use to the large number of young officers drafted to the medical service at present from this College.

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The Elixir of Life.

R. KRISHNASWAMY, M.B., B.S.,

Department of Pharmacology.

The everlasting quest for the elixir of life began with the dawn of civilisation. The Greek legends have it that the gods of Olympus drank Ichor to strengthen their immortality, while in Hindu mythology there is the story of the churning of the ocean of milk to produce divine ambrosia which made the devas immortal. But the real quest for the elixir of life may be said to begin in the early Moslem and Jewish periods. The ancient Chaldeic Pantheism, the doctrine of 'anima mundi', or the 'soul of the world' with indwelling spirits in all things was applied to whatever could be extracted by fire, such as 'spirits of wine' or 'spirits of nitre', or the various essences and quint-essences, while to the seven planets corresponded the seven days of the week and the seven known metals. As these metals were supposed to be generated in the bowels of the earth, the special aim of alchemy was to find the fecundating or germinal substance under appropriate planetary influences. Hand in hand with the transmutation of metals went the notion of a polyvalent 'elixir of life' which could cure all diseases and confer immortality, and which was supposed to be in the nature of 'potable gold' (aurum potabile). The search for potable gold led to the discovery of 'Aqua Regia' (a mixture of nitric and hydrochloric acids able to dissolve gold and platinum), and the strong acids by Geber and Rhazes, and the quest for the elixir of life was the starting point of chemical pharmaceuticals. During the Renaissance period, the influence of

Paracelsus, the pioneer of modern chemistry, gave an impetus to the search for the Philosopher's stone which could convert baser metals into gold. The arch patron of alchemy in the 16th century was Emperor Rudolph II of Germany (1576—1612) who devoted much of his fortune and the whole of his reign to the quest of potable gold. Under his auspices Andreas Libau (Libavius) worked on the secret of potable gold, published a treatise on alchemy and made a real start in chemistry.

Soon after chemistry was established as a science, there was a regular deluge of searchers for the philosopher's stone and the elixir of life. Among these were DeLisle, a French man, who died in the Bastille of the wounds his guardian inflicted on him to extort his secret, and Dr. Price, an Englishman, who committed suicide to escape from a public trial of his pretended discovery. The great French Chemist Dumas considered that a solution of the problem might be found in the doctrine of isomerism, and Sir Humphrey Davy refused to pronounce that the alchemists were wrong.

And so the quest has gone on. In recent times, the persistence of scientists have made the mysteries of human physiology less mysterious, though modern research is not so much in the direction of the discovery of the elixir of life, as towards a searching inquiry into the truth about the nature of life processes. Thus came the discovery

of the glands of 'Internal secretion', which play such an important part in the structure of human personality, and it may be that in this direction may be found, if at all, the secret of perennial youth. The idea that senescence was related to testicular atrophy and consequent loss of the male 'hormone' or internal secretion began with Brown-Sequard and was later revived by Voronoff in France and Steinach in Germany. Transplantation of apes' glands into old men has been performed, and claims have been made that the grafted tissue lives and causes rejuvenation of the recipient. But the evidence, so far has failed to convince. And recently Dr. Alexis Carrel and Col. Lindbergh demonstrated an artificial heart which could keep various organs alive even after the death of the owner of these organs.

It is interesting to speculate on the state of the world when this elixir of life is discovered at last. There will be no disease and death, and the earth will be teeming with an ever increasing population of humans, jostling about and fighting for elbow room. In this deathless Utopia there will be a preponderance of old people. The late Dr. Leonard Williams asked "Could anything be more horrible than Gulliver's Strulbergs who never died? They were incapable of friendship and dead to all natural affections". Rather than have any semblance of this gruesome sight of inhuman dotards cumbering the earth, he prayed to the gods that be, to spare us a merciful disease or two, a kindly earthquake or two, and a devastating epidemic every ten years.

Another equally gruesome world is envisaged in Bernard Shaw's "Back to Methuselah". Here, he pictures an earthly paradise inhabited by men who simply fail to die. These super-

men grown old and decrepit in spite of their wisdom, strut about like animated mummies. In spite of Shaw's liveliness of description, and brilliant wit, we sense an undercurrent of unnaturalness in the whole picture.

As civilisation has advanced, Science, through Medicine, its most humanistic expression, has contrived to save a few millions, who would otherwise have fallen from the ravages of disease, and from the clutches of Nature which is for ever trying to weed out the unfit among the race. The result of such protection against the process of what is called 'survival of the fittest' is seen in our well filled mental hospitals, prisons and Cripples' Homes.

The application of the results of scientific endeavour to the improvement of the human race is fancifully depicted by Aldous Huxley in his "Brave New World". In it he presents the picture of a future race of immortals. In such a society, only approved types of babies are allowed to breed out of test tubes, the embryo is subjected to prenatal treatment so that only babies which conform to required specifications are produced, and after their so-called birth, their reflexes are 'conditioned' in order that only those with characteristics and dispositions that are useful to the community shall survive. Human beings become more or less automata, and respond only to disciplined emotions, mass enjoyment and standardised opinions.

Is such a state worthwhile? It may be an ideal state for dictators, but we miss in that drab, monotonous pattern of living, the essential humanity of man. The whole picture of the soulless universe in which the individuals have lost the birthright to freedom, individual pleasure and the solace of

solitude is, if I may so call it, un-human, though not so gruesome and horrible as Gulliver's Strulbergs, and the frisking mummies in Shaw's "Back to Methuselah".

The question has been asked whether the discoverer of the elixir of life would be deemed a benefactor to mankind or humanity's greatest enemy. The answer to the question depends on the use to which the discovery is put. The scientist works for one purpose only, to seek the truth. He is impelled by a spirit of scientific enquiry, caring little about how the knowledge is to be applied, whether for good or for evil. He leaves that to the people who rule our destinies. He surely cannot be blamed if the results of his labours are used for sinister purposes. The aeroplane has annihilated distances, but it is also being used to annihilate human lives. The radio has abolished time and space, but it has also abolished brotherly love and kindness, by preaching a hymn of hate. Medical skill has given us the power of saving human life, and chemical science has attained an unprecedented skill in destroying the life that medical science has preserved. Indeed, we are dismayed by the spectacle of the uses to which man's power over nature has been put, by making scientific knowledge the helpless accomplice of man's own wickedness. Man's present is not such as to justify us in entertaining optimistic beliefs in regard to his future. Knowledge has indeed come, but wisdom has sadly lingered.

If the elusive elixir is discovered at last, but is used for ignoble ends, the result of the discovery will only be Dead Sea fruit. I would rather live the span of the Psalmist's threescore years and ten, and die in the knowledge that I had been of some little

service to my fellowmen, than live for 999 years in a life spent in selfish and greedy pursuit of pleasure.

As long as man's inhumanity to man continues, the gift of immortality will be an intolerable burden. When the spirit of man overcomes the lust for power and selfish greed, and rises to greater heights of service for the betterment of the human race by an intelligent and humane application of the principles of scientific research, and when whole mankind becomes better attuned to a sense of human values, then, indeed, is the elixir of life worth having. Lord Horder says "Humanity marches on in spite of all we do to check it, and not very much because of what we do to help it. But of these two things that we all can do, for Heaven's sake let it not be the first. Man's evolution is the resultant of his primitive lust to find true values in life—to seek out which is valid—and the corpus of knowledge that science has provided. 'Too much science' some folk say. 'Too little applied science' say I. Our trouble is that we have not linked up our science with the urge to find true values. It is not that we have too much science; it is that we have too little humanity".

And so we still seek the elixir in the hope that there is still scope for optimism with regard to the future of mankind. I cannot do better than to conclude with the words of Mathew Arnold,

"I say, fear not! Life still

Leaves human effort scope;

But since Life teems with ill,

Because thou must not dream; thou needst not then despair".

Oh! 1941.

Oh! Nineteen Forty One, art thou come to bless
Us a happy New Year—quite fresh and sweet?
Then, be kind and cheerful in times of distress;
And never let us down, nor make us desolate;
Be not harsh and cruel, and turn this dear Ind,
The seat of bloody revolts and unfair wars;
Plague not this poor world afore wrinkl'd,
With cares and sorrows and untold miseries.
But, hark! art thou the Angel fair and free,
That brings from Heaven the 'Message of Peace';
Art thou come down here to make us happy,
Putting our troubles to flight with thy grace:
If so, we join our hands and make merry,
And in making merry, our troubl'd life we bury

—T. N. G.

The Madras Medical College Magazine.



It may seem rather early to commence the wail even at the second issue of the magazine. It should rather be the second than the fourth or the last so that the readers and the contributors may come to know the handicaps under which the magazine is produced so that unfair criticism should become minimal.

University examinations are generally in the way of most things with the possible exception of a BLITZKRIEG—but our magazine is no exception. The time entailed in the preparation, the nervous tension of anticipation, the ordeal of going through, the excitement of success, the disappointment of failure, etc., etc., are these not enough excuses for ignoring a thing like the mere magazine? Yet a few brave souls have not forgotten their obligation in this direction—these are the likely workers of the future. Our eternal thanks are due to them.

There is one difficulty that appears hard to surmount. Has it ever been decided as to the type of article most welcomed? It looks not—the scope appears wide and varied, anything from SWAHALI literature to Hebrew Theology. At any rate most of them appear to have little or nothing to do with a medico. Would the readers decide for themselves the type of article they like best to read? Surely, the readers do not have to suffer the magazine.

Lastly, it seems so difficult to comprehend the language chosen by some contributors. The Editorial Staff feels very diffident at having to correct some of them without total alteration. It is our sincere request that mutual help should be sought more generously than at present prior to submission.

EDITOR.

More Graduates.

(BY P. S. V.)

Graduates, more graduates—and still they come! Why shouldn't they?

Medicine as a career to make money is becoming as uncertain as her sister profession—the Law. Unlike in Law, a failure in the medical profession lives to be an exhibition model of failure and could pose for a Mammoth statue of “FAILURE” decorating the world's fairs or equally imposing exhibitions. Unlike his lawyer brother he will not be able to avoid the searching gaze of the public. In short his failure is totally dismal. Yet, here we are, more and more of them endeavour to take up the study of medicine. Thanks to a benign selection body or a benighted government the accommodation is restricted lest the failures in profession should “register direct hits” against the senate house for granting degrees that are not worth the price of the parchment.

Why then do they come? Who wants them to?

It is an interesting psychological complex worth analysing. Is it possible that it is no better than sighting a mirage in a desert or is it the stupid instinct of the fire-fly seeking the fire!

It cannot be that the shrewd calculating parents or guardians would risk all that money (considering that the study of medicine is easily the most expensive one). It is that innate spirit of gambling that the human hoard inherit, preferring the eternal

hopes of great expectations to the humble certainties of life.

It cannot be a fatalistic resignation of believing in the decrees of destiny as this complex has gained access to the deeper layers of the minds of some very matter-of-fact races.

If there are ethical justice in seeking the uncertainties in preference to the actualities that are easily accessible to ever a dull wit? Platitudes in Galore with rich admixtures to proverbial slogans such as “it offers ample opportunity to serve humanity”—“human happiness lies next to human welfare” are indulged in answer to the above question. Yet the following answers to questions as to elicit the truth make good reading.

One young fellow in the “pre-reg” class when asked the reason that prompted him to enter the medical college promptly replied that the medicos are always well dressed and look so distinguished!

Another speaking with equal candour said that he may one day possess the “Phantom Model” Rolls Royce if he practised medicine. A third brimful of modesty said that it was far easier...Seeing the wards with a stethoscope than to slog at “The Raman effect” or the Einstein's “theory of relativity.”

There it is—the choice of a medical career appears to lack normal premeditation or sincere guidance. Is it little wonder then, that a considerable section of the would-be doctors are

entrants by accident. Further the long and tedious course admits little leisure for the education of the individual. The consequence is obvious—Even after graduation the young medico lacks that self reliance which alone can prevent a drifting—downstream-career (which mishap has overtaken a certain section of our brethren).

It is not impossible to pull up things even at the very commencement by choosing the right person to study medicine.

This is possible if the individual has given the matter considerable thought—if his elders give him the proper guidance—If those who accept him undertake his education, and not merely the study of medicine, and lastly the state or the body under whose guidance the works are prepared to protect his rights and interests instead of merely waiting to sit in judgment over his errors of commission and omission.

“See that the seed is worth the soil.”

Rare Vision.

BY RATNASABAPATHY, S.

Whatev'r springs from this mortal frame
It's all but Angelic Love
That ev'r feeds the enthroned flame
Burning bright in sable cave.

Oft' in my happy dreams do I
Live ov'r those happy days,
When lonely under the azure sky
I walk with gloomy thoughts.

Hark! the same familiar voice,
And now it sounds softly
As that of cuckoo's sweetest choice
In primal spring so lovely.

So lovely lies the earth to-day,
All bathed in soft twilight,
I turned to catch one fading ray.
Of hope that's left at heart.

Nature played a soft and doleful air
And sang an old rude song
That stilled my hope! my joy! my start!
And locked my trembling tongue.

I listened with a flitting trait,
With dull gaze all troubled;
Few sorrows moved me not so great
As that of Nature's did.

Up ov'r the yonder hills I behold,
Her lovely form covered up
With golden robes and lilies clad,
Waving her hand at the top.

Amidst that rich and balmy night,
I heard her breathe my name,
Like the murmur of a rivulet
That flows with flaky foam.

My heart swelled with joy—I looked aside
To veil my timorous glance;
But she fled unto me and cried,
I pressed with sweet embrace.



" Dusk "

Well I remember how the pair
Of birds on wavy twigs,
Sang in the moonshine stealing o'er
Us coupled our happy hearts.

I calmed her fears and she was clear,
And told her love with pride.
Sing on! for I won my guiding star,
My bright and beauteous bride.

But then a voice from Heaven spoke,
Wizzing through the clouds,
Like the wind o'er the burning stack
"Dissolve the loved accents."

She turned and spake 'Adieu for e'er more
My love! Adieu for e'er more:
My heart ached as received a score
Of stabs; when all dissolved in air.

And now I miss her voice and face;
In prayer at eventide,
I will pray with a sunken glance,
To mingle with her bide.

The Chemistry of the Neoplasm.

BY A. R. NATARAJAN, B.Sc.,

Final Year, M.B.B.S.

"Ships and tillage; walls, laws, arms, roads, dress and all such like things; all the prizes, all the elegancies, too, of life, without exception; poems, pictures and the chiselling of fine-wrought statues; all these things, practice, together with the acquired knowledge of the untiring mind, taught men by slow degrees, as they advanced on the way step by step. Thus time by degrees brings each several thing forth before men's eyes, and reason raised it up into the borders of light; for things must be brought into light one after the other, and in due order in the different arts, until these have reached the highest point of development."—Lucretius (1st Century B.C.)

This subject has created a new avenue and instilled a surging enthusiasm in the minds of many young pathologists and biochemists. It has awakened the quiescent and suppressed imaginative faculty of many a scientist, to once more launch into the sweet and strange theories and to effect a difficult compromise with the realities. This subject has an universal appeal and it will continue to be so till such time when the usefulness of it has been completely realised. Obsessed with ever increasing difficulties, decried by many conservative scientists, ridiculed by men occupying the peaks of position, condemned by episcopal authorities, a young scientist brimming with ideas, supplemented by fond hopes, thinks that it is almost a futile and thankless job, to pursue

in his research in spite of his confidence. Nevertheless many a scientist struggling against such difficulties are able to perceive in the dim horizon of their sphere a slowly developing brilliance which will one day or other sweep the world over and thus reward them for their relentless and unceasing toil.

Everyone knows how this subject has developed and continues to be the fascination for one and all. Starting from alcohol down to benz-pyrene, patient researches have been carried out and still we are at a loss to grip at the proper thing. Before entering into the nature of the etiological relationship to the neoplasm, it is essential that we should know something of the intrinsic chemistry and its metabolism as it is, uninfluenced by any extraneous factor.

Ewing in his treatise on "Neoplastic diseases" has marvellously written down the various changes that occur in the neoplastic tissues as well as in the blood and the general constitution of the individual.

But it was Dr. Mathews who has given us a clear conception of the chemistry of the neoplastic tissues. Some of the essential changes are:

1. Increased alkalescence of the blood plasma and serum pH 7.4—8.
2. Hypocalcaemia—8 mgm %

3. Hypoinsulinism in the blood and tissues.

4. Increased Zinc in the blood and tissues.

5. Large amount of Prolan A.—Ant. Pituitary hyperfunction.

6. Wasserman test + +

7. Complement deviation with autogenous tumour antigen + +

8. Increase of the concentration of the antitryptic enzyme.

9. Meiostagmin reaction + change in surface tension of blood serum—only a constitutional process of wide occurrence.

10. Glycolytic metabolism of the tumour tissue.

11. Retention of chloride and phosphorus.

12. Hyperglycaemia + +

13. Hypoproteinaemia and a rapid destruction of proteins in the body.

14. Epiphanin reaction of the blood serum being possible due to alkalescence of the blood.

Changes in the Urine:—

1. Increased uric acid content of the urine without any concomitant leucopoiesis (Cairo).

2. Increased urobilinuria due to cachexia and hepatic cases (F. Muller and Gerhardt).

3. Deficiency of alkaline chlorides (Beneke) depends upon diet.

4. Acidosis due to protein loss and cachexia (Waldrogl).—later stages of the disease.

5. Demineralisation associated with nitrogen loss (Lewin).

6. Albuminuria—later stages (Muller) found in all cases Bence Jone's proteose—myeloma.

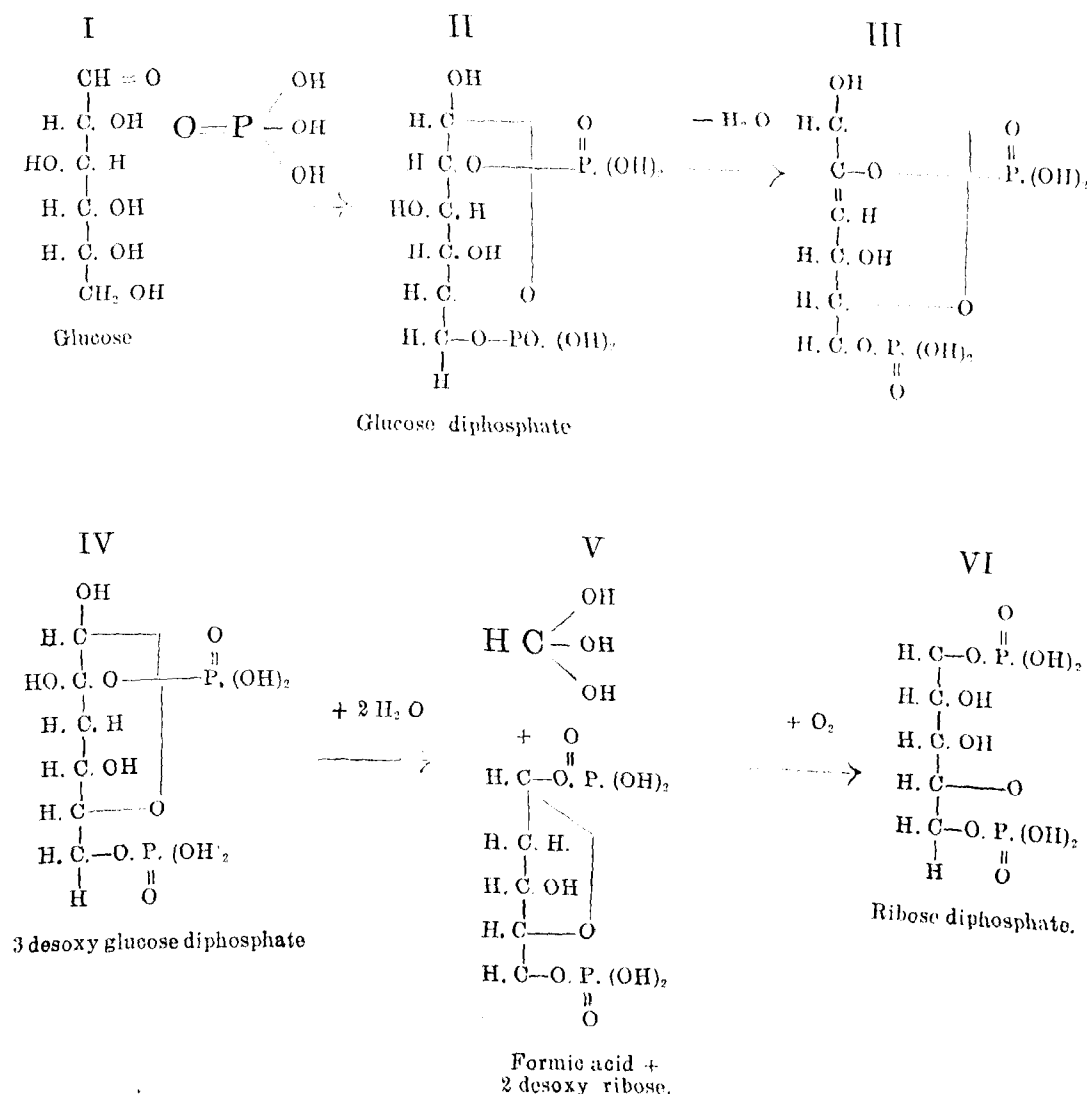
While some of these changes can be explained, others seem to be a mystery, but patient work must reveal to us the nature of these seemingly incongruous elements. Thus alkalescence of the blood is due to increase in the (OH⁻) ions of blood brought about by an increased dissociation of the zinc salts soluble in blood. And when there is a rise in pH, the Ca⁺⁺ ion concentration falls. Apart from the increase in the Zn⁺⁺ ions, the alkalescence may be partly responsible to the abnormal glycolytic metabolism of the tumour tissue. It looks as though there is a rise in pH in the tissue owing to the formation of excessive chromosomal elements—nucleic acid, nuclein, etc. In an attempt to increase the H⁺ ion concentration, the blood exerts its buffer action and thus the blood becomes alkaline. According to Lovat—Evans, the "Zwitterion" structure of the amino-acids + NH₃ Rcoo⁻ is mainly responsible for the control of pH in the tissues. Addition of a strong acid therefore acts, not by enhancing the basic property of NH₂ group, so causing the molecule to acquire a positive charge and thereby influence the pH, but by depressing the ionisation of the Carboxyl $\rightarrow$ NH₃ Rcoo⁻ + H⁺ + cl⁻ $\rightarrow$ NH₃ Rcoo⁻ H + cl⁻. This is only a conjecture, and the author is not definite about it. The hypoinsulinism is due to excessive demand put forward by the abnormal glycolytic metabolism of the

tissues. Another theory is that there is a certain amount of pituitary over-activity which is responsible for an abnormally low content of the insulin both in the tissues and blood. This is substantiated by the strange presence of prolan bodies in the blood and also in the tumour tissue.

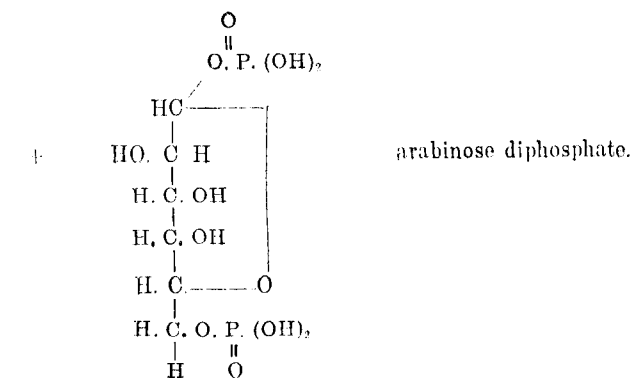
Now let us turn into the subject of the glycolytic metabolism of the

tumour and try to argue out and understand how this strange phenomenon is possible. The blood supplies the tissue with adequate amount of glycogen in the shape of "dextrose".

This dextrose is metabolised as follows:



VII



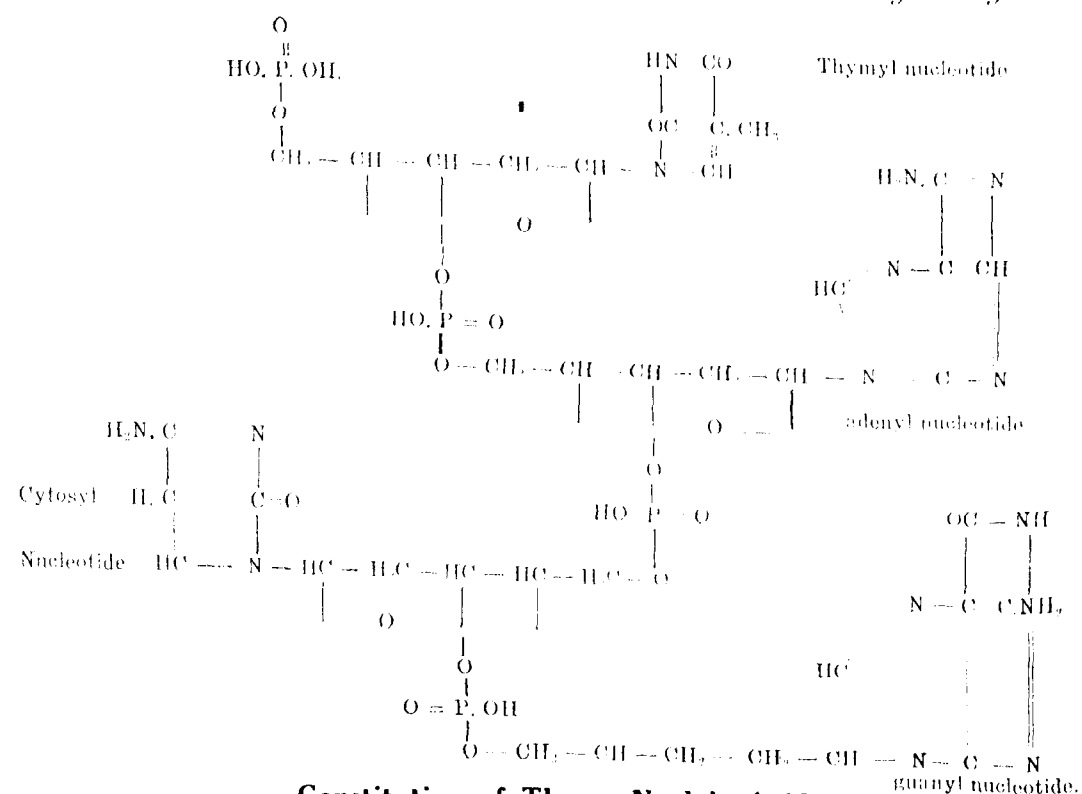
This schematic representation of glucose metabolism, does not happen in a normal tissue and it has been found out that it is singularly characteristic of all tumours to have such a specific metabolic deviation. The resulting product "arabinose" and ribose have been found to be the starting point in the formation of nucleotides. For the synthesis of nucleotides, aminoacids are the bricks and regarding which there are as many theories as there are aminoacids. There are two clear cut schools of thought regarding the availability of these aminoacids. One school believes in the supply of these acids from the blood through food and other believes in the liberation of aminoacids as a result of autolytic histiolysis of the tissues. This latter view has got its warm supporters, since the histopathology of most of the carcinomas reveal the ischaemic nature of the tumour and as every pathologist knows that whenever there is a vascularity the H⁺ ion concn. is low and hence the autolytic enzymes become the dictators of the dead citadel and finish their part of destruction to the acme of their capacity. It is still "subjudice" whether any of these theories can be by itself self-sufficient and self-satisfying.

According to Dr. Mathews the pyrimidine may be readily formed from the purines by oxidative hydrolysis; and many of the colour reactions of the purines are due to the intermediate formation of pyrimidines from them. The author considers that it is much too elementary to go into the various steps of pyrimidine synthesis starting from "purine" bases.

In the formation of nucleic acid there must be at least the following number of molecules of the various constituents.

- 2 pyrimidine bases.
- 2 purine bases.
- 4 orthophosphoric or pyrophosphoric acid bases.
- 4 Desoxy ribose groups. (Pentose).

Having had these compounds at their disposal, the tumour cells begin their synthesis of nucleic acid, chromatin, and nuclein, the rapidity of which excels all known fundamental rules and laws of nature. It is essential that the precursor of the nucleic acid—the mononucleotides—should first be synthesised. There are at least four such mononucleotides which make up the nucleic acid structure complete.



Constitution of Thymo Nucleic Acid.

The various nucleic acids that are found in the tissues are due to the OH group shifts in the sugar molecule. It is also possible that more than one tetranucleotide occurs in the molecule as it exists in the cell. Pyrophosphoric acid may occur in the complex molecule that exists in the chromatin.

This rapid and purposeless formation of nucleic acid—the essential substance of the chromatin of the nucleus—is responsible for the formation of new young cells, giant cells and other atypical mitotic cells. In an endeavour to form cells, the nucleii repeatedly divide and proliferate and the cytoplasm is not able to undergo such rapid changes *pari-passu* with the nucleii. Nature has ordained definite functions and scope to certain structures and here we find how unnatural

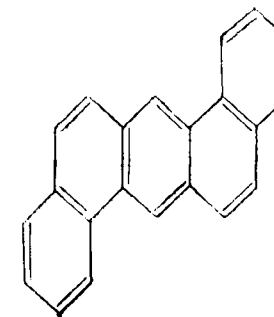
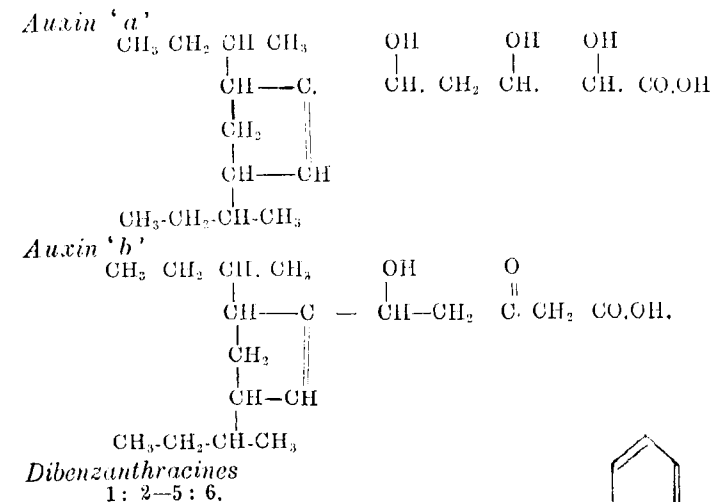
everything seems to be and we are to interpret this as a sequel to the change in the "chemoplasm" of the cell. This leads to the etiology of the change in the cell which has become malignant.

There is no dearth of literature on this subject. Notwithstanding this, we are in a labyrinthine maze to find a way out, and every time we find a new door, we believe at once that we have at last come out of the maze, but only to be disappointed, since the door has led into another reach of the labyrinth. But we believe as Theseus that perseverance must pay us and give us a clue to come out of the maze. The modern conception of this subject is that there are certain higher aromatic compounds closely related structurally to some of the endocrinal hormones particularly pregnandiol and

Theelin of the ovary, which are responsible for tumour formation as evinced by pathologists. But one is at a loss to know whether the human body can synthesise such substances as 1:2 5:6 Dibenz—anthracenes and Benzpyrenes from simpler elements as Benzene, tyrosine, tryptophane, etc. Or is it possible that there is some autocatalytic power endowed in certain tissues which can convert such hormones as progesterones, etc., to such carcinogenic agents? It is here many tumour pathologists and biochemists are compelled to stop and speculate! Dr. Mathews has brought in a new theory of "auxin interference" which refers to the biological development of animals and plants.

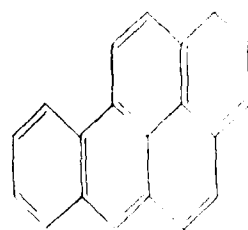
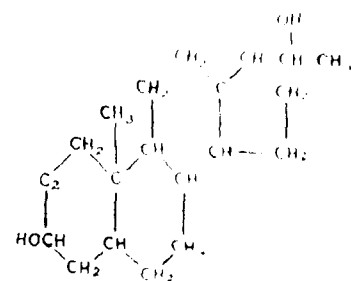
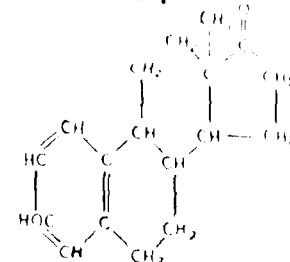
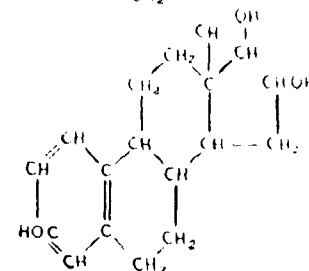
If we should believe in the endocrinal disfunction as a causative factor, the following findings help us a great

deal and strengthen our belief. The presence of prolan bodies in the tumour tissues and also the rapid proliferation of the cells, suggest the overactivity of the pituitary and the gonads. We know definitely that the hormones elaborated by the ovary are responsible for the development of mammae, decidua formation of the uterus, hypertrophy of the uterine musculature, epithelial glandularization of the endometrium and various other changes. This gives us an insight into the potentiality of the hormones, if only they take to vicarious activity. Let us now enter into the structural chemistry of these various compounds and find out what similarity or dissimilarity they possess and how can we compromise ourselves to the fact that these various substances are interrelated and interdependent and act as a composite whole, either consecutively or concurrently!



Benzpyrenes

1:2

**Pregnandiol of Butenandt** $C_{27}H_{46}O_2$ **Theelin** $C_{18}H_{22}O_2$ **Theelol** $C_{18}H_{24}O_3$ 

By a study of the structure of these compounds, what strikes us most is the nature of these substances! Most of them have "Benzene" and "Naphthalene" complexes, but on seeing auxins, one is bewildered to account for its action and thereby correlate the actions of the other substances which have a closer similarity, and establish a chemical identity. We have to stop here and wait for further elucidation on this subject till enough information is obtained regarding these wonderfully incongruous nature of the ever puzzling substances, and

their chemical environmental influences on the human tissues. It is almost irresistible to accept this theory of chemical control of neoplastic growths, but perhaps we had better stop here, for we begin to feel a temptation to allow fancy to outstrip nature, and as Clifford Allbutt says "to put a resemblance of order and completion upon data and inference, which in the nature of things must as yet be fragmentary and scattered, or to work up into artful categories and systems notions which as yet should be left as guesses or suggestions".

"The records grow

Unceasingly, and each new grain of truth
Is packed, like radium, with whole worlds of light.
The eclipses timed in Babylon help us now
To clock that gradual quickening of the moon,
Ten seconds in a century. Who that wrote
On those clay tablets could foresee his gift
To future ages?"

(Alfred Noyes—The Torch-Bearer.)

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Madras Medical College Calling

and to Miss K. S. Jayalakshmi and Mr. Lonappan who were selected to represent the Madras Medical College at the Inter-Collegiate Debate at the Engineering College and the Y.M.I.A. Oratorical Contest.

Dramatic Club.

We are not tired of repeating often and often the need to start a Dramatic Club. In our last number we found many a reader advocating for it vociferously. But due to certain causes (which they themselves must know) their voices are not heard, not even in whispering tones. May we once again request them to come forward and voice their views victoriously for the birth of the Club?

Magazine.

Gentlemen, we thank you very much for your ready response to our appeal and the helping hand that was extended to us to make the last number much more interesting than one expected. We hope the same enthusiasm would continue for ever and ever in increasing proportions and make this magazine march from success to success. But of late, we find a trace of disinterestedness in certain people. A note of warning to them; let them not be beguiled; let them curb it, lest it should slowly permeate and damp their ardent enthusiasm. Further it is becoming more obvious that contributors are shooting tangentially from the 'Medico'. Instead of painting the 'rainbow colours of Romance' in a vivid language or telling a tale, that, looks so stale may we request them to confine themselves within the circle that deals with our profession—both academical and general.

And now just a word about our fair sisters.

It is singularly shocking to see our sisters quite indifferent about the College Magazine. In spite of repeated requests (and reminders too) we could not have the pleasant privilege of receiving contributions from them for publication. No, we don't like to believe that they want to look prominent by not sending in anything to the magazine, nor do we want to believe that they are so unsportive as not to give us an insight into their way of thinking about our studies, students, patients, etc., etc.

We wondered and wondered and are still wondering why they should not come forward and assert for themselves their right in the magazine and claim for fifty-fifty basis in the publication.

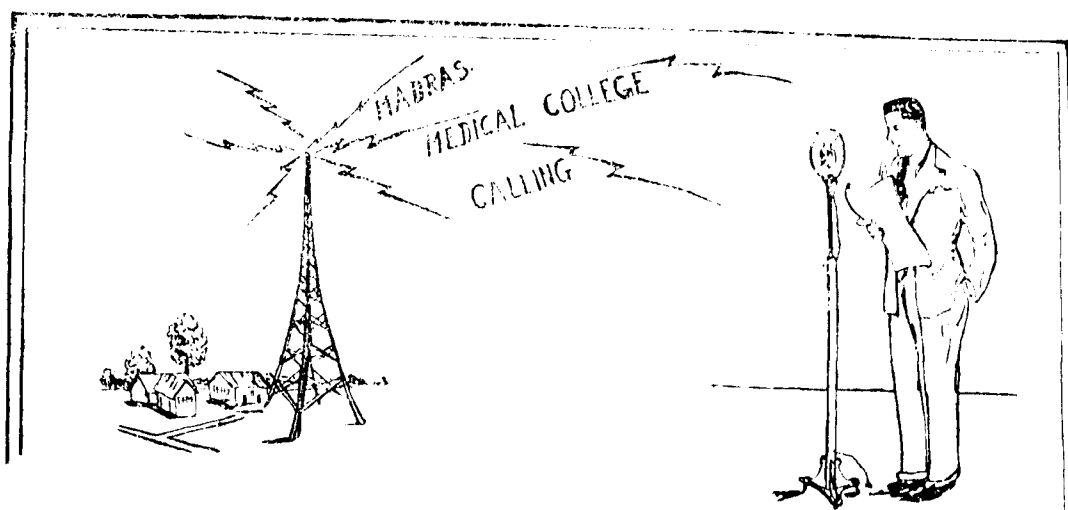
We wonder why they should not give a first-rate knock-out to their big brothers in this field as well, as they are doing at present in the scholastic competitions. Beware; let them not make the big brothers understand that they are fit for nothing except sitting under the screened light, and study and study till their sleepy eyes sink deep in the bony sockets. We do hope, our appeal would enter straight into their hearts and give a brush-up to their witty and nimble brains.

PERSONAL.

We congratulate the following persons on their appointments:—

Dr. D. Sivasubramaniam, M.R.C.S. (Eng.), L.R.C.P. (Lond.), is acting as Additional Professor of Anatomy.

Lt.-Col. P. Verdon, B.A., B.Ch., M.R.C.S., L.R.C.P. (Eng.), I.M.S., Superintendent, Ophthalmic Hospital and Professor of Ophthalmology, has retired after a long and distinguished service.



Dique

Hullo! Everybody

We wish our readers a very happy and prosperous New Year and success in all their endeavours.

Examinations.

The 'Varsity Examinations have come and gone. We deem it a pleasant task to congratulate all who have come out of the ordeal with success. To those, who have jumped clean off the final 'hurdles' and landed on the threshold of a new life, we extend our best wishes and wish them a happy and prosperous future. To those unlucky few, who had the misfortune to lag behind, we offer our heartfelt sympathies and wish them better luck next time.

Sports.

We are proud to say that we retained the Stokes Hockey Shield and finished as runners-up in Mysore Cup Hockey League and Wilson Cup Knock-out Foot-ball.

B. J. Periera won the individual championship at the inter-collegiate Athletic Meet at Annamalai Nagar. We are happy to find that our College Sportsmen had displayed the

same unflagging enthusiasm and ardent spirit right thro' from the beginning of the series of the matches. To them we wish a more successful year in the field of games.

Our hearty congratulations to the following who had the rare distinction of being selected to play in representative matches.

Cricket.—Madras Junior XI: A. K. Haridas and A. V. Rajagopal.

Madras 'Varsity XI: A. V. Rajagopal and M. Muthukumarasamy.

Hockey.—War Fund Pentangular: B. J. Periera, P. V. Krishnamurthi, D. Hari Rajan and E. F. Harben.

Madras 'Varsity XI: B. J. Periera, P. V. Krishnamurthi, E. S. Linton, B. Ince, D. Nugent, E. Harben and B. Carvalho.

Debating Activities.

Thank God! we Medicos are not so bad as others think in oratorical contests. Our congratulations to Mr. C. K. Ramachandran who was selected to represent the 'Varsity in the Inter-'Varsity debate;

Rao Bahadur Dr. K. Koman Nayar, L.M.S. (Mad.), L.R.C.P.S. (Edin.), L.R.F.P.S. (Glas.), D.O.M.S. has been appointed as Professor of Ophthalmology and Superintendent, Government Ophthalmic Hospital.

Dr. K. C. Sankara Menon, L.M.S. (Mad.), L.R.F.P.S. (Edin.), L.R.F.P.S. (Glas.), D.O.M.S. (Lond.), part time Lecturer in Ophthalmology *vice* Dr. K. Koman Nayar.

Dr. R. E. S. Muthayya, M.B.B.S., has been appointed as Resident Medical Officer, Ophthalmic Hospital.

Dr. P. V. Cherian, M.B.B.S. (Mad.), F.R.C.S. (Edin.), D.L.O., F.R.F.P.S. (Glas.), Lecturer in E.N.T. has been designated as Professor of diseases of E.N.T.

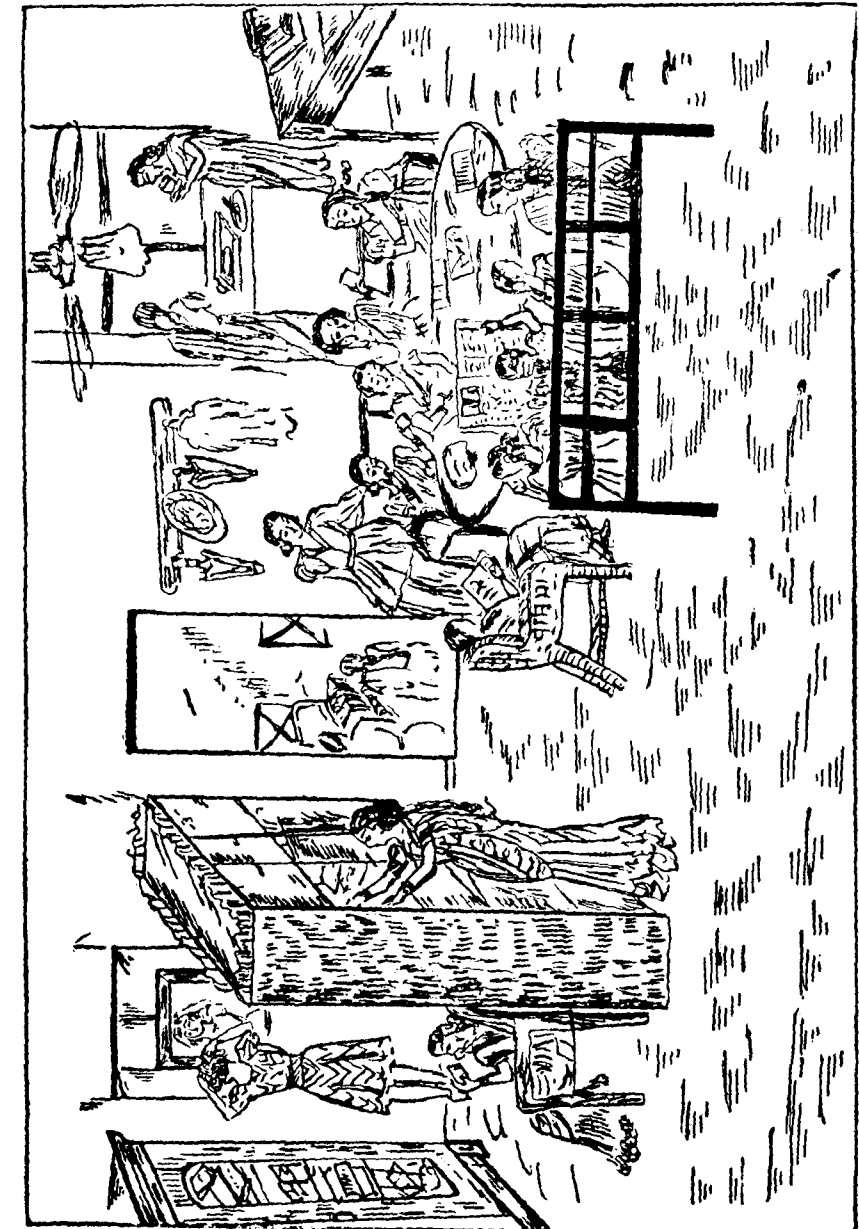
Dr. G. S. Viswanathan, M.B.B.S., has been posted Assistant Professor of Pathology, Stanley Medical College.

Dr. S. Govindarajan, M.B.B.S., has been appointed as Assistant to the Professor of Pathology.

Mr. N. H. Ramaswamy, M.A., M.Sc., has been appointed as Lecturer in Physics, Government College, Telli-chery.

We congratulate Dr. M. J. Santhana-krishna Pillai, L.M.S. (Mad.), L.R.C.P. (Edin.), L.R.F.P.S. (Glas.), D.R. (Edin.), F.S.A.R., retired, Superintendent, Barnard Institute of Radiology, on whom Rao Bahadur title has been conferred.

Our hearty congratulations to Miss Sitachaya, M.B.B.S., on the unique distinction of securing the first class with distinctions in three subjects.



By Ladies

"Just Before the Class"

Dissection Days.

BY ZAC.

"Now thro' the hoop"—and the lions, tigers, horses, dogs and other animals in the Circus perform the feat. The ringmaster holds the hoop high up in the air, and, one by one, these animals jump through. Some do it with perfect ease, some clumsily, and some do not succeed at all. We see the same performance repeated every-day. Time, the greatest of all ring-masters, holds the ring up, and men and women, professors and students, doctors and assistants, all jump through. Let us look on and see whose performance is graceful, whose clumsy, and who does not succeed at all.

Ten minutes to Eight. And the Anatomy Theatre would be as desolate as a cinema theatre ten minutes after a show. But, as the clock strikes eight, the scene would be a very different one—friends greeting friends and boys meeting girls—everything is in a hum. Just then the bell rings and all crowd round a demonstrator for the roll-call.

Calling the rolls is an old custom, as ancient as the institution itself, but the method of answering the call has undergone progressive changes, which, though not very laudable, are none the less ingenious. Some shout from afar, others whisper from very near, and still others sing a regular lullaby. A little more remarkable is the case of a young man who waits to be missed in the first call just for the sake of being called again after the girls!

Roll-call over, sincere workers rush to their tables, others, not so fervent,

slowly walk up to their work, and still others wait so as to reach their tables last. Others there are who simply stand and stare!

Most people may be normal, but there are a good many who are not, and, when a group consists of such, there is always some commotion before the commencement of any work. For, they would be confronted with that perplexing problem: 'who should dissect?' After a few minutes' vehement argumentations on every side, one takes up the day's task, not because he believes that any good can come out of it, but just to set things on the move. From then on starts an endless conversation on topics which may vary from the war to the weather or from parliaments to the local picture houses, and discussions about personalities who may be dictators or mere demonstrators.

It is not uncommon for such a group to be disturbed in its deliberations by the sudden appearance of the professor. At the sight of him, the person with the scalpel digs it deeper into his work, and the one with the book starts reading aloud, all to the amusement of those looking on. This procedure is repeated regularly and the professor chuckles with satisfaction at seeing all his students so industrious. But, the moment he turns away, the old order returneth, the time having come to talk—"of cabbages and kings."

This talk continues till the advent of another intrusion in the form of a demonstrator or an assistant professor,

who peeps in either out of sheer curiosity or with the deliberate purpose of seeing things for himself. All stand up and make obeisances with the greatest respect, and, when talked to, respond with expressions of awe and attention on their faces. The person with the book manages to answer all the questions and rests contented with the satisfaction of having created a good impression. But the demonstrators are sly foxes and are seldom deceived.

There is one type of dissector who is in a fool's paradise and who thinks a whole lot of himself. He is quite confident of his superior skill and has the highest opinion about himself and his work. He invites others to inspect his work which, he boasts, is one of the best. When anyone does have a look at it, he returns more amused than amazed for he would have discovered something that is just mediocre if not shabby. Pride in one's achievements may be pardonable, but the boasting makes it ludicrous. One is reminded of four of Goldsmith's most famous lines:

"The naked negro panting at the line,

Boasts of his golden sands and palmy wine,

Basks in the glare or stems the tepid wave

And thanks his gods for all the good they gave."

One of the most entertaining pastimes when in the "Shed" is to look at others and sometimes, to wink at them. If nothing else, winking is a very pleasurable pastime, judging from the occasional thrills that result from a reciprocal wink.

Pardon my frankness—if it were not for these distractions, work in our theatre would have been a very dull affair!

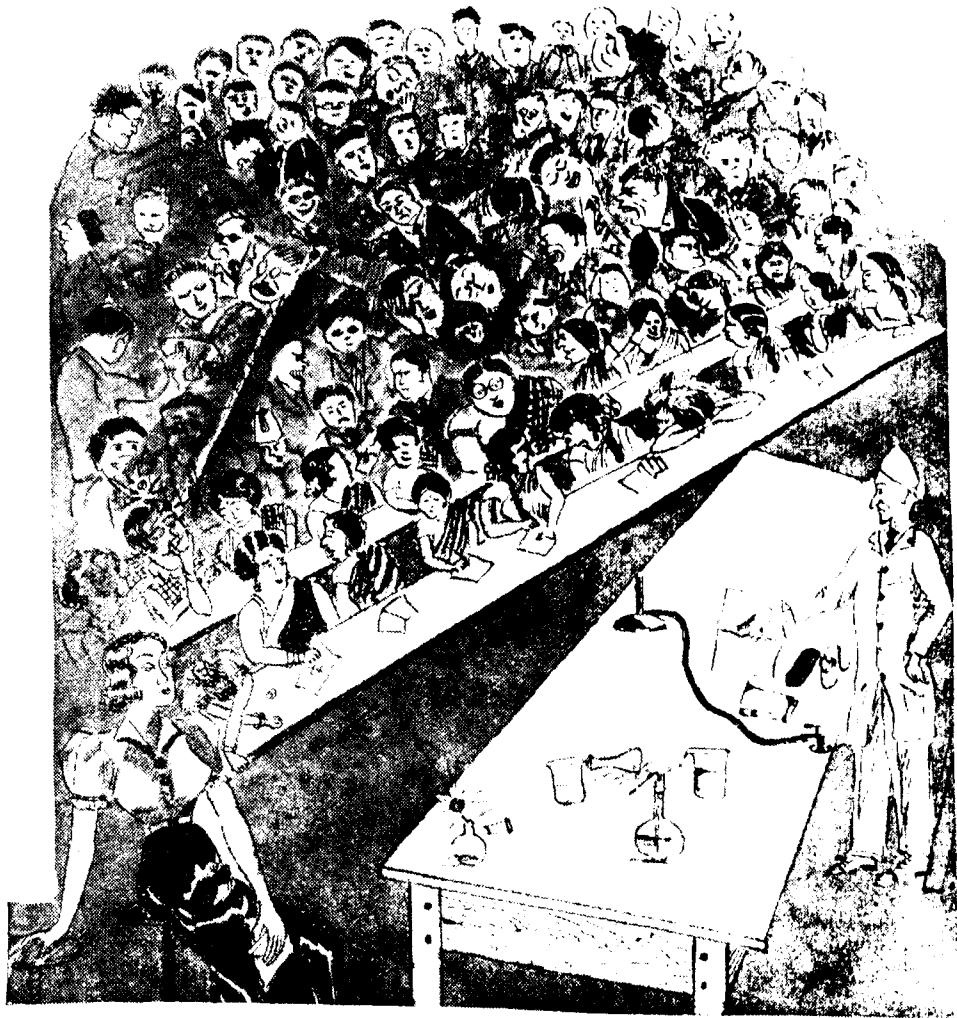
Time, a commodity which everyone has a right to spend, but never spends usefully, plods along. The hands of the clock pass from eight to nine and from nine to ten rather too slowly, despite the frowns of those anxious to get away. The old, dismal clock appears to put on a frown with a solemnity that beats all human efforts.

At half past ten, the bell rings. With some individuals it is a point of honour not to work after hours. They down tools immediately. There is a rush for the soap and the tap, and the person who washes his hands first, curiously enough, walks out last.

Some appear to be very industrious and work overtime, and the professor makes a note of them.

Time, the greatest showman of all, presents his show; this sequence of events—and probably many more—repeats itself everyday. But, those are dissection days!

"THE CAUSE"



Oh! You Student.

BY "TEE YEN JEE".

Bidding good-bye to your parents dear,
With empty promises enough for the year ;
Oh ! you student, start on your yearly tour,
Scrapping the savings of your parents poor.

1

With a heart elated and purse heavy,
You arrive at hostel gay and happy ;
With ' how-do-you-dos ', your friends you meet
As you pass along the city streets.

2

You join the blessed College a fortnight late,
Dressed in new tweed suit, well-cut and neat
You enter the class a few minutes late,
With an air of dignity and a measur'd gait.

3

You find the lecturer an awful bore,
And so you pay your attention no more ;
But think of cafes and " shows " newly sprung,
And of the current fashions in full swing.

4

Never, will you miss your evening walk,
Along the marina to have a talk,
With your dear happy friends near Q. M. C.,
On subjects that take your youthful fancy.

5

You are a banker rich by remittance,
But soon you're a bankrupt with a mere pittance ;
To you, lies and false accounts are nothing,
Which when written to parents bring forth something

6

Reg'lar attendance you give at Roxy,
While at the College you manage proxy ;
You feel quite safe, from the boredom of books
Or its haunting, ugly, hideous looks.

7

Such life you prefer, and the time doth fly
When lo ! you suddenly wake up and espy ;
The 'Varsity Exam staring at you,
And that is enough, to make you turn blue.

8

To My Class-Mates.

BY C. JAYARAJ (*Final Year.*)

Aurora in Greek mythology is mother of *Memnon* (the East), and wife of *Tithonus* (the appearances of Earth and Sky during the last hours of night). She leaves him every morning in renewed youth, to prepare the way for *Phoebus* while *Tithonus* remains in perpetual old age and grayness. *Phoebus* (the Sun-God) ensaffroning sea and air, makes vanish every star and chases hence the ugly night. And the following is written in memory of those happy-days, days long-wished of all our life so dark.

It was on the day before the internment that we were all hurrying up packing our things and engaging rickshaws. We had our own peculiar feelings and imaginations about this, about which we heard much from every batch. Indeed, we had an *Elysian* life, hearing some music or other throughout the day and making fun, of each other—sans care and sans labour—and all the same with that watchful expectancy to hear our bells ringing, calling us all to the theatre to witness some emergent operation. The internment really gives an opportunity of conducting normal labours and being familiar with the regular routine of work taking place in a standard hospital as this. We at the same time have an idea of the common obstetrical and gynæcological cases one may meet with and the usual operative measures to be adopted thereby.

It looks that this is the only period, one can remember later when the hair is turned grey and the mind which is at rest worn out by many wars, turns back towards those days filled with cups that cheered but never inebriated. Who will not like to evade all the pains and stings of life and be submerged in slumber's holy balm like—*Lotos-Eaters*?

During this short period, we have seen operations from version upto portes (and have learnt a lesson also, that is about the responsibility of a medical man to do his service to the humanity at any time of the day. We had our palpation classes too which we did with palpitation of the after-doses from those women-folk.

Our college course is almost at the exit. The heartfelt gratitude which we exchanged during these years and is sublime in our minds can never be extinguished however long and far off the separation be, by Time's all-serving wave. It was only at the time not far off, that we joined and evermore the period has evolved with flying wheel. Let us make the most of what we yet may have for the Bird of Time has but a little way to flutter—and the bird is on the wing. A poet composes whenever attracted by environments but our intuition will be composing vistas of past memory in our diaries for ever.

Society, Friendship and Love divinely bestowed upon us can beget the same and it is indeed to the sympathetic eye that their treasures will be visible. Ah! how many flowering isles lie where *Sweet Aeolus* abides in the deep wide Sea of Misery with *Neptune* sitting by smiling! While memory brings us back again each early tie that twined us, recollection at hand soon hurries us back to despair. May we share what To-day may afford before we know what Tomorrow can? For the paths of glory lead but to the grave.

We all pray to the Almighty to give a long life of bliss and happiness before Death can approach and rob us of all our pleasures.

Our Personalities—No. 8

AUGUSTUS APPADURAI!

If, on a fine evening, you climb up all the stairs and reach the College terrace, and find a fellow there with a book in his hand, grip him by the collar and sock him on the jaw. And hit hard; it is Augustus Appadurai. And tell him there are much better things for a young man to do of an evening than merely mumbling to a book.

If it were not for his mania for mugging, Augustus is a nice fellow, and extremely jolly. He meets you with a bland "Hallo!", and, if you start talking to him, and if he gets going, well, that's Augustus! For, Augustus is a very engaging conversationalist. Engaging, in the sense that he weaves a kind of gummy web of words from which one has the greatest difficulty in disentangling oneself.

The most shabbily dressed scholar in the Anatomy Theatre, Augustus astonished everyone by his sartorial finery when he stepped into the hospital. Many could not believe their eyes. He looked like one of those tailor's models that had just stepped out of its show-case. The metamorphosis was so miraculous that it was as unbelievable as the caterpillar-butterfly story narrated to the schoolboy. One had to see it to believe it.

The least remarkable feature about Augustus is his alliterative appellation. He signs his name A.A.A., the three A's standing for Augustus, Appadurai and Asirvadam respectively. This interesting phenomenon has been the cause of much imaginative thinking, and friends and foes alike have conferred on him additional names ranging from Ambujam to Anatomist.

The story of this august personality would be incomplete without the mention of one important fact. Augustus has a great weakness for brunettes. The only comment one may venture to make is that he is great even in his weakness. Catholic in his tastes and oriental in his selections, he is verily a diplomat of judicious discretion.

Augustus has found a place in the hearts of every one of his class-mates. It is all the more enduring because he did not strive to seek it, but attained it in his characteristic unobtrusive manner. His sincerity, honesty, joviality and good humour make him one of the most lovable characters.

Polite to all and chivalrous to women, he is the noblest example of a perfect gentleman.

ZAC.

Co-operative Club.

BY R. GANESAN, *Student Director.*

It is with a certain amount of trepidation that I set myself to the task of discharging the obligation that has devolved on my shoulders owing to the kindness of my colleagues. I wish to take this opportunity of congratulating people concerned in reviving the almost extinct interest of the shareholders in the Club affairs. It was to my intense surprise and happiness that I found criticisms and references made in the last issue of the Magazine about the Co-operative Club.

The Co-operative movement is to encourage mutual help and responsibility for one another's conduct. Co-operation is the other name for Brotherhood, Peace and Prosperity. For the Co-operative movement to be successful, two things should always be in our minds:—

(1) The movement should be well organized; it should consist of members who take sufficient interest in the working of the Club. The members should be conversant with Co-operative principles.

(2) The members should be faithful to the society and should realise that the interest of the society is their own.

If we could work with these principles in our minds, we can achieve the maximum good out of the Co-operative Club. "*All for one and one for all.*" Till now, we have convened two General Body Meetings this year, and I am very sorry to remark that the attendance always tempted me to doubt whether the shareholders numbered only 20. The few who

attend are there just to please the Directors or the President. This state of affairs should end. The shareholders should consider the Club as their own and should try to take more lively interest and if they have the leisure, they should probe into the working of the Club. Every shareholder should try to learn how the Club is working and from time to time advise the Directors about the improvements in the machinery of the movement.

As in every form of Co-operative Society, the supreme authority rests with the General Body, all important matters are decided at a General Meeting and confidence is gained by strict adherence to democratic principles. A member who feels grieved can refer the matter to arbitration. "Thus reliance is placed on preaching and persuasion and not upon the element of compulsion."

There is enough criticism concerning the bad quality of goods and defects in the running of the Club. Of course, good work is the mere discharge of duty which deserves no special recognition, bad work only needs any recognition at all! Co-operation has come to stay with us and we can only expect a slow but steady progress. I feel that the Club is no longer the concern of an interested few but the property of the shareholders, safe from all fear of defect or extinction. We shall try to rectify the defects and improve the Club to the best of our abilities and hope we would be able to give a good account of ourselves at the end of the term. I am

sure my colleagues would continue to extend to me their kind co-operation and help. I am indeed very lucky in my co-directors without whom I am sure I would not be able to do even the little I am now capable of.

Tastes in food as in other matters differ the world over; but we are trying our level best to suit our things to the palates of the majority of our customers. One of the basic principles of Co-operative movement is to have minimum profits or no profits at all and to give maximum comfort. We are trying to adhere to this maxim and believe us, when we say that the things supplied in the Canteen are of

the highest quality—(first class ghee being used mostly).

The Directors are making efforts to arrange for the sale of things (especially books) at a much lower percentage of profit and with this as an accomplished fact, the future of the Madras Medical College Co-operative Club is certainly bright.

Herewith we publish the balance sheet of the Club for the year 1939-1940. In closing let me request the students of the College to patronise the Club in all possible ways.

The transactions under the different main heads, and the profits earned in each were as under :—

	Transaction	Profits	Profits
			Per cent
Books	... 15,398 0 0	697 0 3	4.5
Canteen	... 11,824 0 0	2,438 4 10	17
Note Books, Stationery and Instruments	... 4,187 0 0	533 1 1	12
Hostel Section	... 2,430 0 0	181 1 1	7.5
Profits under Miscellaneous Heads	...	200 1 10	
		<u>4,049 9 1</u>	

The Gross Profit earned during the year was Rs. 4,049-9-0. The establishment and contingent expenses came up to Rs. 2,045-0-0, fifty per cent (50%) of the gross profit.

Deducting the amount due to depreciation of stock (furniture and vessels), and the audit fees for 1938-1939, paid during the year under review, a net profit of Rs. 1,588-5-0 is

left over. The bye-law 36 (i) of the Club requires that 25% of this amount should be credited to the Reserve Fund (Rs. 397-0-0). A sum of Rs. 1,191-0-0 will be available for distributing among the members as interest on the share-capital @ 6% (Rs. 75-0-0) and as bonus (Rs. 1,116 0 0). Approximately six pies per rupee could be distributed to the members.

Suggestions of a Sadhu.

By C. THOMAS SIMON,

(III Year, M.B.)

I am ever of opinion that the knowledge and experience gained by a man or woman will never be complete unless and until he or she makes acquaintance with and mingles freely in the company of the low and the poor. Day by day with enraptured ear we listen to the radio broadcasts and platform thunderings; we voraciously skim through the dailies and magazines; we blindly swallow the public statements of party leaders and philanthropists. In all these cases we are made to understand the opinion of those who occupy the highest wrung in society regarding certain vital and burning problems of the day. But as Mahatma Gandhi has often stressed it, there are the dumb millions in the world, especially in India, who have much to speak on many important matters, from their point of view of course, and who therefore deserve our patient and sympathetic hearing.

I had an opportunity once for an intimate and lengthy discourse with a poor old man walking about and begging in the streets and the reader will very soon understand how much an apparently mean individual can contribute to our knowledge. When I first met this old man, I was struck by his intelligent looks and therefore I decided to talk to him and clear some of my doubts regarding the life and outlook of the beggars as a whole. To shed off my superiority complex, I thought I will meet him in his hut only, dressed as far as possible as a poor beggar myself.

So one night I started as I had planned and saw the old man sitting in front of his hut. I approached him and told him in a pathetic tone that I had been begging all day long but could not get anything. The old man surveyed me from head to foot and said, "You don't get anything by begging because you don't look like a beggar."

"But look here," I said "can't you see how haggard and half-naked I am. My loin cloth is torn and soiled, there is nothing but dirt on my body and my hair has never seen a comb for years together."

"You can talk anything you please," he said, "but your person and physiognomy belie your statement. Not only that, I am quite sure that you have never begged in all your life."

I was surprised at the old man's power of observation and thought that honesty will be the best policy at least on that occasion. So I told him that he was perfectly right and that I had gone to him in such a manner that I could talk to him as an equal and gain some information from him.

"I will never talk to you" he said, "until you tell me who you are and what you are."

I told him that I am a University student studying in the Medical College.

The old man jumped up from his seat really amazed and said, "Can I believe it." He at once called his wife and children from inside and said, "This is a red-letter day in the history of our family. Never in all my life did so distinguished a guest come to my house. He is an undergraduate of the Madras Medical College." The old woman looked at me with open eyes. The two urchins were really chips of the old block and were ready to step into their parents' shoe on any day.

The hospitality evinced by the old man and his family were far above my expectation. But however I had to refuse everything on many grounds. Soon I was seated on a mat by his side and any press reporter might have easily mistaken us for Rev. Kagawa and Rabindranath Tagore in Santiniketan.

It was I who first broke the silence. "I want to know at the very outset," I began "whether people like you who go about moaning and whining, begging and prostrating in the scorching sun are really happy."

"Are you happy?" asked the old man, evading a direct answer.

"To a certain extent I must suppose I am happy," I told him. "But compared to many other people I am not."

"Comparisons are often odious" he said, "and there lies the trouble with people of your status. You look at the moon and despair because you are not so beautiful. You envy the flowers because they are so fragrant. But have a look at the myriads of worms and insects whom you unwittingly kill under your feet. Always think of those who are having greater sufferings than yourselves and then you are happy."

"I beg to differ from you" I said, "if all people are going to think and act according to your advice the world will daily deteriorate. Every young man and woman, according to me, must have an ideal and an ambition which should be far above his or her reach. This is the fundamental idea of Heaven. Heaven is something beyond our reach in this world and hence its charm."

"You are talking merely from the materialistic point of view," he said "and the great pity is you are bringing in spiritual ideas to vindicate your statements. When a man abandoneth all desires of heart, and on every side is without attachment, and can withdraw his senses from the object of sense, he alone is happy. This is what Bhagavad Gita has taught me. But you the so-called decent people of society want all pleasures and when you don't have the means for it do all kinds of ignoble actions. I am sure that greater rogues are going about in cars and on motor-cycles than many of those who are interned for trifling pilferings."

"What a damaging statement," I shouted. "Look here my dear old man, do you know that one of my ambitions in life is to buy a beautiful motor-car and go about an evening ride with my wife and children?"

"Your ambition is good," he said "but once you have purchased a car will you like to live without one afterwards. You will only try to maintain one by fair or by foul means and will stoop to do any mean action with that end in view. This is all what I meant."

"So you beggars are cheating the public every day" I said, "you are really happy, but pretend to be miserable and get money from good people."

"You are thoroughly mistaken," he said, "begging you must remember is our profession. Do you think a judge who is full of gravity in the court will be in the same mood in his house also. Or do you think that a priest who weeps on the altar or a clown who laughs on the stage will be doing the same thing in their private lives. People put on different dresses to fill their one-span length of belly and ours is only one among them."

"But there is this difference," I said, "if there are various kinds of people in this world they are all of some use to mankind whereas you beggars are an out-and-out nuisance to society."

You spread diseases from Cape Comorin to Himalayas and thus lower the standard of the public health of the whole of India. You can be easily compared to itinerant warehouses wherein all abominable diseases are stored and therefore every infectious disease. I can easily say it has one of its main origins from you only. You visit every festival and other crowded places and so diseases spread like wild fire. Please remember my dear old man that in every western country they have passed regulations to stop begging for ever; not because the people of those countries are unkind but they want their sons and daughters to be healthy. Do you know that in India alone there are more than six million beggars going about like the Angels of Death dropping the seeds of disease and misery everywhere. The first duty of the medical men is to pluck out diseases completely from the face of the earth and as long as you remain an impediment to this sacred duty and mission of ours, we the medical men are against the beggars and therefore support with

all our hearts the present move in the Madras City promulgated by the leading ladies to build Beggars' Homes to keep the disabled and miserable and then to stop this obnoxious begging for ever."

"I wish you all success in your laudable endeavour" he said, "but remember that ours is a problem which even the great Asoka could not solve."

"Since you are so unconcerned over it," I said, "we need not talk anything more about it. But I shall be highly obliged to you if will kindly let me know why beggars are always going about singing."

The old man smiled and answered "we sing because it gives us more strength to go about begging. Anyhow it has been a surprise to me how music can make us forget our worries and even infuse strength into us. You are a medical student and so you must explain this phenomenon to me."

"Music has much medicinal value," I began my lecture. "The healing power of music has long been recognised by the medical men and they have therefore ranked it as one of the efficient agents to relieve and even cure diseases like melancholia and hallucination. The sweet concord of music produces harmonious sound waves which by their rhythmic movements stimulate and tone up the depressed nerve centres. And you must remember that the various parts and systems in the body are interdependent and therefore these effects reach the heart, the lungs and the muscles. When the heart begins to work efficiently the flow of blood to all parts of the body is enhanced. Increased respiration causes a greater intake of oxygen, so that as far as invalids are concerned music may be

regarded as an effective substitute for exercise. In America minor operations have been carried out without anesthetic on music loving patients. So let us hope that before long music will find a prominent place in our hospitals also."

"Why can't you introduce radios and gramophones into the various wards and operation theatres of the General Hospital—I mean only as an experiment."

"It is left to the authorities concerned" I said. "And therefore I will be the last person to make such uncalled-for suggestions. I am a firm believer in the theory that charity begins at home. We must make our position secure first and then only step out into the wide world for humanitarian projects. I hope you will not consider my ideas as the outcome of sheer selfishness."

"I will not be surprised even if you are selfish," he said, "as long as the main motto and ruling principle of the entire humanity is selfishness you and I are no exception from it. But there is only one effective antidote to this ugly quality and that is to love others as we do ourselves. Hence it is that this noble sentiment, Love, has been given to mankind, sanctioned and even encouraged by Gods. But most of us misunderstand it and the rest misuse it."

"As far as I am concerned" I interrupted, "you can rest assured that your precept will be put into practice. I belong to that unique profession wherein one has every chance to help and relieve the suffering humanity. The spirit of this good resolution permeates the relationship between a Doctor and his patient."

"Thank you very much" he said, "for the promise you give on behalf of your profession." He again continued, "your action tonight deserves all my applause. If the rich and the poor were to meet and mingle like this on common grounds, it will be like the meeting of the ocean and the horizon and the result will be the bursting forth of the glorious morning sun silhouetted against the blue etherial sky. Then alone will be dawn on earth, that Millennium with its utopian charms and multifarious fascinations. India alone can be the guide and the leader to all the world in this respect. There is so much of work to be done in India now, so much of scope for personality and spiritual growth, so many Gordian Knots to be cut asunder by sheer force and so many sphinxes to be baffled by superior brain, that to be born in India to-day is a rare privilege and great opportunity given to any nation. Let us appreciate and utilize this to the fullest extent."

She follows the Prescription.

(A SHORT STORY.)

BY "SEE-YESS"

The doctor, a little jaded, after the long stream of patients who had been passing through his "Clinic", glanced without any real interest at the last one, a lady. He had arrived at the stage where one woman looked very much like the other to him and where none of them looked like having the feminine in them to tickle the doc's sixth sense. In short the last patient looked nothing more than a mere human being.

"What is your name, please?" The doctor put on rather mechanically.

"Chum, Kum".

The doc' wrote down "Miss C. K." and then asked without looking up "Age, please".

"Just seventeen". She said it with a peculiar tone which made the doc' realize he was with a girl so young as all that. He was so tired that he passed on again into a refractory period, which rather made the girl feel feverish and disgusting.

"You have never been here before?"

"Never!" said Chum with a light emphasis that suggested she would never come again, either.

"And what do you complain of?"

"Oh! complaints!—What time you propose to go to bed?" she asked.

"I beg your pardon?" He looked up this time, and rather quickly and

perturbed. She noted that his surprised black eyes were rather attractive. "What I mean is, that unless you are rather a late bird, so to speak, you will miss your usual bedtime if I really start complaining!"

The doctor picked up a small, shining and wicked looking scalpel and prodded the blotting pad with it. He hoped it would be a hint to her.

"Well look here—What is exactly your trouble?"

"Well, of course that's really what I ought to ask you, isn't it? If I knew—well, I should be saving us both some bother!"

The doctor was thinking to himself: "Abounding patience is the most essential quality for a general practitioner!" A maxim he had learned in his college days. Aloud he said, with exaggerated gentleness, "Of course—of course, have you any symptoms?"

"Oh, dozens and dozens!" answered Chum, cheerfully. Quantity did not seem to move the medico to any degree of enthusiasm. On the other hand he felt like saying "Indeed, you look it."

"Could you enumerate some of them?"

"Well, generally speaking, I feel—I feel—well, I feel anyhow!"

"I see!" He did not sound enlightened. "Such as?"

"Especially in the mornings," said Chum. "When I'm in bed I'm frightened to get up; and at night, when it's time to go to bed, I'm just too bored and lazy to go!"

"Ah!" said the doc'. "By the way, are you married?"

"Of course, not yet!" She replied with apparently unnecessary indignation.

"How do you sleep?" asked the doctor.

"What do you mean?" retorted Chum with an accent of suspicion.

"Oh! well,—I mean, how do you—eh,—do you sleep well?"

"Oh!" sighed Chum. "I said I don't."

"And how do you eat?"

"Oh, in the usual way—with a supply of food, and by the use of both my hands and my mouth."

"If I may mention it," snapped the doctor, feeling that he was not being treated with proper respect "your stomach and your gastric juices also play an important part in the process."

"I don't know!"

"Then you don't. If you did you would!"

"Sorry! Do you mind saying that again?"

"It doesn't matter!" said the doc'. "Put out your tongue, please." He could not help asking for this when he found her rather talkative.

She put her head back, and gazed soulfully at the ceiling. In that position her throat looked like a column of smoothly polished alabaster.

And I assure you she did not apply any cosmetic for that. Then the rather full, very scarlet lips opened slowly, revealing a double row of perfect teeth. What looked like a delicately pointed strip of moist, palpitating coral was slowly projected to doctor's gaze. But this did not interest him much as it could have been if he had seen something else, for he would have seen at least 100 tongues that day.

"Perfectly clean!" said the doctor. "Thank you!"

"Why, thank me!" snapped Chum. "I keep it like that entirely for my own satisfaction."

To be more systematic in the examination he looked for the tonsils and then went on digging his fingers for the 'glands.'

"Your pulse?" said the doctor and his fingers closed lightly on her wrist. It was a very pretty little wrist the skin smooth and velvety. From it a shapely hand hung, delicately pendant. It was a smooth white hand, with long dainty fingers, the nails slightly pointed and very faintly coloured. The doctor noted all this—subconsciously.

"H'm!" said he, after a minute. "May I look at your eyes?"

"They're here—and I don't see how I can stop you!"

The doctor, drawing down the under lid gently, became aware of the satiny smoothness of her cheek. And then the eye itself. These made him think every so many things. Of course I mean the diseases associated with these signs. Evidently he could not arrive at anything.

"H'm!" said the doc' again. "I would like to try your reflexes!"

She follows the Prescription

"Oh, would you?" she sounded a little startled.

"Draw your sarcee up a little, if you please."

"Oh! I see! Is—er—that enough?"

"Quite!" said the doctor assuming seriousness. "Now please cross your legs."

"Oh, certainly!" Her tone meant something—possibly relief. She crossed them.

The doctor, if jaded, was not entirely unconscious. He noted a pair of slim, shapely legs, a beautifully rounded knee, a slender ankle, and a most dainty little foot, with a ridiculously flimsy, high-heeled sandal on it. He took a thing like a rubber-headed hammer and smote just below the knee. Instantly that shapely leg shot up with such violence that the little sandal, not to exaggerate, became detached from the charming foot, and went sailing across the room.

"H'm!" said the doc', with emphasis.

"Oh, I'm sorry" cried Chum.

"Not at all!" replied the doctor perfectly, truthfully. He went and retrieved the sandal. When he went to put it on, she deliberately kept her foot so that he had to stoop to adjust it, and the faint perfume of her larolascented dainty feet tickled his nostrils, obliterating completely the smell of 'Iodoform' which usually held sway there.

She thought he took a little longer than really necessary to replace the sandal. She did not complain. He was a very handsome young doctor.

Now he sat down in his chair again and regarded her steadily and with a

certain amount of attention. What he saw, now that he was really looking at her, he found quite good to look upon. He could see a delightfully well-formed figure whose curves were almost as attractive to an anatomist as to an artist.

After a deep survey he said "You are very run down".

"Oh, am I?" she seemed a trifle startled.

"Your nerves are—er—well, Jumpy".

"Really?" she looked hastily down at herself, apparently expecting to see some signs of movement.

"What you need," the doctor continued, "is a complete change. And, by that, I do not mean a fortnight at Kodaikanal or Avadi or even in the country. The essential thing about a complete change is—well, to make it a complete change!"

"Yes, I suppose so!" smiled Chum, gently sarcastic.

The doctor frowned heavily, "In short, what I mean is, change your habits, your routine, whatever it is you have been doing. Stop doing things you habitually do—do things that are more or less directly opposite. Better still, do things you have never done before—go to places you have never been to before. Get experience you have never had before. For instance, you say you are not married?"

"Are you suggesting that I should get married?"

"As an example, that would be a change!"

"Rather a permanent one, don't you think?"

"Not necessarily—in these days. Anyway get that change somehow. Otherwise you will become worse, and I will not be responsible for the result. That will be five rupees, please!"

"Oh, I see!"

From a smart handbag she took a small purse. The currency note she extracted therefrom was not so smart, but it was doubtless more useful. She laid it gently on the desk.

"What I really came to see you for, doctor," she announced sweetly "Was to see whether I could induce you to subscribe for the flood-fund. My father has started it."

"The devil he is!" exclaimed the doctor incongruously. "I say, I—I'm most awfully sorry. Here, if I may—"

"Thanks awfully!" She took a Rs. 10 note and dropped it into her bag. Not bad Rs. 10 for Rs. 5. "But really, it's been very interesting, you know. I had no notion that I was run down; but now I shall do just what you say. I shall follow your instructions to the letter. Oh—"

She had risen while speaking, and now seemed to sway, giddily on her heels. The doctor sprang to assist her, and then, somehow, she seemed to slip quite naturally into his arms.

"What's the matter?" cried the doctor. "What is it?"

"Only this!" she answered in a low, slightly tremulous voice.

Next moment her powdered arms were round his neck, and she had

pulled his head down so that her warm, sticky lips pressed closely to his own ones, rather startled ones. The unexpected contact thrilled him like a presystolic murmur, and he really murmured something.

Her delicately perfumed breath made him as dizzy as a whiff of his own ether. For a moment he was in Paradise. Then he wriggled deftly out of her 'gum-resined' lips. He stared at her dazedly.

"What—whatever are you doing?" he gasped, stupidly.

Her attitude was full of grateful defiance; her smile of sheer roguery!

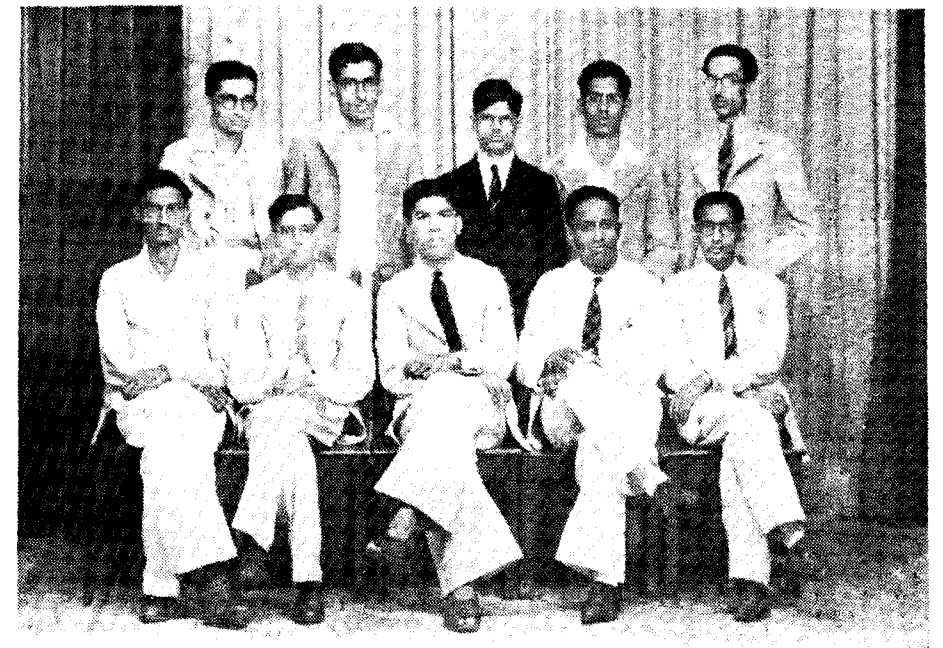
"I'm taking your prescription," she answered. "A complete change! Doing the things I've never done before! That's the first time I've ever kissed a doctor in his clinic, and the first time I've ever kissed a man uninvited. I believe I'm going to like your treatment doc!"

"Are you?"

He made a tentative movement towards her, but before he could reach her she was out of the door and, with her head round it, she laughed at him.

"No! If we make a habit of it, it won't be a change any longer, will it? But I will be seeing you again and let you know my progress!"

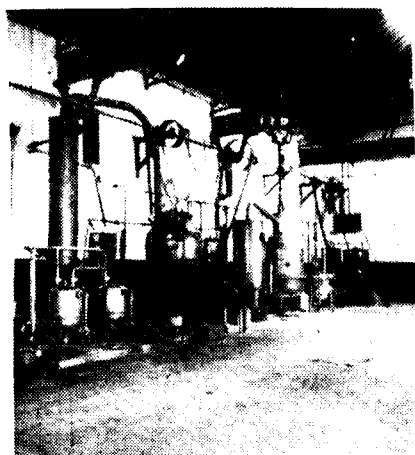
She was gone. He tested his own pulse and found it registered 120, while his reflexes were those of a mad footballer playing a losing game.



THE BATCH OF PHARMACY STUDENTS
who made the Tour to Calcutta.

The Pharmacy Students at Calcutta.

BY B. M. KANNABIRAM B.SC., PHARMACY STUDENT.



Absolute Alcohol Still.



Feeding Boiler.



Tinctures making.



Carbon Dioxide filling.

The Calcutta Mail which left Madras on the night of the 20th of September 1940 carried in it a jolly party of ten—the first batch of Pharmacy students ever to go to Calcutta on an educational tour.

We steamed into the Howrah station at 10-30 on a Sunday morning. The approach to what has been called the "London of the East" is through a district which bears the stamp of industrialism on it. The earlier part of our first day at Calcutta was spent in sleeping off the effects of the long railway journey from Madras, and it was only about 3 o'clock in the afternoon that we sallied out on a sight-seeing expedition, which was to be the prelude to a week of strenuous activity for us. The Kali Temple of which we had heard so much in distant Madras was one of the many places whither we turned our steps. We were surprised to be told that we had to purchase tickets to get into the Temple. Our own impression about the Goddess Kali was that she was far from mercenary; but here she was, just like an ordinary circus manager, charging us one anna per head for admission into her temple! However, pay we did, and when we entered the Temple we were agreeably surprised to find that only flowers and fruits were offered to the idol, just as in South Indian temples. From what we had heard of the Temple, we would not have been surprised at all if we found the idol submerged in a flood of human and goats' blood. Thus if 'a Sunday well spent means a week of content', we felt that we had already assured our content for the week that was to follow.

On the Monday morning we started our work with gusto. The Standard Chemical and Pharmaceutical Works Ltd., was the first firm which we visited. Thanks to the courtesy of the Managing Director, Mrs. A. Ghosh, a conveyance took us from our hotel to the factory. This is one of the firms which has grown up with enormous strides. Though young in years, (it is only four years old) it is today making all the pharmaceuticals and preparations that firms of much longer standing do. Among the many things we saw from start to finish, are the isolation of the three alkaloids Kurchicine, Kurchine and Conessine, besides resins and gums, from Kurchi bark. The manufacture of glass ampules from long tubes of various diameters is worth seeing. Besides these, Adrenalin is extracted from suprarenal glands, and Pepsin from the stomach of goats, Quinine alkaloids from Cinchona bark and the liquid extract from Asoka bark. Wine made from the fermentation of grapes is used for their patent nerve tonic "Vinotone". "Seroid" (sulphanilamide) which is equivalent to Bayer's Prontosil Album or May and Baker's 693 is also extracted here. This firm has a cold room for keeping glandular and other thermolabile preparations. The alcoholic preparations of the B. P. and indigenous drugs extracts are under the control of the Excise Department. The drugs manufactured are standardised biologically.

Recreation after instruction is the law of life, and so the evening was naturally spent at The Rose Beauty, where charming Japanese girls keep miniature aquariums and sell goldfish to visitors.

Dr. Bose's Laboratory Ltd., was the first firm that we visited the next day. This is situated outside the city a suburb of Calcutta. We were first taken to the Distillery and then to the Bonded Pharmacy. Here alcohol is distilled from fermented molasses. The Yeast Culture is made with Hunsen's apparatus, and Grim's Still is used for the distillation. Absolute alcohol is made here, and they have a separate still for distilling alcohol for Homeopathic preparations. Besides Spiritus Aetheris Nitrosi and other B. P. and indigenous preparations are distilled here. All the spirituous preparations were, of course, under the control of the Excise Department.

The Sulphuric Acid plant at Ballia-ghatta is a sight which should not be missed. The process followed is the Lead Chamber one, but the Nitrate is added to the Sulphur and heated in an oven. There is no separate furnace for the preparation of the oxides of Nitrogen. Sulphur dioxide, nitric oxide, nitrogen peroxide and air are passed into the cylindrical lead chambers nearly 120 ft. high and 50 ft. in diameter. The weak acid which is formed by the injection of steam into this mixture of gases is called chamber acid. This is later concentrated into about 99 per cent. The daily output of acid of this laboratory is $2\frac{1}{2}$ tons.

The role which Sulphuric acid plays in commercial Chemistry is so immensely important, that it has been said that a country's commercial prosperity can be gauged from its annual output of acid. As a matter of fact India has very few Sulphuric Acid factories and the total output of India is not sufficient to meet the Industrial demands of the country.

Besides alcoholic preparations and Sulphuric Acid, Dr. Bose's Engineering

Works also manufacture many machines and utensils necessary for pharmaceutical operations. Soaps, both of the toilet and the washing variety, are made by their Soap Works, besides disinfectants like Phenyle and Lysol.

On our way from Dr. Bose's Laboratories we were privileged to visit The Imperial Glass Works Ltd.

Glass is a solidified undercooled solution of several silicates—most commonly of Potassium, Calcium and Lead—and is made by fusing together a mixture of clean sand, limestone, sodium or potassium carbonate and litharge in right proportions. The mixture is melted in fire-clay crucibles, and when in the molten stage and at a particular temperature, a portion is taken at the end of an iron tube and brought to the desired shape by forcing it into a mould and blowing into the tube. The moulded glass is then annealed in an annealing kiln, since rapid cooling causes brittleness and slow cooling devitrifies glass. Though there are many varieties of glass like Bohemian glass, Jena glass, Flint glass, cut glass and soda glass, only the last variety is being made at this factory as it is still in its infancy.

The next day after doing justice to our Hotel menu of Madras Sambar, Malabar pappadams and Gonkura chutney we sallied out to Messrs. Smith Stanistreet and Co., Ltd., which is also situated in another suburb of the City. The European Manager was kind enough to take us round an extremely well-kept factory. The department where alkaloid Strychnine is extracted from nuxvomica seeds was the first to draw our attention. It is remarkable that this is the only factory in India which manufactures Strychnine and its salts, and the monthly output is about 100 lbs. We

also saw essential oils being prepared in the same department. In the department for the preparation of non-alcoholic materials we saw huge disintegrators, mixers, sifters, Ball mill, tablets machine, emulsifier and end-runner and edge-runner mills in operation. We visited also the testing laboratories, the bonded laboratories, drying chamber and the place where the products are given the necessary finish and despatched.

The next day we visited the Calcutta Chemicals, Limited. We watched the deodourisation of Neem Oil and the preparation of Margo Soap from it. In this factory potassium nitrate is prepared from the crude salt obtained from cowdung and wood ash. It was here that for the first time on our tour we saw lactic acid and calcium lactate being prepared by the fermentation process. After seeing the distillation of lemon grass oil and various other essential oils used in the manufacture of perfumes, we moved on to their laboratories where the oils and the chemicals were analysed. A chemist who had previously worked at both the famous Lautierfills of France and Schimmel's of Germany showed us the various bouquets of perfumes. We also saw the manufacture of Neem tooth paste, hair oils and various other patents. When we left the Factory our pockets were bulging with the many specimens that we had stuffed into them.

The Bengal Immunity Co., Ltd., whose speciality is the manufacture of vaccines and serums was visited by us the next day. Sturdy Australian horses, kept in clean stables and well cared for are used for immunisation. We walked through the bleeding room and the two cold rooms where the immunised blood is kept for clotting, and serums both in the

process of preparation and those which had been completed. We also saw the laboratories where the serums are tested and carefully standardised. The doctor who took us round the factory was kind enough to treat us at tea.

Messrs. B. K. Paul & Co., Ltd., at Dum-Dum which we visited the next day are famous for the herbarium they maintain in their garden, for in it, they have succeeded in growing all the herbs which are used in the making of drugs. Digitalis, we were told, grows well during winter, but withers up by the end of January, due to the heat. Hyoscyamus Sennæ Tinnevely, Chaulmoogra, Nuxvomica, and Scilla are some of the other plants we saw growing there.

This firm makes surgical dressings also, and the demand for this is so great now that the factory is working for all the 24 hours of the day. Cambodia cotton and U. P. cotton is freed from fat by alkali, washed with water, bleached and then rinsed, squeezed, dried in hot air ovens and then sterilised and packed. Besides essences and perfumes, they make disinfectants also from the fractions obtained in their coal tar distillation plant, and surgical instruments in their workshop.

That afternoon we went to see The Bengal Chemical and Pharmaceutical Works Ltd. One of their men took us round the whole place in 40 minutes—a smart job indeed. We skipped over many things which would have required volumes of scientific explanation to make us understand them; but we were definitely unfortunate to miss seeing their acid factory, and their preparation of surgical dressings, vaccines and serums,

We were really happy when the next Sunday came round and gave us a chance for unadulterated sight-seeing. Roaming round the city, we occasionally stepped into a few drug shops, and found that these shops stocked almost all the B. P. drugs. In a shop which sold Indian indigenous drugs we were surprised to find heads of various wild beasts, serpents, reptiles and scorpions being roasted in oil. And to think that lions have to be hunted down and tigers decapitated to provide the constituents of the drugs to cure all the ills that flesh is heir to, makes one thrill at the thought of the great sacrifices that have been and are being made to alleviate human suffering.

On the last day of our stay at Calcutta we visited Dr. Mukherjee at The Central Laboratories. Dr. Mukherjee himself was kind enough to take us round the whole place, explaining all the various apparatus and the experiments, both of chemical

and biological value. Dr. Mukherjee dealt with the whole subject of Pharmacy in such a simple manner that even a child could understand it; in fact he was a regular mine of pharmaceutical information.

And then to shopping and packing! And you can be sure that the most important of our purchases was of course the Rasagullas. For we might visit a thousand factories at Calcutta and get back to Madras with our heads crammed with information, but the little ones at home will not believe that we had been to Calcutta unless we present them with Rasagullas on our return. And so encumbered with tins of that commodity we stepped off the train at the Madras Central Station.

We had a very enjoyable tour indeed. To our professors who arranged this tour for us, and to the managers of the various factories which we visited are due our thanks—the coin current in the realm of kindness.

Extract

REHABILITATION, MASSAGE, AND PASSIVE MOVEMENT

It is most unfortunate that an otherwise excellent editorial on this subject (October 12, p. 493) should include a grave misstatement. You write: "It may be said conveniently and correctly that there are often three stages in the treatment of an injury. First comes the active surgical treatment with some period of rest or immobilization immediately after; then a stage in which massage and passive movement are the chief remedial features; lastly the stage of active exercise and graduated work".

Such a view is a complete contradiction of the principles of modern fracture treatment. It represents a survival of the obsolete practice of immobilizing injured bones, and then after several weeks or months discovering for the first time that joints have become stiff. If the task of rehabilitation centres is to cure stiffness which should never have arisen it is unlikely that they will be any more successful than the old massage departments. There are no such stages of treatment. Active exercise and rehabilitation must begin on the day that active surgical treatment begins—that is, on the first day. Some joints may need to be immobilized, but every other joint is actively exercised, and functional activity is thereby maintained even in the immobilized region.

The most pernicious phrase of the sentence is that which refers to passive movement as the chief remedial feature. **Passive movement and passive stretching should never be employed at any stage of the treatment of bone and joint injuries.** It defeats its own object. Far from increasing the movement of a joint, it causes progressive stiffening. Hugh Owen Thomas spent his life teaching this. Sir Robert Jones spent his life teaching it. Every member of the British Orthopaedic Association Fracture Committee is now teaching it. It is regrettable, when three generations of surgeons have attacked this dangerous practice, that by a slip of the pen a *British Medical Journal* editorial should advocate it.—We are, etc.,

T. P. McMurray, Liverpool.
E. P. Brockman, London.
R. Watson-Jones, Liverpool.
H. O. Clarke, Manchester.
W. P. Gissane, London.
C. G. Irwin, Newcastle.
E. Lloyd, London.
K. H. Pridie, Bristol.
R. I. Stirling, Edinburgh.

President and Secretary of British Orthopaedic Association, and Chairman and Members of the Standing Committee on Fractures.

Sports.

The introduction of Black-out in Madras strangely coincided with an almost complete black out for our teams in Collegiate competitions. The only saving grace of the long term had been our winning the Stokes Hockey Shield for the second year in succession. For the first time after 1933, we missed the Mysore Cup for the Inter-Collegiate League Hockey and finished as mere runners-up. By doing so we also failed to earn our right to qualify, for the University championship. Sad to say we have gone one step down the stairs of tradition and history. The black jersey with the skull and cross-bones, that splendid symbol of sportsmanship, hardihood and the winning vein has for once been eclipsed in Collegiate League Hockey. Despite the vaporings of dull critics, our hockey team still is the best among the Colleges in the south of India. That as many as seven from our College were chosen for the 'Varsity team is proof-positive of this fact, if proof be needed. Linton as Captain had had more than his share of bad luck. Yes, it is true. But yet it is painful to point out that our men have not taken the Inter-Collegiate games with half the same seriousness and enthusiasm as they do in the open-tournaments. Many would no doubt start, indignantly were a small elf to whisper in their ears the word, 'over-confidence'. Yet that and no other is the name of the failing in most of us. Many amongst our hockey players, otherwise splendid fellows and fine players, are seriously though often unconsciously burdened with this large parcel of blown-out-Nothing, when they step into the field for an inter-Collegiate game. We have paid dearly for it and it is high time we get rid of it.

Coming to *Cricket*, once again it was a tale of missed opportunities. Hari-

das heroically stood by the side at great risk to his own studies. If only other men who stood down from cricket had shown a wee bit of his sincerity and purposiveness we could have easily kept up our last year's unbeaten record. But as it was we finished only as runners-up. On the only occasion when we mustered our full side, the team showed the mettle that it is made of. I refer to that memorable match against the Christians. On a rain soaked pitch that was unfit for cricket, against the wishes of the rival captains and their men, the teams were forced to play. Padmanabhan, the lion-hearted bowler, skittled the Christians out for a paltry total to enable our team to have a comfortable victory. In the only other interesting match against the C. N. T. Institute, A. V. Rajagopal indulged in hectic hitting but was unfortunate to just miss the century that he so richly deserved.

Then on to *football*. Many things have been said about the Bangalore trip. Whatever it may be, there is no gainsaying the fact that our football team is a hundred per cent improved side after that tour. In our very first encounter in the Wilson Cup Football Tourney, playing on a neutral ground with a common referee, we had a comfortable win against Loyola. Such of those as may remember that unhappy League game against the same team, in which the whistle was effectively used to make us lose the game, would feel particularly happy about this. Then came the gruelling fight for three days with the Presidency College in the semi-final. Much nearer the truth to say, the gruelling fight with their splendid goal keeper. Ultimately we had the better of the argument and entered the final as we richly deserved to.

COLLEGE HOCKEY XI

Winners of the Stokes Shield.



Standing : (L. to R.)

D. Harirajan; P. V. Krishnamoorthy; G. Crosse; C. B. Alexander;
E. S. Linton (*Captain*); B. J. Pereira; D. A. W. Nugent and B. W. J. Ince.

Sitting : (L. to R.)

D. M. Gomez; B. D. L. Carvalho and E. F. Harben.



B. J. PEREIRA,
who won the individual championship
at the Inter-Collegiate Athletic meet at
Annamalainagar.

But as for the actual finals there is nothing pleasant to say about. We lost badly to Technology, a superior and experienced team. It is not our losing badly that matters so much as the way in which we lost it. Just to mention one incident: A wing half-back taking a free kick from a spot, just a couple of yards from the touch-line and 30 yards from the goal-line, sends it back to cross our own goal line and walks off smiling with a reproachful air of superior wisdom. Later on an explanation was offered that the half back meant it as a back-pass to the goal-keep. I have not seen even the Olympic Hockey team, the most famous exponents of back-pass play, do it with a comfortable lead of 10 goals. I could just refrain from shouting 'Sez you' which in good Anglo-Saxon would mean to say 'Tell us another'.

Our Athletic team led by A. J. Nicholas went to Annamalai Nagar to defend our title at the Inter-Collegiate Athletic meet. Due to very heavy rain-fall the ground was not fit for an Athletic meet. Not only that. The programme was so badly arranged that Nicholas had to take four items at a stretch on the same day without any rest. The result was that he could win only one of his items. It may be remembered that he obtained four firsts last year. We lost the championship. But it is consoling to note that B. J. Pereira won the individual championship. Punja won the pole-vault in fine style.

Many great names will be missing from our College sporting side: B. J. Pereira, the most outstanding athlete of recent times, easily the best pivot at Hockey we have had since Cullen, and a fine soccer goal-keep: A. V. Rajagopal, another fine all-rounder and a grand cricketer; B. Mahadevan, wicket-keep

batsman and an athlete of no mean merit; G. Bird, athlete and a splendid Hockey goal-keep. P. F. Mathias, a good cricketer and T. Madhava Rao, that unassuming and stylish bat, have left us. We are sorry to lose them all in a bunch together. We wish them all success and a very bright future and we will be scanning the sports columns of the press for their achievements elsewhere.

If anything has been said with Transatlantic frankness, it is not intended to touch anyone on the raw. It is only done so that we may do better and better still.

Before closing down, hearty congrats to the following 'Varsity Blues:—

CRICKET

A. V. Rajagopal and M. Muthukumaraswamy. A. V. Captained the team.

HOCKEY

B. J. Pereira, P. V. Krishnamurti, E. S. Linton, B. Ince, D. Nugent, E. Harben and B. Carvalho.

I wish the hockey players the same success at Lucknow as attended them at Bangalore.

We commend the following extract from the *Bangalore Daily Post*, dated 27th September 1940, to our readers:—

"This was the last occasion on which the Madras Medical College appeared on the Bangalore Hockey Field as the team left this morning for their home station. They are a fine set of men and the public of Bangalore who had the good fortune of seeing them will long remember them as good, clean, sportsmen and regret their stay was all too brief".

(Sd.) P. V. KRISHNA MURTHY,
Sports Secretary.

Exchanges.

We acknowledge with thanks the following exchanges :—

1. King George's Medical Clinical Society, Lucknow.
2. Grant Medical College Magazine, Bombay.
3. Vizagapatam Medical College Magazine, Vizagapatam.
4. Indian Journal of Venereal Diseases, Bombay.
5. The Kemcol Journal of King Edward Medical College, Lahore.
6. Burma Medical Times, Rangoon.
7. Journal of Andhra Medical Association, Bezwada.
8. Indian Medical Association, Calcutta.
9. Ceylon Medical College Magazine, Colombo.
10. The Prince of Wales Medical College Magazine, Patna.
11. St. Joseph's College Magazine, Trichinopoly.
12. Patna Medical College Magazine, Patna.
13. Osmania Medical College Magazine, Hyderabad.
14. St. Aloysias College Magazine, Mangalore.
15. Loyolla College Magazine, Madras.
16. Sind Medical Union, Karachi.
17. Medico-Surgical Suggestions, Madras.
18. Rangoon Medical College Magazine, Rangoon.
19. National Medical College Magazine, Bombay.
20. Medical Digest, Bombay.
21. Journal of South Indian Medicine, Madras.
22. Indian Medical Journal, Madras.
23. Lahore Medical College Magazine.
24. Stanley Medical College Magazine, Royapuram, Madras.
25. Journal of Indian Medical School, Kilpauk, Madras.

University of Madras.

Medical Examinations, November—December 1940.

The following is the list of successful candidates at the Medical Examinations held in November–December 1940 :—

[*Note.*—Names in italics denote women candidates.]

FIRST M.B. & B.S. EXAMINATION, DECEMBER 1940.

NEW REGULATIONS.

PART I

Register number.	Name of candidate.	Where educated.	Register number.	Name of candidate.	Where educated.
211	<i>Aminikutti, A.</i>	Madras Medical College.	250	Karunakaran Nambiyar, P. C.	Stanley Medical College.
213	Annamalai, A. L.	Do.	251	Kasim Mustapha, K. M.	Madras Medical College.
214	Appayya, B. C.	Do.	252	Kesava Menon, N.	Stanley Medical College.
216	Audikesavulu, K. J.	Stanley Medical College.	253	Kulandaivelu, K.	Do.
217	Balaram, A. C.	Madras Medical College.	254	Kuppuswami, G.	Madras Medical College.
218	Balasubrahmanyam, L. R.	Stanley Medical College.	255	Lakshmanan, D.	Do.
221	Bhaskaran, K.	Madras Medical College.	256	<i>Lakshmibhanamma, S.</i>	Do.
222	Chacko, A. K.	Do.	257	<i>Lakshmikutti, K.</i>	Do.
223	<i>Chandapilla, Rebecca</i>	Stanley Medical College.	258	Lakshminarayana Rao, U.	Stanley Medical College.
224	<i>Chandran, Indrani</i>	Madras Medical College.	259	<i>Lalitha, C.</i>	Madras Medical College.
225	Chandrasekharan, R. G.	Stanley Medical College.	260	Lingappa, P.	Do.
226	Chinmayanandan, K. G.	Do.	262	Mahadeva Ayyar, K.	Stanley Medical College.
228	Cooper, M. M.	Madras Medical College.	263	Malins, R. N.	Madras Medical College.
230	Desmond, A. F.	Stanley Medical College.	265	Monsurate, E. J.	Stanley Medical College.
231	Dharmarajan, A.	Madras Medical College.	266	Monteiro, E. J.	Madras Medical College.
232	<i>D'Souza, Clare</i>	Do.	267	Muhammad Abdul Hadi	Do.
233	Gajendran, V.	Do.	269	Narasimhachari, G.	Do.
234	<i>Gangamma, C. B.</i>	Do.	271	Natarajan, K.	Stanley Medical College.
235	<i>George, Bridget</i>	Do.	272	Natarajan, M.	Do.
237	Gopinathan, N.	Do.	273	Nilakantan Nambudripad, K. M.	Madras Medical College.
238	Hellein, R. H. S.	Do.	274	Nugent, D. A.	Do.
239	Hensman, E. R.	Do.	275	Paramesvaran, V. V.	Do.
240	<i>Janaki, K.</i>	Do.	276	Parthasarathi, A. L.	Stanley Medical College.
241	<i>Janaki, P. V.</i>	Do.	277	Parthasarathi, R.	Do.
242	<i>Jayalakshmi, M.</i>	Do.	279	<i>Pereira, Sheila</i>	Madras Medical College.
243	John Victor Satyanathan	Do.	280	Philip, P. E.	Do.
244	Kalyanasundaram, V.	Do.	282	<i>Ponniiah, Glory</i>	Stanley Medical College.
245	<i>Kalyanikutti, P.</i>	Do.	283	Ponnuswami, A.	Madras Medical College.
246	<i>Kamala Bai, C. A.</i>	Stanley Medical College.	284	Pahlada Rao, D.	Do.
247	<i>Kanakammal, T. S.</i>	Do.			
248	Kannan, R.	Do.			
249	Kappini, N.	Madras Medical College.			

FIRST M.B. & B.S. EXAMINATION, DECEMBER 1940—*Contd.*NEW REGULATIONS—*contd.*PART I—*contd.*

Register number.	Name of candidate.	Where educated.
285	Rabindran, P.	Stanley Medical College.
286	Rajagopal, C. S.	Do.
287	Rajagopalan, V.	Do.
288	Rajalakshmi, P.	Madras Medical College.
289	Rajamma, K.	Do.
290	Raja Rao, K. T.	Stanley Medical College.
291	Ramakrishna Bhat, U. C.	Do.
292	Ramamurti, A.	Madras Medical College.
293	Ramamurti, V.	Stanley Medical College.
294	Ramanujam, S.	Do.
295	Ramaswami, T.	Madras Medical College.
296	Ramesh Rao, D.	Do.
297	Ranganathan, V.	Stanley Medical College.
298	Ranganayaki, A.	Madras Medical College.
299	Rashida, M.	Do.
300	Rugmini, M.	Do.
301	Sambamurti, E. K.	Stanley Medical College.
302	Sampath, K. S.	Do.
303	Sankaran Nayar, M. N.	Do.
304	Sankara Sundaram	Do.
306	Sarojini, A.	Madras Medical College.
307	Sarojini Devi, M.	Do.
308	Satyashankar, K.	Stanley Medical College.
309	Satyavagisvaran, L.	Madras Medical College.
310	Savitri, R.	Do.
311	Seshachari, T. K.	Stanley Medical College.
314	Shashidar Bhat, H.	Do.
315	Shiva Rao, P. V.	Do.
318	Srinivasamurti, V.	Do.
319	Srinivasan, M.	Do.
320	Srinivasan, M. O.	Madras Medical College.
321	Srinivasan, P. K.	Stanley Medical College.
322	Srinivasan, V.	Madras Medical College.
323	Srinivasa Rao, S.	Stanley Medical College.
324	Sriramulu, K.	Do.
326	Subbiah, S.	Do.
328	Subrahmanyam, P. S.	Do.
330	Thangavelu, M.	Do.
331	Tirugnanasambandam, S. T.	Madras Medical College.
332	Tirumalai, S.	Do.

NEW REGULATIONS—*contd.*PART I—*contd.*

Register number.	Name of candidate.	Where educated.
333	Tirupurasundari, S.	Stanley Medical College.
334	Vadharaja Rao, P.	Do.
335	Vatsala, M.	Madras Medical College.
336	Velm, S.	Do.
337	Venkatachalam, V.	Stanley Medical College.
338	Venkataramanan, T.	Madras Medical College.
339	Venkataraman, G.	Stanley Medical College.
340	Venkataswami, G.	Do.
342	Visalakshi, V.	Do.
343	Vurghese, Mariam	Madras Medical College.
344	Wasudeo Mudaliar	Stanley Medical College.

OLD REGULATIONS.

PART I.

Register number.	Name of candidate.	Where educated.
345	Azaryy Ashrvadam, G.	Madras Medical College.
348	Dauood degum	Do.
349	Dakshinamurti, N.	Do.
350	Harben, E. F.	Do.
351	Ince, B. W. J.	Do.
352	Krishnamurti, R.	Stanley Medical College.
354	Madhavan Nambiyar, A. M.	Madras Medical College.
355	Narasimham, G.	Do.
356	Narayanan Nambiyar, M.	Stanley Medical College.
357	Paulie, G. A.	Madras Medical College.
358	Ramakrishnan, N.	Do.
359	Thomas, T.	Stanley Medical College.
362	Dominic, Teresa	Madras Medical College.
364	Kothari, R. C.	Do.
365	Labhshankar Acharya	Do.
366	Prem Singh Rathore	Do.
367	Rajashekhar Reddi, M.	Do.
368	Swaminathan, T. R.	Do.

The following candidate completed the First M.B. & B.S. Examination by passing Part I:—

SECOND CLASS.

Register number.	Name of candidate.	Where educated.
360	Tyagarajan, A.	Madras Medical College.

FIRST M.B. & B.S. EXAMINATION, DECEMBER 1940—*contd.*

Rank. Register number. Name of candidate. Where educated.

The following candidates completed the First M.B. & B.S. Examination by passing Part II:—

FIRST CLASS

1	461	Ramamurti, B.*	Madras Medical College.
2	410	Kalyanam, T. S.	Stanley Medical College.

SECOND CLASS.

1	388	Crosse, G.	Madras Medical College.
2	387	Colaco, G. P.	Do.
3	386	Chengappa, M. M.	Do.
4	{ 409	Kalavathi, N.	Do.
	{ 482	Srinivasaraghavan, K.	Stanley Medical College.
6	463	Ramaswami, M. A.	Do.
7	467	Ratnakara Baliga, K.	Do.
8	502	Weerasiri, G.	Madras Medical College.
9	465	Ranganatham, C.	Do.
10	440	Narayanan, R.	Stanley Medical College.
11	413	Kausalyi, T. B.	Madras Medical College.
12	441	Narayana Rao, V.	Stanley Medical College.
13	423	Krishnankutti, P. K.	Madras Medical College.
14	{ 366	Prem Singh Rathore	Do.
	{ 379	Beemer, Mary	Do.
16	489	Sundararajan, R.	Do.
17	364	Kothari, R. C.	Do.
18	{ 385	Chelvakumaran, T. S.	Do.
	{ 405	Indira, L.	Do.
20	{ 412	Karunakaran, K.	Do.
	{ 485	Subba Rao, A. R.	Stanley Medical College.
22	392	Davidson David	Madras Medical College.
23	416	Kesavalu, P. G.	Do.
24	477	Shakuntala Karamchand	Stanley Medical College.
25	448	Peramanadan, M.	Do.
26	498	Venkatasubba Rao, Y.	Madras Medical College.
27	{ 370	Abida Latheef	Do.
	{ 446	Panduranga Pai, M.	Stanley Medical College.
29	490	Sundararajan, V.	Do.
30	374	Anantanarayanan, P. V.	Madras Medical College.
31	460	Ramakrishnan, K. S.	Stanley Medical College.
32	408	John, Rosamma	Madras Medical College.

* Gained distinction in Organic Chemistry.

Rank. Register number. Name of candidate. Where educated.

SECOND CLASS.—*contd.*

33	443	Natarajan, L. S.	Madras Medical College.
	464	Ramasubrahmanyam, M. K.	Stanley Medical College.
	475	Seshadri Reddi, M.	Madras Medical College.
36	424	Krishnan Nambissan, M.	Do.
37	{ 447	Paramesvaran, K.	Do.
	{ 483	Srinivasa Rao, M.	Stanley Medical College.
39	474	Seshadri, M. S.	Madras Medical College.
40	422	Krishna Nayak, M.	Do.
41	426	Krishna Varman, K.	Do.
42	445	Osman Sheriff, M.	Do.
	{ 371	Abraham, A. P.	Do.
43	{ 394	D' Lanoy Carvalho, B.	Do.
	{ 481	Srinivasan, V. R.	Stanley Medical College.
46	{ 429	Mahabobuddin Sahib Siddique	Madras Medical College.
	{ 439	Narayanan, M.	Do.
	{ 381	Bhaskaran, T. S.	Do.
48	{ 415	Kerala Varma	Do.
	{ 468	Roby, M. E.	Do.
51	478	Sitarama Shetti, Y.	Do.
52	407	Jeremiah, D. E.	Do.
	{ 365	Labhshankar Acharya	Do.
53	{ 470	Sankararaman, K. T.	Do.
	{ 495	Varadarajan, M. G.	Do.
56	471	Sarwar Begum	Do.
57	449	Perry, G. F.	Do.
	377	Babu, P. S.	Do.
	380	Bhaskaran, K.	Do.
	382	Bunyan, Deevana D.	Do.
	384	Chathukutti Nayanar, V.	Do.
	390	Danaswami, J. A.	Do.
	396	Ganesan, R.	Do.
	400	Gokale, K.	Do.
	402	Gopalswami Chetti, S.	Do.
	404	Hargreaves, Una	Do.
	411	Kantha Rao, N. L.	Do.
	414	Kennedy, P. J.	Do.
	420	Krishnamurti, C. S.	Do.
	433	McRobert, Catherine Norah	Do.
	436	Muhammad Ubeidullah	Do.
	438	Narayana, B. V. L.	Do.
	450	Purnendubikas Roy	Do.
	455	Raghunath Haripant Gholkar	Do.
	458	Ramachandra Ayyangar, C.	Do.
	473	Satyanarayana, C.	Do.
	487	Subrahmanyam, S. V.	Do.

The following candidates passed Part II of the First M.B. & B.S. Examination, but failed in Part I:—

361	Bhagawan Das Kumar	Madras Medical College.
363	Grover, H. D.	Do.

SECOND M.B. & B.S. EXAMINATION, DECEMBER 1940.

PART I.

MADRAS MEDICAL COLLEGE.

Register number and name of candidate.	Register number and name of candidate.	Rank.	Register number.	Name of candidate.
504 Annapurna, S.	537 Moses, Ruby L. G.			
505 Annaswami, V. S.	540 Narayana, G. L.			
506 Aranha, Bernadine M.	541 Narayana Pai, K.	1	623	Natarajan, A. R.
	542 Newton, E. J.	2	651	Suryanarayana Rao, M.
507 Arunachalam, A.	543 Padmarathi, P.	3	652	Syed Zahiruddin Ahmed
508 Balakrishnan, P. R.	544 Parthasarathi		611	Krishnamurti, T. Ambujamma
509 Balaram Varma, P. T.	Nayudu, V.	4	639	Ranganathan, V. K.
	545 Peer Muhammad, K. M. N.	6	577	Tungar, S. V.
510 Balasubrahmanyam, K.	547 Ramdas, A.	7	644	Sarvottaman, S. R.
	548 Ramesh Pai, K.	8	574	Pyare Lal Rishi
511 Brafield, A. J.	549 Ratnakar Rao, K.	9	616	Linton, E. S.
512 Colaco, Lydia	550 Russell, D. A.	10	607	Hemachandra, C. T.
513 David, C. V.	551 Sadananda Rao, P.	11	648	Sitalakshmi, T. V.
515 Devakikutti, K.	552 Salem, Esther V.	12	617	Mac Farlane, E. R.
516 Dhanalakshmi, P.	553 Samuel, J. R.	13	622	Narayana Sheno, M.
518 Gomez, D. M.	556 Seena, V.	14	634	Ramachandran, P. V.
519 Gopichand, A.	557 Sankar Nayak, H.	15	583	Anjaneyulu, D.
520 Innis, M. D.	558 Sivarajan, K.	16	645	Sebastian Zacharias
521 Janardhanan, M.	560 Scundararajulu, T. N.	17	585	Augustus Appadurai, A.
522 Jayaraman, R.	561 Subhadra Devi, N. V.		609	Joseph, C. M.
523 Kalyanasundaram, S.	562 Thangamma, K. C.	19	657	Venugopal Shetti, M.
	563 Thankam, M.	20	642	Sarada, A.
524 Kodandapani, C.	564 Thomas, A. J.		595	Damayanti, S.
525 Krishnamurti, P. V.	565 Thorpe, R. D.	21	605	Guruswami, M. N.
526 Krishnamurti, S.	566 Vadivelu, C.	23	589	Balasubrahmanyam, A.
527 Krishna Rao, P. S. R.	567 Varughese, J. K.	24	626	Ponnammal, N.
528 Krishna Reddi, M. V.	568 Venkatachalapati, K. R.	25	579	Abraham, John Edwin
529 Krishnaswami, G.		26	654	Urumese, M. A.
530 Krishnaswami Rao, K. B.	569 Welsh, Hazel J.	27	633	Ramachandran, C. K.
	570 William, S. A.	28	603	Gopalakrishnan, S.
531 Kunhunni Nayar, K.	571 Ganguly, K.	29	638	Ranganathan, S.
532 Kunjan, K. R.	572 Mital, B. S.	30	625	Pitchamuttu Samuel, D.
533 Lakshminarayanan, S. V.	573 Narayanan, S.	31	647	Seturamalingam Pillai, C.
	574 Pyare Lal Rishi	32	573	Narayanan, S.
534 Leelakrishnan, A. G.	575 Rawat, V. B.	33	613	Kuriyan, M. V.
535 Madhavan, M. K.	577 Tungar, S. V.	34	571	Ganguly, K.
536 Mohanarangam, P.		35	653	Umapathi, K.

The following candidates completed the Second M.B. & B.S. Examination by passing Part II:—

MADRAS MEDICAL COLLEGE.

FIRST CLASS.

Rank.	Register number.	Name of candidate.
1	587	Balakrishnan, C.*
2	597	Devi, P. K.†

* Gained distinction in Pharmacology, Hygiene, Pathology and Ophthalmology.

† Gained distinction in Pharmacology and Pathology.

SECOND CLASS.

Rank.	Register number.	Name of candidate.
	623	Natarajan, A. R.
	651	Suryanarayana Rao, M.
	652	Syed Zahiruddin Ahmed
	611	Krishnamurti, T. Ambujamma
	639	Ranganathan, V. K.
	577	Tungar, S. V.
	644	Sarvottaman, S. R.
	574	Pyare Lal Rishi
	616	Linton, E. S.
	607	Hemachandra, C. T.
	648	Sitalakshmi, T. V.
	617	Mac Farlane, E. R.
	622	Narayana Sheno, M.
	634	Ramachandran, P. V.
	583	Anjaneyulu, D.
	645	Sebastian Zacharias
	585	Augustus Appadurai, A.
	609	Joseph, C. M.
	657	Venugopal Shetti, M.
	642	Sarada, A.
	595	Damayanti, S.
	605	Guruswami, M. N.
	589	Balasubrahmanyam, A.
	626	Ponnammal, N.
	579	Abraham, John Edwin
	654	Urumese, M. A.
	633	Ramachandran, C. K.
	603	Gopalakrishnan, S.
	638	Ranganathan, S.
	625	Pitchamuttu Samuel, D.
	647	Seturamalingam Pillai, C.
	573	Narayanan, S.
	613	Kuriyan, M. V.
	571	Ganguly, K.
	653	Umapathi, K.
	655	Vaidyanathan, A. S.
	578	Abdul Hamid Baig
	582	Anantagiri, V.
	586	Babu, A. P.
	591	Burhanunissa
	592	Chandrasekharan, N.
	593	Chandrasekhara Reddi, P.
	596	David, G. H. S.
	606	Hari Shanker Saksena
	610	Kalyanasundaram, P. V.
	612	Kunhi Muhammad, K. M.
	614	Lakshmarayudu, Ch.
	618	Madhavan, S. P.
	620	Muttukrishnan, C.
	624	Pancholi, D. M.
	628	Radhakrishna Chetti, M.
	629	Radhakrishnan, P. V.
	640	Sankarankutti Menon, P.
	641	Sankara Pillai, V.
	650	Sundararajan, N.
	656	Vedamayagam, D. T.
	659	Wilson, E. M.

FINAL M.B. & B.S. DEGREE EXAMINATION, DECEMBER 1940.

The next convocation for conferring Degrees will be held in the Senate House, Madras, on Thursday, the 20th February 1941, at 4-30 p.m.

Qualified candidates should apply to the Registrar for forms of application for admission to the Degrees in person or *in absentia* as the case may be. The application forms duly filled in must reach the office of the Registrar not later than Tuesday, the 4th February 1941.

MADRAS MEDICAL COLLEGE.

Register number and name of candidate.

PART I.

Register number and name of candidate.	Register number and name of candidate.
660 Abraham Annamma	694 Venkaswami, T. J.
661 Bagh, M. L.	
663 Ganapati, S. N.	695 Venkatesan, T. V.
664 Girdhar Prabhu, G.	696 Verghese, P. F.
665 Gopalaratnam, M. R.	697 White, E. R.
666 Harirajan, D.	698 Alfred Paul, D.
667 Isaac, Kamala Bai	699 Anantanarayanan, L. K.
669 Jayaraj Aiyannadar, C.	702 Balakrishna Ayyar, N.
670 Krishnan, S.	
671 Kumaravelu, P. S.	703 Balasubrahmanyam, C. S.
672 Kunjalia, C. A.	
675 Mohanan, T.	704 Devairakkam, T.
676 Muttukumaraswami, M.	705 Durairaj, T.
677 Mutturam, T. R.	706 Jayaram, D.
678 Noble Adishesayya	707 Kannivelu, P. D.
679 Pancholi, D. M.	708 Krishna Rao, K.
680 Paulose, P. P.	710 Lobo, Lucy H.
681 Raghavan, A.	713 Muhammad Rahimulla
682 Rajasekharan, N.	715 Narayanan, T. K.
683 Ramakrishnan, A. S.	716 Padmanabhan, V.
684 Ramanarayan Sharma, †	717 Raghupathi, M.
685 Rama Rao, S.	718 Rajagopalan, R.
686 Ramacharan Prasad, †	720 Sampath, A. R.
687 Rangaraj, A. G.	722 Sarada, K.
689 Sanjiva Rao, K.	723 Shamba Shetti, K.
690 Sankara Pillai, V.	725 Subbaramayya, J.
691 Saraswati, D.	726 Sukumaran, K.
692 Sengottayyan, K. N.	727 Sundararaj, L.
693 Subrahmanyam, G. K.	728 Venkatachalam, V. C.
	729 Venkataramanan, G. N.

† Not completed Second M.B. & B.S. Examination.

The following candidates qualified for the M.B. & B.S. Degree by passing Part II:—

MADRAS MEDICAL COLLEGE.

FIRST CLASS.

Rank.	Register number.	Name of candidate.
1	730	Achaya, Sita*
		SECOND CLASS.
1	742	Durgaprasada Rao, B.
2	844	Venugopal, A.
3	746	Gopalan, C.
4	773	Lakshmanan, M. V.
5	786	Mathias, P.
6	776	Madanagopal, A. V.
7	804	Purushottaman, N.
	827	Srinivasan, N. S.
9	733	Bhaskar Mahadevan

* Gained distinction in Medicine and Surgery.

MADRAS MEDICAL COLLEGE—contd.
SECOND CLASS—contd.

Rank.	Register number.	Name of candidate.
10	812	Ramanujam, K.
11	698	Alfred Paul, D.
	842	Venkataraman, R.
13	839	Vasanta Rao, K.
14	755	Nayudu, Varalakshmi
15	835	Terry, S. W. W.
16	837	Thimmappayya, A.
17	785	Mathias, Josephine, A.
18	845	Venugopal, B.
19	745	Gopalakrishna Prabhu, M.
20	735	Bird, G. W.
21	787	Mauskar, V. A.
22	805	Raghavachar, V.
23	741	D'Souza, Muriel M.
	753	Hughes, Olive M.
25	796	Norman, A. S.
26	702	Balakrishna Ayyar, N.
27	747	Govindarajulu, N.
28	807	Rajagopalan, A.
29	708	Krishna Rao, K.
	732	Bhaskara Varma, K. R.
	734	Bhavsar, C. K.
	738	Chowbey, R. D.
	739	D'Cunha, L.
	744	Ganapati, S.
	754	Jacob, C. V.
	756	Jagannadha Reddi, D.
	760	Jegaroyan, M.
	766	Krishnamurti, S.
	768	Krishnamurti, T. R.
	770	Krishnankutti Menon
	771	Krishna Rao, B.
	778	Madhava Rao, T.
	780	Maragadavel, S.
	791	Narain Prasad Dube
	792	Narayanan, P. K.
	794	Natarajan, M.
	798	Patil, L. H.
	799	Pattabhiramaswami Reddi, A.
	800	Paul Devadoss, A.
	801	Pereira, B. J.
	806	Rajagopalachari, K. S.
	808	Rajagopalan, A. V.
	809	Raju, W. S.
	811	Ramamurti, A. K.
	813	Ramapandya Raj, V. P.
	814	Ramaswami, M.
	815	Ratnakannan, N. R.
	817	Sam Johnson, Y.
	818	Samuel, Annamma M.
	821	Sarangapani, K. S.
	823	Simcock, Ruby
	885	Somayya, C. I.
	826	Srinivasan, N. A.
	829	Srinivasa Rao, K.
	833	Sundaram, P. V.
	834	Swarnambal, S. V.
	836	Thanaratnam, P.
	841	Velayudhan Pillai, K.
	843	Venkatarama Rao, B.
	846	Venugopalan, M. S.

The following candidate passed Part II but failed in Part I:—

701	Babji, P. V.
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PRE-REGISTRATION EXAMINATION, DECEMBER 1940—*contd.*

MEDICAL EXAMINATIONS, DECEMBER 1940.

The following is the list of successful candidates at the PRE-REGISTRATION EXAMINATION held in December 1940 :—

[Note. —Names in italics denote women candidates.]

Distinction in	Inorganic Chemistry	...	...	a
Do.	Physics	...	...	b
Do.	Natural Science	...	...	c

Madras Medical College.

PRE REGISTRATION EXAMINATION, DECEMBER 1940.

FIRST CLASS.

Rank.	Register Number.	Name of candidate.	Subjects in which distinction gained.	Rank.	Register number.	Name of candidate.	Subjects in which distinction gained.
1	114	<i>Nirupama Bai, P.</i>	a b c	55	115	Norris, G. F.	a
2	137	Ramachandra, K.	a b	57	204	<i>Vijayalakshmi, M.</i>	a
3	106	Muttuswamy, S.	a b	57	4	Angus William Coshan	...
6	24	De Beaux, J. L. M.	a b	58	21	<i>Chitra Sankunni</i>	a
7	34	Ganeshiya, S. R.	a c	58	42	Govindaswami, C.	a
9	158	<i>Sankari, N.</i>	a	58	109	<i>Narasamma, T.</i>	a
10	185	<i>Sundari, S.</i>	a b	61	23	Chunnam, V. D.	a
11	194	Tiruvengadam, C.	a b c	61	53	Jayachandran, M. K. R.	a c
13	12	Bhaskara Rao, K.	a b	63	47	<i>Iscari Ammal, A.</i>	a
14	203	Victor, I.	a b	63	206	Vijayaraghavan, T. R.	a
15	88	Kupparajan, N. B.	a c	66	1	<i>Abrolom, Itaca</i>	a
16	196	<i>Vas, Enid (Mrs. Roberts)</i>	a c	67	83	Krishnan, N. M.	a
17	192	<i>Tara Bai, K. M.</i>	a b	69	159	<i>Sarada, M.</i>	a
19	71	Kamesvara Sarma, A.	a c	70	37	George, P. V.	a
19	118	<i>Padmarathi, S. R.</i>	a c	70	141	Ramachandra Pai, T.	a
22	152	<i>Sakuntala Devi, P.</i>	a	75	20	<i>Chempakakutti, K.</i>	a
24	11	Balasubbayya, G.	a	76	9	Balakrishnan, E.	a
25	145	Ramakrishnan, G.	a	76	41	Gopinathan Tampi, K.	a b
25	180	Sundaram, C. R.	a	79	17	Cadogan, G. S.	a
30	8	Balogopala Raju, V.	a b	79	14	Biddappa, K. K.	...
30	51	<i>Janaki, K.</i>	a	83	120	Parthasarathi, V.	...
34	105	Muneeruddin Khan, J.	a	83	155	Samuel Muttayya	a
34	31	Ganapati, M. N.	a b	83	169	Siva Reddi, P.	a
35	103	Muhammad Abdus Subhan	a	87	38	<i>Donsulets, Phyllis</i>	a
36	170	<i>Soares, Edna M.</i>	a	90	157	Sankarankutti Nayar, C.	...
40	200	Venkatadaswami, R.	a	92	210	Williams, D. E.	a
41	121	Parthow, C. T.	a	92	93	Legat, H. D.	a
43	13	Bhaskara Reddi, C.	a	94	164	Shanmugam, S. P. S. S.	a
44	26	Devadas Adappa, M.	a	95	123	Pereira, P. F. A.	...
45	122	<i>Pariathi, K.</i>	a	95	78	Krishnamurti, R.	...
48	144	Ramakrishnan, C. V.	a c	95	104	<i>Makambu, B.</i>	...
48	10	Balakrishna Shetti, B.	a c	98	54	<i>Jayalakshmi, T.</i>	a
49	101	Mohan Rao, K. R. R.	a	99	68	<i>Kamala, D. C.</i>	...
49	102	Mohan Rao, M.	b	101	40	Gopalan, U.	a
49	119	Panduranga Vittal, Y.	a	104	52	Janakiraman, T.	...
49	130	Raghava Wariyar, P. K.	a	105	188	Sushil Kumar	...
				107	Karamchand Wade, J.	a	...
				107	46	<i>Israel, Daisy H.</i>	...

Rank.	Register number.	Name of candidate.	Rank.	Register number.	Name of candidate.
SECOND CLASS.					
1	201	Venugopal, N. S.	66		Kalyanaraman, V.
2	7	Balachandran, G.	76		Kochunni, A.
4	208	<i>Visalakshi, R.</i>	80		Krishnamurti, R.
10	171	Srinivasan, A.	81		Krishnamurti, V.
12	207	Virabhadra Reddi, N.	94		Madhavan Tampi, V.
13	126	Prakas, M. S.	108		Nagarajan, N. S.
14	70	Kamesvaran, S.	112		Narayanaswami, P. C.
16	62	Joseph Antony, A.	139		Ramachandran, P. R.
17	100	Mohamed Hashim Sait, M.	146		Ramamurti, G. S.
	3	<i>Anguli, V. C.</i>	148		Ratnasabhupati, S.
	44	Hashim Sait, M.	162		Sebastian, A. P.
	50	Jagannathan, K. R.	175		Stephen, L. J.
	57	Jayasheela Punja, N.	178		Subrahmanyam, N.
	59	Jeyaraj, D.	179		Sukumaran, K.
	64	Juan Muhammad, D. M.	186		<i>Susheela, K.</i>
			199		Venkataraman, A.

B.Sc. (PHARMACY) PRELIMINARY EXAMINATION, DECEMBER 1940.

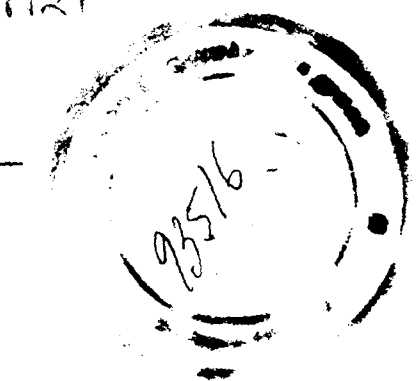
The following is the list of successful candidates at the recent B.Sc. (Pharmacy) Preliminary Examination held in December 1940 :—

MADRAS.

MADRAS MEDICAL COLLEGE.

Rank.	Register number.	Name of candidate.	Distinction gained in.
SECOND CLASS.			
1	1	Dinadayalu, T.	...
...	11	Umesh Rao, H.	...
...	7	Ramamurti, S.	...

32
Jan 21, 1941
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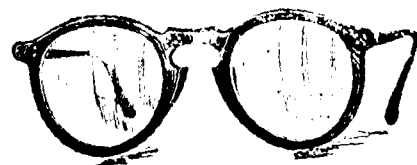


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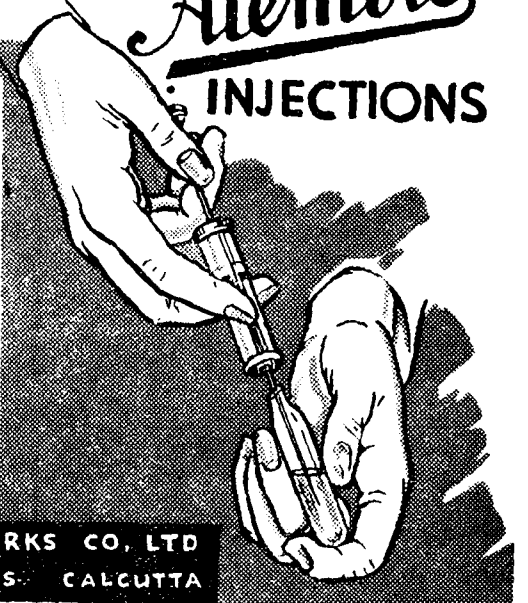
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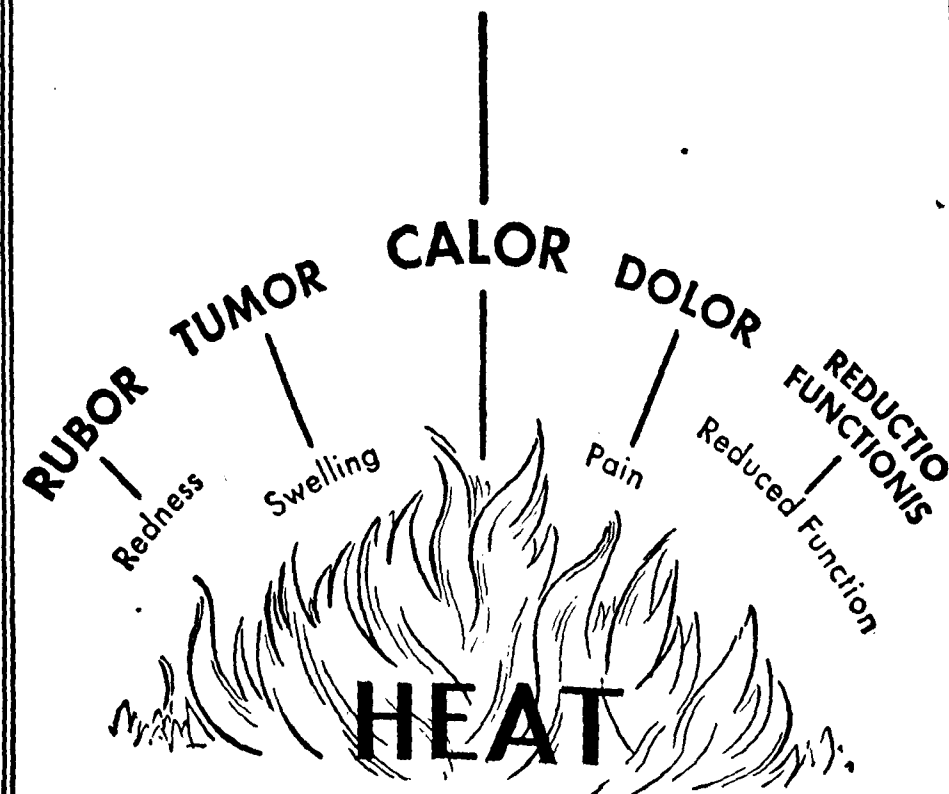
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