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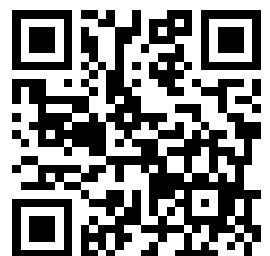
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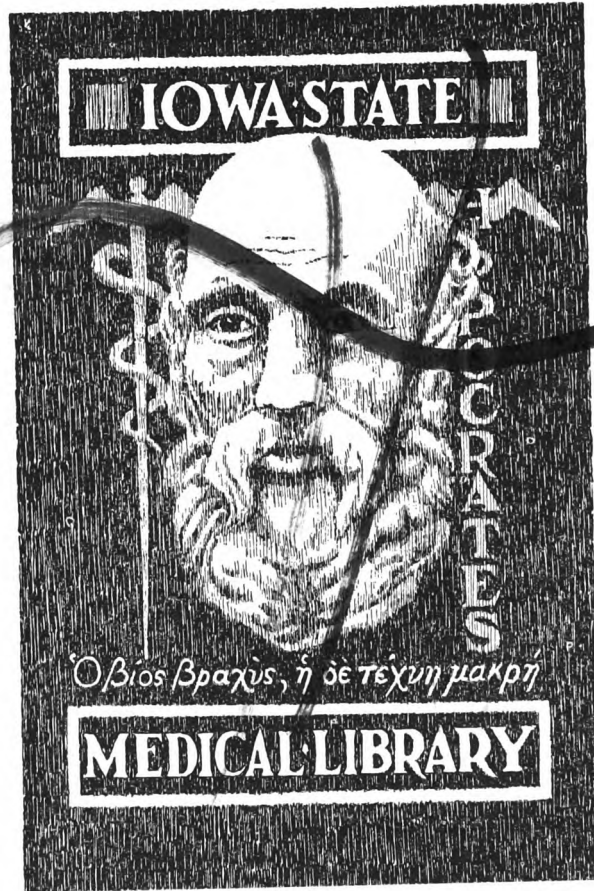
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# THE LANCET

A JOURNAL OF BRITISH AND FOREIGN MEDICINE, SURGERY, OBSTETRICS,  
PHYSIOLOGY, CHEMISTRY, PHARMACOLOGY, PUBLIC HEALTH, AND NEWS

FOUNDED BY THOMAS WAKLEY IN 1823

VOLUME ONE

JANUARY-JUNE *March*

1943

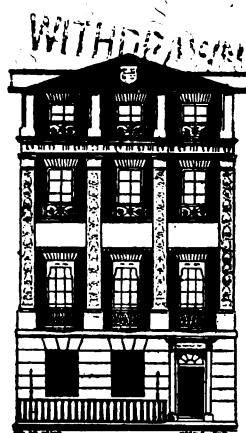
VOL. No. CCXLIV

EDITED BY

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PUBLISHED BY

THE LANCET LIMITED

7 ADAM STREET, ADELPHI, LONDON, W.C.2

PRINTED BY  
HAZELL, WATSON & VINEY, LTD.  
LONDON AND AYLESBURY

35527

## SURGERY IN THE MIDDLE EAST\*

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LIEUT.-COLONEL RAMC

THE major surgery in the Middle East is as a rule limited to three units—the surgical team or field surgical unit, the casualty clearing station, and the base hospital. The surgical team consists of a surgeon, anaesthetist and a varying number of RAMC personnel, usually drawn, as in the last war, from the base hospitals. They may be used to reinforce a CCS, or may work in the forward area with the light section of a CCS or the main dressing station of a field ambulance. A forward surgical team is likely to be of particular use in mobile and fluid warfare when the absence of a fixed line makes it necessary to keep a CCS a considerable distance behind the forward area.

The equipment carried by a surgical team is designed to allow the team to function on its own for a limited period. Their theatre may be a lean-to tent fixed to the back of a lorry, or a separate theatre tent. Successive advances into Cyrenica and East Africa resulted in the capture of many Italian hospital tents, and these became popular with surgical teams, either as a theatre or as a ward; double-sided and roofed, and well supplied with windows, they are excellent tents though a little cumbersome to carry. Lighting of the theatre may be by 'Petrolmax' lamps or from the lorry or truck. The 'Primus' stove is one of the surgical unit's most valuable instruments—as indeed it is with any unit. The mobility and small size of these field surgical units enable them to be moved nearer the scene of action than a CCS. In Eritrea and Abyssinia the CCS was occasionally as far back as 200 miles from the scene of fighting.

The forward surgical unit shortens the period between the receipt of the wound and its treatment, often considerable in the Western Desert, it provides a surgical opinion in the forward area, and its presence is appreciated by the combatant troops. The surgeon must confine his attention to the very seriously wounded; those with penetrating wounds of the abdomen, sucking wounds of the chest, severe burns, certain wounds of the head and face and serious limb injuries—in fact, the cases which might not be expected to reach the CCS alive. If he starts to treat others a sudden rush of serious casualties will swamp him. One of the difficulties of such units is that once a serious case has been operated on the patient becomes immobile for perhaps 48 hours or longer and the mobility of the unit may be impaired. As with other forward units they are exposed to ground strafing by enemy aircraft and more than once they have been taken prisoners.

The surgeon in the CCS of the last war must, I think, have had a happier time than his successor in the Middle East. The necessity to keep the CCS further back has led to some of his surgery being stolen by a field surgical unit, and on at least two occasions when casualties have been plentiful, a base hospital has taken over the duties of a CCS, as in Tobruk and later at Alexandria. For a CCS, too, periods of inactivity with few casualties and little work have been frequent in the Middle East and its situation, has made this inactivity worse.

Apart from those which are housed in existing buildings, most of our base hospitals have been created by the Royal Engineers, on desirable desert sites, on fine sandy soil with rail facilities, and I have never ceased to wonder at the short time in which a piece of sandy desert is transformed into a 1200 bed hospital, partly tented, partly hutted, well equipped, with a good water-supply, roads and electric light. Such a hospital experiences perhaps its only disadvantage when a cold sandstorm rages in January or a hot sandstorm or "khamzin" in May. Nothing will keep out the sand, and as far as is practical dressings are left untouched and operations postponed. To such hospitals the sick and wounded from the desert arrive by ambulance train, and in spite of a journey of perhaps over 200 miles they have usually arrived in good condition.

## GENERAL TREATMENT OF WOUNDS

I have not yet felt justified in practising excision and primary suture of any wound. Clean through-and-through

\* Introducing a discussion at the Medical Society of London on Nov. 23, 1942.

bullet wounds are best left alone, apart possibly from the introduction of some sulphonamide powder and the application of an antiseptic dressing. For larger wounds the term excision is misleading, since the ideal to be aimed at is the removal of necrotic tissue, cleansing and the provision of really good drainage. The use of powdered sulphanilamide or sulphapyridine and a 'Vaseline' pack is almost universal in the Middle East for wounds of any size. The importance of immobilisation for soft tissue injuries is well recognised and many flesh wounds of the limbs are treated in plaster. Certainly all serious wounds will have begun a prophylactic course of sulphapyridine or sulphanilamide in the forward area, though by the time they arrive at the base hospital their dosage will often have been erratic. Intravenous sulphanilamide or sulphapyridine solutions are easily obtainable and the blood-transfusion service in the Middle East has deservedly won praise for its work.

The usefulness of skin-grafts in the healing of wounds and burns cannot be over-emphasised. Faciomaxillary units in the Middle East are available for those requiring an extensive or difficult graft, but pinch or Thiersch grafts for wounds of moderate size can effect a saving of weeks in healing time and can be applied in any hospital. In the preparation of the surface for grafting we have found a sulphanilamide spray as valuable as it was economical in the treatment of other wounds. A very efficient substitute for tulle-gras was obtained by purchasing curtain net of small mesh in Port Said or Cairo.

The provision of Army hospitals in South Africa has rendered it unnecessary to retain in a Middle East hospital a patient who is likely to require several months hospital treatment, and while the surgeon may sometimes regret that he cannot see the end-result of the case there is never any doubt as to the patient's own feelings when he is told that he is to be evacuated.

In Eritrea and Abyssinia the Italian hand grenade caused a high proportion of our casualties. The particular one in vogue at that time was a small red one with a light metal casing. Their size and weight made them easy to carry and the Italians and their native askaris, crouched behind the rocks on the mountains round Cheren, flung large numbers down on our troops. The noise they made was startling, but the fragments had little penetrating power. They caused many casualties with multiple small wounds; direct hits were more unpleasant, but few were fatal. A great number were left by the retreating Italians, and many natives, unable to overcome their curiosity, lost their fingers and their eyesight in attempts to open them.

Among our casualties in Syria was a very high proportion of bullet wounds. The effect of this was most obvious in the compound fractured femurs of that campaign, for most of them, caused by bullet, had little or no sepsis and united as quickly or even quicker than a simple fracture.

The Western Desert has of course produced casualties of all kinds, but compared with the fighting elsewhere land-mine injuries have been very common, such as bilateral fracture of the os calcis from the blowing up of a truck. It has also furnished a surprisingly high number of accidental burns, some of them very serious, caused by the use of petrol in sand fires, usually for making tea. Though hardly a battle casualty, the desert appears to be a bad place for the patient with piles. Many patients say that they are quite well as long as they are not up "in the blue." Once there they become constipated and their symptoms recommence. They attribute this to the diet, which can hardly be varied, to the comparative lack of water, and, for some of them, their inability to take liquid paraffin regularly.

## PENETRATING WOUNDS OF THE ABDOMEN

To me one of the greatest disappointments of war surgery has been the lack of success with penetrating wounds of the abdomen. The published records of these wounds in the last war had led me to hope that a survival-rate of 40-50% might be obtained, and indeed, descriptions of casualties in the Spanish War and more recently in civilian casualties at home show results of that order. From my own limited experience and surgical gossip with colleagues I do not think that the operative survival-rate for penetrating abdominal wounds in the Middle East would be more than 20-30% and probably less. Of my own 17 cases only 5 survived, approximately

30%. Perhaps the best picture I can give of the mortality of these cases is the fact that during one year at a base hospital of 1200 beds only 7 postoperative cases of penetrating wounds of the abdomen were admitted.

Most of these cases are treated by the field surgical unit; only occasionally does the CCS receive them, and the base hospital only under exceptional circumstances. The earliest abdomen on which I operated was 6½ hours from the receipt of the wound; a young officer with a penetrating wound of the ascending colon, destruction of one testicle, and a compound fracture of the tibia. The average time which elapsed before operation was about 14 hours. Lieut.-Colonel Ian Aird, one of my colleagues working in the Western Desert, in 18 cases of abdominal wounds, had only one admitted within 12 hours of wounding and only 7 within 24 hours. In East Africa the delay was largely due to the mountainous and difficult terrain, necessitating a long carry by the stretcher bearers, occasionally up to 7 hours. In the Western Desert it is partly due to the immobility of transport at night and the scattered nature of the fighting. Peritonitis was present on arrival in about three-quarters of my cases.

Heat was an unpleasant factor in East Africa. A shade temperature of 105°-110° F. was common near Cheren. Ether boiled when the cork was removed from the bottle; gas was not then available and chloroform became a necessary anaesthetic. It is not to be recommended for the shocked abdominal patient in whom the surgeon wants relaxation.

#### PENETRATING WOUNDS OF THE CHEST AND SKULL

Special centres for the reception and treatment of chest wounds exist in the Middle East. Their treatment in the forward area, however, devolves on the general surgeon. Some of the sucking wounds are closed by the first medical officer who is able to insert one or two through-and-through sutures. If left alone, the value of this form of closure is doubtful, since wounds closed in this necessarily shipshod manner are apt to break down badly when infected; there is something to be said in favour of a temporary pack and delaying any closure of the wound until it can be performed under proper surgical surroundings. In general the tendency of surgeons in the forward area has been to deal conservatively with chest cases and to do little more than close a sucking wound. The after-treatment has been repeated aspiration, with or without air replacement, blood-transfusions according to the patient's hæmoglobin level, and sulphapyridine. Most cases seem to have done well on these conservative lines. Even when there is a retained foreign body of some size in the chest no early attempt has as a rule been made in the forward area to remove it. Surgeons feel that to attempt to remove a foreign body by an early thoracotomy in such a setting would be to court disaster.

The majority of penetrating wounds of the skull are admitted to a special centre. The initial treatment will be done elsewhere and useful instructions have been issued to all surgeons emphasising the important points in the examination and closure of such wounds.

#### COMPOUND FRACTURES

With few exceptions compound fractures have been treated by wound toilette, removal of dead or devitalised tissue, a sulphonamide vaseline pack and plaster. There is no doubt as to the great value of this treatment both as regards the patient's future and the immediate problem of transportation. The faults of this treatment have arisen from technical errors—a tight plaster, excision of too much skin, failure to remove devitalised muscle, particles of clothing or other foreign matter from the wound, and the excessive removal of bone fragments.

Compound fractures of the humerus have as a rule been treated by plaster with the arm to the side unless the type of fracture indicated an abduction plaster.

Compound fractures of the femur remain one of the most serious casualties. Most of these arrive at a base hospital in a Thomas splint with extension strapping, a wound toilette having been already carried out and a sulphonamide vaseline pack inserted. Whether a compound femur should be treated by a plaster spica remains a matter of debate. My own preference, were I ever to

suffer from such an unpleasant injury, would be a really wide excision of the wound so that the bone ends could be seen at the bottom of the sloping sides, ensuring good drainage, a sulphonamide vaseline pack, a Kirschner's wire through the tibial crest with weight extension, and a plaster spica from waist to toes, cut open over the knee. After two to three weeks I should prefer to be treated on a Thomas splint. I believe that plaster and packing for the first two to three weeks effectively seals off the fracture from the tissue planes and greatly reduces the likelihood of gravitation abscesses. Excision of the wound is unnecessary in the case of compound fractured femur with a small entry and exit wound of a bullet and no sign of infection; where there is a small apparently uninfected entry wound and a larger exit wound, only the larger wound should be excised.

#### AMPUTATIONS

The sites of election for a lower limb amputation are almost standard but when such an amputation should be performed is more debatable. This question does not arise in civil life since a street accident is admitted to hospital with little delay. In warfare a wound of the lower limb, which by its severity requires amputation, is often 24 hours old before surgery is available. It is infected and any amputation performed in its proximity stands a considerable risk of becoming infected also. If amputation is carried out at the site of election and gross infection ensues, further amputation will subsequently be necessary and the patient has then lost the most favoured site. Up to what period after the receipt of a wound it would be safe to choose the site of election must depend on the surgeon and the wound, but in doubtful cases a guillotine amputation at the site of injury would probably be the safest course.

A true guillotine amputation at the site of election can only be justified if there is no other alternative. These amputations are seldom done; in most of the amputations performed in the forward area flaps of some kind have been fashioned, held together with one or two sutures, perhaps over a sulphonamide-vaseline pack or occasionally stitched back. Secondary suture has in many cases produced an excellent stump. Of amputations admitted to a base hospital I have seldom seen an amputation stump of the lower limb heal completely by first intention, and when an attempt has been made in the forward area to obtain this by the insertion of many sutures the results have often been disastrous. The inference to be drawn is that if a wounded limb requiring amputation is more than 12-24 hours old, the site of amputation must be regarded as a potentially and perhaps heavily infected area.

Amputation through the knee-joint may be a life-saving measure, but posterior retraction, with perhaps a visible popliteal artery and vein in the infected granulations, is unpleasant and should be avoided if possible.

#### BURNS

The treatment of burns was one of the subjects discussed at a surgical conference held in Cairo in the early part of 1941. It was noteworthy for the varied opinions expressed. Tanning methods have produced some excellent results but many failures and when these methods fail it would have been far better for them never to have been tried. They are as a rule unsuitable in the forward area unless optimum facilities are present and adequate time for careful cleansing. The use of tannic acid jelly as a first-aid dressing is now generally deprecated. Treatment by moist dressings is difficult where long lines of evacuation are present and some form of sulphonamide vaseline dressing has much to commend it.

In my experience, most of the severe and extensive burns received at a base hospital, 2-4 days old, have required treatment afresh. Cleansing under an anaesthetic, a sulphonamide spray, and bandaging with six-inch rolls of vaseline gauze is the treatment I have preferred. The patient is given a course of sulphalanilamide by mouth and a plasma drip till the hæmoglobin is reduced to 100%. The highest I have seen was 140%, a finding which was confirmed by the pathologist who pointed out that it was actually higher but that this was the highest level he could record. The patient, a South African with second degree burns of more than a third of his

body surface, made a surprising recovery. If pyrexia subsides, and the dressings do not become soaked in pus, they are left till they drop off. When secondary infection is present, the dressings are soaked off in a warm saline bath every 48 hours and reapplied. The greater part of these burns is usually second degree but whole skin destruction often only becomes apparent when sloughing appears. For these areas sulphanyl-amide powder, tulle-gras and moist dressings are excellent as a preparation for skin-grafting, but for the earlier and more extensive dressings the wide vaseline gauze roll has the great merit of speed in application. Glycerin and sulphanyl-amide dressings, and the use of plaster for limb burns have their adherents. Some of the more recent methods of treatment recommended in this country have not been available for the Middle East or have been unsuitable.

#### TETANUS AND GAS GANGRENE

Few cases of tetanus have occurred in the Middle East, which is in keeping with the experience of surgeons who served there during the last war. I cannot say what part tetanus toxoid has played in this low incidence. I have only had one case—the only occasion on which I have been guilty of associating with an unqualified practitioner.

An Arab of the Arab Legion was wounded by bombing during the Syrian fighting. He was admitted to hospital three days later with a large lacerated wound of the thigh and a compound fractured femur. After the usual treatment of the wound he was put up in a plaster spica. On the 12th day he developed tetanus but recovered after a stormy passage. At one time it was feared that he might lose his leg, and his father asked that he should be allowed to call in an Arab bone-setter. I replied that I should be very pleased to consult with him and a few days later he arrived at the hospital accompanied by all the near—and most of the remote—relatives of the patient. He was an imposing figure, 80 years of age, a huge mountain of a man with a large hooked nose and wrinkled brown face. He was a shepherd from Bethlehem Fields who from the age of 6 had been interested in fractures and had gradually acquired a reputation and a practice among his people. We examined the case together and then, with the aid of an interpreter, discussed the treatment. He told me that the Arab believes that a broken bone will heal in the same number of days as the patient's age and requires splinting and rest for this period. Thus the bone of a man of 40 will take 40 days to unite. The rule broke down in the case of infants and in the presence of an open wound. In his practice he made it a rule never to treat a fracture with an open wound but to wait till the wound had healed before taking over the case. I explained that I was not in the happy position of being able to choose my cases and we parted amicably. The patient kept his leg and eventually obtained union.

True gas gangrene has been uncommon, and though I know of several cases I have only operated on one, an Abyssinian patriot in the army of Ras Sayoum, who sustained a compound fractured femur and on whom I performed an amputation.

#### MORTALITY

The surgical mortality will necessarily be high in the forward area and low at the base. The deaths which occurred in the surgical division of a 1200 bed base hospital in the Middle East during twelve months were:—

Appendicitis and its complications .. .. .	2
Tonsillectomy .. .. .	1
Pulmonary embolus .. .. .	2
Cellulitis of face .. .. .	1
Multiple burns and bronchitis .. .. .	1
Compound fractured femur .. .. .	1
Fractured spine and ribs .. .. .	1
Fractured skull .. .. .	1
Shell wound of leg; compound fracture tibia and fibula; gangrene; anuria after blood-transfusion in hospital ..	1
Shell wound; compound fractured humerus; admitted with anuria after blood-transfusion in forward area ..	1
Shell wound; compound fractured femur; duodenal ileus on 48th day .. .. .	1
Shell wound; compound fractured femur; secondary hæmorrhage .. .. .	1

Of this total of 14, only the last 4 were in men wounded in battle.

Of the surgeons in the Middle East, many are at that stage in professional life when, but for the war, they would have been about to start a surgical registrarship. Instead they now learn their surgery and gain their experience in a different school. This experience is valuable for all but principally for the specialist in certain subjects. For the general surgeon it cannot take the place of what he has missed.

## CROSS-DESENSITISATION IN ALLERGIC DISEASES

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THIS paper deals with desensitisation to that class of allergens, called "idiotoxins" by Freeman or "atopens" in America, which cause bronchial asthma, eczema, conjunctivitis and rhinitis. The allergic properties can be exerted by biologically different groups—food proteins, pollen and other constituents of plants, animal feather, hair and wool, and all sorts of dust. Bacteria and moulds can also act as idiotoxins, apart from their immunological properties.

The routine method of attempting a general "specific" desensitisation is the injection of those allergens to which the patient shows a special sensitiveness. If only one positive test is found, then that particular allergen alone is used for desensitisation. In the common case where several positive reactions are found the opinion of the allergists varies as to the course that should be adopted. Freeman (1933), and Freeman and Hughes (1938) have shown that a patient successfully desensitised with any one pollen ceases to react to any of the others. But the question whether the injection of a single allergen in multisensitive patients can, as a rule, also protect against allergens of another group has not been settled.

This investigation therefore is designed to examine the specificity of the anti-allergic mechanism. For this purpose a method of local desensitisation of the skin has been studied. This technique has been applied in order to obtain evidence whether in multisensitive patients one allergen can desensitise the skin so that it will no longer react to the others. This is termed "cross-desensitisation" as opposed to the "direct desensitisation" in which the same allergen is used for desensitising and retesting.

#### MATERIAL AND METHODS

The investigations were carried out on patients with bronchial asthma, eczema or hay-fever, most of whom were under the care of Dr. J. L. Livingstone. Other cases were volunteers from the medical staff. Those submitted to local cross-desensitisation showed multiple sensitiveness. All patients received the usual general treatment for their disorder, including breathing exercises (Livingstone and Gillespie 1935) and elimination of focal sepsis, but no specific treatment was employed throughout the period of local desensitisation.

The desensitising injections were carried out with two allergic extracts, A and B—e.g., pollen and fish or feather and flour (see tables I and II). Extract A was injected into a localised area on one side of the back, B into a symmetrical part. The intracutaneous method has been used for tests and for local desensitisation. Instead of injecting 0.01 c.cm., as is usually done in routine intradermal testing, I used 0.05 c.cm. which can be measured more accurately. The local desensitisation was effected by injecting the allergic extracts in increasing doses. The additional units were given merely by using more concentrated extracts, not by increasing the quantity injected. The reason for this was that repeated inoculations produced some tissue damage which was more obvious when quantities larger than 0.05 c.cm. were injected. Therefore 0.05 c.cm. of extracts of varying concentration were used throughout the experiments.

The doses were so graded that the concentrations increased at a rate of 25% with each successive injection. Where with any particular concentration the reaction appeared to be rather intense the subsequent injection was of the same concentration. The inoculations were given when possible on successive days, otherwise on alternate days. By this means the dose has been

gradually worked up to about 100 times the concentration initially used. Where the increase was 25% each time, without repetitions, the number of desensitising injections was 21.

The day after the last desensitising injection each site was tested against the initial dose of its corresponding allergen. Next day the highest dose was repeated to make sure that the high level of local desensitisation would be maintained. This is referred to as the "maintenance dose." After another twenty-four hours the tests were crossed, so that the areas which were desensitised by extract A were injected with the initial dose of B and vice versa. Another maintenance dose was given next day.

Twenty-four hours later histamine was injected into the treated areas to determine whether they were in a state of mere refractoriness against any kind of stimulus, or whether they still responded to a non-allergic irritant. Histamine was chosen for this purpose because on injection it produces a weal and an erythema simulating the allergic reaction, but occurring as a non-allergic phenomenon. Before retesting the treated areas it was, however, essential to find in each particular patient what dose of histamine would produce in the untreated skin the same size of weal as the initial allergic test. This was found to vary in different patients from 0.05 c.cm. of a dilution of 1 in 10,000 to the same quantity of a dilution of 1 in 100,000. For determining the reaction of the skin as a whole the three final tests—the lowest allergic dose, the highest allergic dose and the corresponding histamine dose—were always injected into untreated areas.

The patients were divided into two groups. Those in group 1 were treated with extracts standardised for skin-activity by accurate intradermal tests. By such means the size of the skin-reactions of A and B was fairly equal throughout the course of injections. These extracts differed mostly in regard to their concentration, as expressed in units. The desensitisation with both extracts was started with the weakest dose that would give a definite positive reaction and subsequently the desensitising injections were given as described above. The inoculations in group 2 were carried out with two extracts also, but they were standardised so as to have equal concentrations as expressed in units, and therefore mostly showed different degrees of skin activity in the individual patient. Desensitisation was thus attempted by weak skin-reacting doses of one allergen and stronger ones of the other. The cross-testing in both groups was

TABLE I—RECIPROCAL CROSS-DESENSITISATION, SHOWING THAT TWO ALLERGENS OF EQUAL SKIN-ACTIVITY DESENSITISE FOR EACH OTHER, EVEN IF THEY ARE OF DIFFERENT GROUPS

Group 1 patient	Allergen	Local desensitisation dosage (units per c.cm.)	Site	Initial test	Re-test (initial dose)		
					Direct	Cross	Histamine
1. Hay-fever, Oct. 10–Nov. 12, 1941	A : Grass-pollen	40–3518	1	++	0	0	++
	B : Tree-pollen	743–64,000	2	++	0	0	++
2. Hay-fever, br. asthma, eczema, Feb. 28–March 3, 1942	A : Grass-pollen	20–2251	1	++	0	0	++
	B : Fish	100–10,738	2	++	0	0	++
3. Ditto, Jan. 1–Feb. 26, 1942	A : Feather	1161–100,000	1	++	0	0	++
	B : Fish	1161–100,000	2	++	0	0	++
4. Br. asthma, Feb. 15–Mar. 23, 1942	A : Feather	1161–100,000	1	++	0	0	++
	B : Flour	1161–100,000	2	+++	0	0	++
5. Br. asthma, Feb. 1–Mar. 10, 1942	A : Cat-hair	1161–100,000	1	++	0	0	++
	B : Horse-hair	1161–100,000	2	++	0	0	++

TABLE II—UNILATERAL CROSS-DESENSITISATION, SHOWING THAT THE STRONGER ALLERGEN DESENSITISES TO THE WEAKER ONE, BUT NOT VICE VERSA; THIS IS INDEPENDENT OF THE BIOLOGICAL GROUPS

1. Hay-fever, July 1–28, 1941	A : Grass-pollen	194–20,971	1	+++	0	0	+++
	B : Tree-pollen	194–20,971	2	+	0	0	++
2. Hay-fever, asthma, Sept. 19–Nov. 9, 1941	A : Grass-pollen	194–20,971	1	+++	0	0	++
	B : Wheat-flour	194–20,971	2	++	0	0	++
3. Asthma, June 1–July 10, 1941	A : Horse-hair	100–10,738	1	+++	0	0	+++
	B : Grass-pollen	100–10,738	2	+	0	0	++
4. Asthma, Oct. 20–Nov. 17, 1942	A : Feather	1161–100,000	1	+++	0	0	+++
	B : Kapok	1161–100,000	2	++	0	0	++
5. Hay-fever, asthma, Oct. 18–Nov. 17, 1942	A : Grass-pollen	1161–100,000	1	+++	0	0	++
	B : Fish	1161–100,000	2	+	0	0	++

Notes to Tables I and II

Quantity injected : 0.05 c.cm.  
Increase of dose per injection : 25%  
Number of injections for desensitisation : 21–27  
Injections daily or on alternate days.

carried out with the initial dosages. Modified experiments which are not given in detail will be referred to when discussing the result.

PREPARATION OF EXTRACTS

To ensure sterility the simpler method of heating was preferred to the usual Berkefeld filtration, although the question of heating extracts is controversial. The loss of potency of my own extracts seemed negligible, as estimated by comparative skin-tests and by the neutralisation test (Arbesman and Eagle 1938). The content of carbolic acid in the carbol saline used as extracting fluid and as a diluent was reduced from the routine 0.5 to 0.1% to prevent unspecific damage to the tissues. A fixed amount (5 grammes) of the substances was taken and the fats were extracted with ethyl-ether. The solvent was decanted. The residual substances were then washed with methylated spirit. The spirit was likewise decanted; 90 c.cm. of carbol-saline (0.1% carbolic acid) was added and these mixtures heated to boiling-point in a water bath for 20 min. The mixtures were cooled and filtered. Wheat flour was extracted in cold water and filtered. All the filtrates were heated next day for 15 min. in a water bath. Cultures were made. The resulting 10% solutions were preserved as stock. The required dilutions were made with 0.1% carbol-saline.

The extracts have been assayed on the weight-by-volume basis, expressed in Noon-Freeman units, one unit being the amount of active substances derived from a millionth of a gramme of pollen. This calculation was adopted also for the other allergic substances.

ESTIMATION OF THE REACTION

The reading was done at the height of the reaction, usually 15 min. after the injection. The weal and the erythema were marked out in ink and the outline thus demarcated was transferred to a moistened label pressed against the skin. For reasons explained later, only the weal is recorded in my tables.

RESULTS

(1) *Direct tests after local desensitisation.*—The recorded experiments showed (tables I and II) that repeated injections of an allergen into the same site of a sensitive skin invariably produced a diminution of response, if applied in increasing doses. Although a weal was still formed by the more powerful doses at the end of the desensitising course this was much smaller in the treated than in untreated zones. This diminution of response became more obvious still when, after a hundredfold increase of the dose, the lowest concentration (the initial test) was repeated. The site then showed no weal formation. The erythema behaved in a different way. It failed to appear after injection not only of the weakest but even

of the more powerful doses. The extent of the area in which the sensitiveness for the initial test was abolished was strictly limited to the injected sites. There was only a slight general decrease in the skin-reaction all over the body and this became more marked only when much higher doses were injected. For about three weeks the allergic tests in the treated areas produced no response; then the sites started to react again.

Various modifications of the recorded experiments have been carried out. An increase of the dose by 50-100% at each injection gave the same result. In some cases it was necessary to reach a final concentration five hundred times as strong as the initial one. The abolition of the initial test was also evident when "rush-inoculations" (Freeman 1930) were given at hourly intervals into the same areas, but in this case estimation of the single reactions during the course was difficult, because the first weal had not always disappeared when the next dose was given. When repeated injections were given in a constant dosage local desensitisation was not regularly achieved and if it occurred it lasted only a few days. In some cases the reactions showed fluctuations over a long period and were sometimes still positive after the thirtieth injection.

(2) *Cross-tests after local desensitisation.* Group 1. *Reciprocal cross-desensitisation* (table I).—Two allergens (A and B) which were used in such concentrations that the skin-reactions of A were the same size as those of B produced desensitisation not only for themselves but also for each other. This occurred not only, as might be expected, between allergens of the same biological group—e.g., between various sorts of pollen—but also between unrelated substances, such as pollen and fish, or feathers and fish. The method was employed with five different pairs of allergens, and the result was always the same.

Group 2. *Unilateral cross-desensitisation* (table II).—When the two desensitising allergens (A and B) differed according to their skin-activity the strongly active allergen could desensitise for the weaker one, whereas the weaker did not abolish the reaction to the stronger. For example, strongly active pollen injections desensitised against weak fish-allergen, but desensitisation with the weak fish-allergen could not produce a negative test against stronger pollen. For other examples see table II. This form of desensitisation is spoken of as "unilateral." Like the reciprocal one, it is not dependent on a biological relationship between the two allergens.

(3) *Histamine test after local desensitisation.*—When histamine in a suitable dilution was injected into the inoculated areas for the purpose of testing for refractoriness, weals as large as their counterparts developed. The sites, though completely desensitised for the allergic tests, still reacted to the corresponding histamine doses. The weals were sometimes even larger, but flatter (see controls).

It is of interest to add an observation made incidentally. A patient with a high degree of sensitiveness for fish was desensitised locally in two areas for fish and in two others for feathers (table I, patient A3). He then ate 2 grammes of fish and developed a rash. His skin as a whole was covered with urticaria and erythema and only the four treated areas, 2 in. in diameter, appeared normal. This demonstrated that a protection against the fish allergen had developed not only in the areas treated by fish but also in those treated by feather.

*Controls.*—It was necessary to ascertain that the abolition of the reaction in the desensitised zones was only due to the allergens and not to other constituents of the extracts. The same number of injections were therefore given using carbol-saline only and also using non-offending allergens. When these areas were finally tested against the allergen the weal was as large as the corresponding one in the untreated site, but the erythema was definitely weaker. The erythema must therefore be looked on partly as an unspecific phenomenon.

#### DISCUSSION

Sherman and Stull (1937-38) published interesting experiments on the cross-neutralisation of allergens. They mixed multi-sensitive sera in vitro with one allergen and tested these mixtures by the method of Prausnitz-Küstner for this allergen and for the others against which the patient gave positive tests. They demonstrated that unilateral neutralisation by one allergen for another is common. They found, however, that reciprocal cross-neutralisation occurred only between

related antigens. The present experiments throw light on the production of cross-desensitisation in vivo, and demonstrate the influence of one allergen on the reaction to another on a still wider scale. It was shown that one allergen can act on all the antibodies present of the skin-sensitising type of "reagins." The inhibition of the allergic reaction may arise from the neutralisation of all the reagins present by one allergen, or the liberation of an unspecific substance blocking the reaction between allergen and reagin. The latter view is based on reports of the occurrence of a "blocking substance" in the serum of treated hay-fever patients, demonstrated by Cooke and his co-workers (1934-35) and confirmed by Harley (1937).

The wide range of cross-desensitisation raises the question whether this is a special anti-allergic mechanism or only a general exhaustion of the tissues. Such an argument has been put forward by Cooke (1922), who, on producing a local exhaustion by allergens, assumed that the tissues had only become fatigued in a general sense; on his view the local decrease in the allergic reaction is often referred to as "refractoriness." Cooke did not, however, test the response of these fatigued areas to other stimulants. Mackenzie and Baldwin (1921) and Mackenzie (1921, 1922), who were the first to publish observations on the local exhaustion of cutaneous reactions, considered this phenomenon to be a specific desensitisation, and so did Storm van Leeuwen (1929, 1930), Wagner and Rackemann (1935, 1936) and Bruce Pearson (1940) on the grounds of similar observations. The present experiments show that, after desensitisation with allergens, only the allergic extracts fail to produce a weal; the response of the treated areas to histamine remains unchanged. This proves that the capillaries have not lost their capacity for increased permeability in the sense of refractoriness and consequently the failure of the allergen-weal confirms the special anti-allergic mechanism of the phenomenon.

This observation also throws some light on the general theory of allergic skin-reactions. It is generally believed that they are produced by liberation of histamine or histamine-like substances. The fact that cells, desensitised by the allergic test, will still react to a corresponding histamine dose leads to the assumption that, during the process of desensitisation, the liberation of histamine is inhibited or immediately counteracted.

The results in the controls showed that an allergic test in an area, previously treated by repeated injections of carbol-saline only, produced a normal or even increased weal but a weaker erythema. This independent behaviour of weal and erythema is not surprising in the light of Lewis's (1927) investigations on the "triple response" of the cutaneous vessels. He showed that the erythema is due to an axon reflex, whereas the weal occurs independently of nervous influences by a direct chemical stimulus on the capillary wall. It may well be that damage done to the tissues by repeated intracutaneous injections, even if they are unspecific, leads to degeneration of the cutaneous nerve-endings which must weaken the erythema but not the weal. This explains also why during desensitisation the erythema became negative at a time when the weal was still positive. The increase in size and flattening of the weal may simply be due to some loosening of the tissue-spaces.

The experiments have some bearing on therapy. The defence-measures were developed more rapidly and to a higher degree in the zone of the injections than in the tissues generally, and the anti-allergic mechanism therefore seems to be more of a cellular than of a humoral nature. This encourages the attempt to alter the reaction of tissues by introducing the allergen locally, for example into the nostrils in cases of hay-fever.

Some other factors, demonstrated by local desensitisation, should be stressed in regard to anti-allergic treatment. The first point is the observation that the decrease in the allergic skin reaction was only achieved regularly if increasing and not constant doses were used. Secondly, the results show clearly that abolition of the skin reaction is achieved easily only for the weaker doses. This demonstrates that there is no qualitative return to a normal reaction but only a quantitative diminution of the allergic response after treatment. It should therefore be spoken of as hypo-sensitisation, not as desensitisation. Consequently, in

attempting the reduction of sensitivity, these results should encourage us to increase the doses to as high a level as possible.

The wide range of cross-desensitisation suggests further that a patient with a multiple sensitiveness does not require a mixed extract but that it should be sufficient to treat him with a single allergen. If the sensitiveness for one allergen is stronger than for the others the choice is easy. If, on the other hand, various allergens give positive reactions of equal strength, that extract which is obtainable in strongest concentrations should be chosen, so that, during treatment, the initial dose can be increased ten thousand times or more, as is done in pollen desensitisation. It seems that an improvement in desensitisation must not be expected from finding still more skin-reacting allergens but from the production of highly effective extracts and by carrying the desensitisation as far as possible.

#### SUMMARY

A method of local desensitisation with allergens has been developed, by which a wide range of local cross-desensitisation could be demonstrated. If the desensitisation is carried out with two allergens of the same skin-activity a reciprocal cross-desensitisation occurs. If one allergen is stronger than the other the desensitisation is unilateral. The occurrence of either reciprocal or unilateral desensitisation is independent of the biological group of the allergens. The desensitisation is only a quantitative change and not a qualitative return to a normal response. Observations on the histamine reaction in desensitised areas showed that the decrease in the allergic reaction is not a mere general refractoriness of the tissues but the result of an anti-allergic mechanism.

I am indebted to the Medical Research Council for a research grant, to Dr. J. L. Livingstone for providing the patients for the investigation and his suggestions, to Dr. J. Freeman for criticism and for supplying pollen extracts, to various members of the medical staff of Horton Hospital for their help, and especially to Mr. A. J. Briggs and Mr. J. D. Abbott for their coöperation as volunteers.

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## RECOVERY FROM HEART FAILURE AFTER CARDIAC MASSAGE

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RECOVERY after cardiac massage for heart-failure during general anaesthesia is rare and only about 50 cases have been reported.

#### CASE-HISTORY

A railway clerk, aged 55, was first seen in the outpatient department of St. Peter's Hospital for Stone on Dec. 11, 1937. He was suffering from an enlarged prostate, and in addition had three uric acid calculi in his bladder. He was very stout, his blood-pressure was 160/100 mm. Hg, there was a normal response from the renal-function tests, and the Wassermann reaction was negative.

Operation was performed on Jan. 10, 1938, under nitrous oxide, oxygen and ether. I removed the stones, enucleated the prostatic adenoma, and controlled the hæmorrhage from the prostatic cavity by inserting an Andrew's bag; but while I was stitching the wound the patient's pulse and respiration suddenly failed. Artificial respiration was started at once without result. Mr. Swift Joly, who had assisted me, had taken off his gown and gloves, and was talking to a visitor in the theatre. He realised that there was no time to scrub up, so he seized a pair of sterile gloves, and without waiting for a

gown, or even to disinfect the patient's skin, made a midline upper abdominal incision and started cardiac massage. The time which had elapsed since the heart had stopped was now about 3½ min. Artificial respiration had been continued throughout. After roughly 30 sec. of cardiac massage the heart began to beat at 80 per min. and almost immediately increased suddenly to 160. In all, therefore, the patient's heart had been still for about 4 min. The wound was closed with through-and-through sutures and the patient was returned to the ward. Within an hour his pulse-rate fell again to 80.

He was conscious on the morning after the operation, but did not speak more than a few incoherent phrases until Jan. 24. During these 14 days his pulse was irregular and averaged 100-120. He did not understand anything that was said to him but drank fluids when they were given him. From Jan. 24 onwards he became restive and talked nonsense incessantly. He was by now increasingly difficult to keep in bed and under control. On Feb. 7 his suprapubic wound was not healed, but he was so maniacal that it was necessary to fit him with a permanent suprapubic tube and send him to an observation ward.

In the next month or two his mentality improved so much that in July, 1938, he was sent to a convalescent home where his tube was removed and the suprapubic sinus healed spontaneously. When seen again on Oct. 15, 1938, his mental condition appeared normal, he had a tremor of his hands and slurred speech and repeated words several times over, but he was well enough to begin work again in November, 1938. Dr. Worster-Drought kindly saw the patient in December, 1940, 2½ years after the operation, and reported as follows.

"I regard this case as one of coagulation necrosis of the deeper parts of the brain—i.e., in the region of the basal ganglia. During cessation of the heart beat it would appear that the deeper portions of the brain suffer from anoxæmia and undergo a coagulation necrosis. Most cases prove fatal very rapidly, but I have seen a few recover and live for some hours in a spastic condition—that is, in a condition which appears to be one of extrapyramidal rigidity. It must be seldom indeed that sufficient recovery ensues to allow the patient to live on although in a spastic condition. The signs in the present case are those of extrapyramidal hypertonia with characteristic speech changes due to basal ganglia lesions."

The patient was sent for speech training. I saw him last on Aug. 27, 1942, when his condition appeared to be stationary. Except for a slight slurring his speech was normal. He had a parkinsonian gait but no tremor of his hands and could perform fine movements easily. There was a slight bulge of the upper abdominal wound; his urine was clear and he had to rise only once at night to micturate.

#### DISCUSSION

This case emphasises the paramount importance of the time factor in cases of cardiac failure under general anaesthesia. In cases recorded by Hamilton Bailey<sup>1</sup> the timing was most accurate, and his suggestion that the passage of each ½ minute should be called out aloud in the theatre should be adopted as soon as the heart has stopped. When it is certain that the heart has ceased to beat there is no doubt that cardiac massage should be started as quickly as possible. Time should not be wasted in injecting adrenaline, which is of very doubtful value.<sup>2</sup> The case for immediate cardiac massage is supported also by the finding that fewer successful cases are recorded where a deliberate and separate laparotomy had to be made, as in the present case, than where the peritoneal cavity was already open and therefore cardiac massage could be begun sooner. Now that chloroform anaesthesia is less used cases of cardiac failure appear to be fewer, and I feel that this is not merely coincidence but cause and effect.

I am indebted to Mr. Swift Joly for his help in this case, and to Dr. Worster-Drought for permission to quote his report.

1. Bailey, H. *Brit. med. J.* 1941, ii, 84.
2. Primrose, W. B. *Ibid.*, 1935, ii, 540.

Dr. IRWIN MOORE, 30A, Wimpole Street, London, W.1; would like to get in touch with anyone who has had practical experience of the after-effects and treatment of radium or radon burns in the gynaecological and rectal regions.



## ACCIDENTAL HEAD INJURIES

## PROGNOSIS IN SERVICE PATIENTS

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THE word accidental in the title of this paper requires explanation. In the course of our work at a military hospital for head injuries we have had to deal with two groups of cases—gunshot or bomb wounds, and a variety of head injuries due to accidents of a kind which may also occur in civil life. It is with this latter group that the present paper is concerned. There is much uncertainty among surgeons and physicians regarding the prognosis in these cases, as is shown by the great variety of opinion expressed on the optimum duration of rest in bed, the period of convalescence required, and the likelihood of return to useful duty in the Services. With the aid of a grant from the Medical Research Council we have been able to collect data which have a bearing on these problems, and at the suggestion of the council's committee on brain injuries we present a summary of our experience and conclusions.

Cases of accidental head injury admitted to this hospital may be divided into two groups. (1) Chronic cases which have been previously treated in other hospitals; many of these have been transferred because their progress, judged by expectation, has been unsatisfactory, and they therefore form a highly selected group. (2) Acute cases; a relatively unselected group, being usually admitted because the accident happened in the neighbourhood of the hospital, though many had been first admitted to a general hospital and subsequently transferred. Cases admitted to this hospital within 3 weeks of the injury have been included in the acute group. The series is thus not entirely representative of accidental injuries, such as would be seen in a large general hospital in an industrial area, because it does not include those cases in which the severity of the head injury, or associated injuries of other parts, forbade transfer within the period specified. Doubtless this explains why the number of deaths in our series was small.

The analysis covers 242 consecutive acute cases; 5 died, and 22 (9%) of the survivors were invalided out of the Service from this hospital. The remainder, 215 (89%), were returned to duty, and it is with the subsequent fate of this group that we are first concerned.

## POST-TRAUMATIC AMNESIA IN ACUTE CASES

One of us has previously emphasised that a convenient means of classifying the severity of head injuries is the duration of the post-traumatic amnesia (Russell 1932). This method is incomplete, because it takes no account of local injury to the skull, brain or cranial nerves, but it is useful provided these limitations are clearly recognised. Post-traumatic amnesia is taken to end at the time from which the patient can give a clear and consecutive account of what was happening around him. This can be estimated by careful questioning after recovery of full consciousness and normal orientation. Care is necessary to avoid two sources of error. One arises from accepting the patient's first memory of his surroundings as the end-point, when it has in fact been followed by a further period of clouded consciousness and amnesia. Such "islands" of memory are not uncommon and may be followed by further amnesia for a day or two; it is therefore the beginning of continuous memory which we prefer as our measurement. The second, though less common, error is to assume that because a patient is aware of what is happening around him he will be able to recall this later. This may lead to underestimation of the duration of the post-traumatic amnesia in a patient who is under observation in the acute stage of his symptoms. It is therefore necessary in cases of this type to check the duration of the amnesia some time after the apparent recovery of full consciousness, for example, before the patient is discharged from hospital.

In table I the prognosis in those who survived is compared with the duration of the post-traumatic amnesia (PTA). Of the 215 cases returned to duty, 193 (90%) have been followed up, and the table gives

not only the number of those invalided from the Service in this hospital but also of those known to have relapsed and been invalided later. The figures show that as the duration of the PTA lengthens the prognosis becomes worse. There is a rise in the proportion of those invalided when the PTA exceeds 1 day, and a further significant rise in the over 7 days group. But a third of the most severe cases (PTA over 7 days) returned to duty successfully, and at the other end of the scale, of those with a PTA of less than 1 hour (including those with no amnesia), 11% were invalided. This table, therefore, indicates both the value and the limitations

TABLE I—SURVIVING ACUTE CASES: PROGNOSIS IN RELATION TO SEVERITY OF INJURY

Duration of PTA	Cases	Invalided in hosp.	Invalided later	Total Invalided	No follow-up
Nil	28	1 (4%)	2 (7%)	3 (11%)	1
Under 1 hour	75	2 (3%)	6 (8%)	8 (11%)	9
1-24 hours	65	3 (5%)	5 (8%)	8 (12%)	7
1-7 days	34	5 (15%)	3 (9%)	8 (24%)	2
Over 7 days	35	11 (31%)	10 (29%)	21 (60%)	3
Total	237	22 (9%)	26 (11%)	48 (20%)	22 (9%)

Percentages are of the number in each subgroup.

of the duration of the PTA as a criterion of prognosis. All that can be said for it is that it is the best single criterion at present available.

A record of the type of duty performed was included in the follow-up questionnaire, and the proportion of those on duty who were reported to be on full duty, efficiently performed, was 82%. This did not, however, always indicate that the patient was still in the same medical category as before the accident.

## DURATION OF HOSPITAL TREATMENT AND REHABILITATION

The plan has been to continue with treatment in hospital, including graduated physical exercise, until the patient is ambulant and then to transfer him to a convalescent hospital nearby; there, supervised by the medical officer who had charge of him in hospital, he is given physical training of progressive severity, and mental occupation, until he is judged fit for return to duty.

Of 193 cases discharged to duty and successfully followed up, 167 were reported on duty. Table II gives the actual duration of treatment and rehabilitation of those who returned to duty successfully: 92% were treated for less than 3 months, and of these, 84% were reported by the medical officer of the unit to be doing full duty efficiently. On the other hand, 26 patients were

TABLE II—DURATION OF TREATMENT IN ACUTE CASES WITH A SATISFACTORY FOLLOW-UP REPORT AFTER RETURN TO DUTY

Months from injury to discharge to duty	Duration of post-traumatic amnesia					Total
	Nil	Under 1 hr.	1-24 hr.	1-7 days	Over 7 days	
Under 1	4 (4)	4 (3)	..	..	..	8 (7)
Over 1	7 (7)	20 (20)	10 (10)	1 (1)	..	38 (38)
1-2	7 (6)	19 (19)	23 (19)	15 (12)	1 (0)	65 (56)
2-3	6 (5)	13 (10)	12 (6)	5 (3)	7 (4)	43 (28)
3-4	..	2 (0)	3 (2)	1 (1)	1 (0)	7 (3)
4-5	..	..	2 (2)	2 (1)	1 (1)	5 (4)
5-6	..	..	..	..	1 (1)	1 (1)
Over 6	..	..	..	..	..	..
Total	24 (22)	58 (52)	50 (30)	24 (18)	11 (6)	167 (137)

Figures in parentheses show patients doing full duty efficiently. Duration of treatment (including rehabilitation) was less than 3 months in 154 cases (92%); of these, 129 were doing full duty efficiently.

returned to duty, but on the follow-up were found to have relapsed later; of these only 17 (65%) were under treatment for less than 3 months. The incidence therefore of relapse was not higher among those who had been treated for relatively short periods, from which it may be concluded that a relatively short period of treatment, under conditions obtaining at this hospital, was not a factor of importance in causing relapse.

Table III shows some of the clinical findings in the acute cases. The number successfully returned to duty who show the features tabulated is also given; it is apparent that though some of the complications referred to have an adverse effect on prognosis, none absolutely excludes return to duty. The figures indicate clearly that the prognosis in cases of accidental head injuries in Service

TABLE III—OTHER CLINICAL FEATURES OF THE ACUTE CASES

	Cases	Cases followed up and on duty
X-ray evidence of fracture of skull ..	83	53
Depressed fracture (included in above)	17	9
Injury penetrating bone, dura or brain	10	5
Intracranial hæmatoma (extradural, subdural or intracerebral) ..	7	1
Injuries to other parts of body ..	49	20
Injury to cranial nerves 1 or 2 ..	22	13
Injury to cranial nerves 3, 4 or 6 including pupillary abnormalities ..	46	28
Injury to cranial nerve 8 ..	18	11
Abnormal motor, sensory or reflex physical signs ..	40	17
Epilepsy ..	11	2
Total in group ..	242	167

personnel is usually good. About 80% of those who survive the acute stage return successfully to useful (usually heavy) duty within a few months of the injury. This figure is similar to that obtained in a consecutive series of civilian head injuries (Russell 1934). Cairns (1942) has recently emphasised the same point. This should correct the old belief that for cases of severe head injury or skull fracture very long rest and convalescence are necessary for recovery.

## TREATMENT GIVEN

The satisfactory rate of progress described was not due to any novel form of treatment. We have described elsewhere the principles followed, apart from the surgical treatment of wounds of the scalp or deeper tissues (Russell 1942, Symonds 1941, 1942). All cases are at first nursed in bed, but as soon as a patient is symptom-free he is encouraged to get up and gradually to increase his activities. The rate of progress is determined by no fixed rule, but by the symptoms of the individual case. For example, a patient with a long PTA but no headache may be up and about in a few days, while a man with a brief PTA with headache may be kept in bed for 2-3 weeks. Except in the mildest cases lumbar puncture is usually done, in order to ascertain the pressure and the presence or absence of blood in the fluid; it may be repeated if the CSF is under high pressure (over 250 mm. of water), if there is much blood in it, if there is considerable pleocytosis, or if the withdrawal of CSF seems to relieve headache and restlessness. Treatment by dehydration has been very rarely employed and fluids are given in quantity sufficient to relieve thirst. No restriction is placed on posture in bed, the patient having his head raised or lowered to the position he prefers. Sedatives are used as little as possible because they prolong mental confusion.

Explanation and reassurance, for both the patient and his friends, has been a part of the routine. Persistent confusion of moderate or slight degree has not been regarded as a contra-indication to allowing a patient to be up, provided that he appears no worse for it. A patient is sometimes encouraged to get up and progress towards greater activity in spite of symptoms if he is of an apprehensive or worrying disposition. During the

period in bed the patient is allowed to read and converse as much as he is inclined, provided that his doing so is not followed by symptoms such as headaches, irritability or excessive fatigue. Manual occupation, such as leather work, is encouraged as soon as the patient is willing to undertake it, and regular physical exercises of a light type are begun after he has been up for a day or two.

By the time he has been up for a week he is usually able to walk a mile in his clothes, and if his progress is satisfactory he is then transferred to the convalescent hospital, where the average stay is 3-4 weeks. During this period he proceeds through light to heavy physical training, conducted by a trained NCO; he also has daily occupation of a manual kind—weaving, carpentry, gardening or wood cutting—and takes part in such organised games as golf, cricket, football, baseball and tennis under medical supervision. Only those patients who are considered likely to return to duty are sent to the convalescent hospital, and few of those sent fail to do so; the atmosphere is therefore encouraging. Throughout the period of rehabilitation the rate of progress is determined not by any rule but by experiment in the individual case (see Symonds 1940). One man may be fit to return to his normal way of living a week or two after his injury. Another after the same initial symptoms may need a month or two before he is equally recovered. We believe that preconceived notions as to the duration of disability to be expected after injury of particular degree are apt to result in unnecessarily prolonged invalidism. The patient who is symptom-free should be encouraged to go ahead rapidly, but by gradual steps, which should be prescribed by the physician.

In some cases in which it has been decided to send a man back to duty after a severe injury there has been evidence of slight intellectual impairment or personality disorder, which has made the prognosis appear doubtful. The conditions of hospital life, however rigorous, cannot compare with those of the ordinary Service routine, and the final test in certain cases must be return to duty.

## COMPARISON OF PROGNOSIS IN OTHER SELECTED GROUPS

The great majority of patients admitted to this hospital have belonged to the group which we have called chronic—that is to say, they have been admitted or transferred from other hospitals more than 3 weeks after the injury (as a rule much longer) because their progress was unsatisfactory. Table IV shows that the

TABLE IV—PROPORTION OF CASES INVALIDED IN ACUTE AND CHRONIC GROUPS

	Acute	Chronic
Invalided from hospital ..	22 (9%)	221 (31%)
Invalided later (on follow-up) ..	26 (11%)	149 (21%)
Total invalided ..	48 (20%)	370 (52%)
No follow-up ..	22 (9%)	42 (6%)
Total surviving cases ..	237	718

percentage of the chronic cases invalided from hospital was higher than in the acute group, and that, of the cases followed up in each group, the percentage returned to duty but invalided later was again higher in the chronic group.

Analysis of the chronic cases invalided in terms of the duration of PTA (table V) shows that, although the percentage of those finally invalided in the group of cases with a PTA of more than 7 days is the same as in the acute cases, the percentages invalided in the groups with a shorter PTA is in each instance much higher for the chronic than the acute cases, indicating the presence of factors other than the duration of the PTA in determining the prognosis. The impression of one of us (Symonds 1937) that the mental constitution before injury plays an important part in the prognosis of head injuries led us to compare the incidence, in the acute and chronic groups, of predisposition to mental disorder, as evinced by the family or personal history of the individual. This has been systematically inquired for and recorded in all the cases of this series. The criteria for such predisposition included the following.

*Personal history* of: (1) Backwardness; failure to reach average standard at school (e.g., for primary school, top standard) unless offset by satisfactory subsequent work record.

(2) Any functional nervous illness necessitating medical care or absence from work.

(3) Poor work record—e.g., failure to hold any job for longer than 6 months.

*Family history*: of alcoholism or marked eccentricity, as well as mental illness or nervous breakdown needing medical care, in parents, sibs, uncles, aunts or step-sibs (provided there was blood relationship in the last three).

We are aware that these criteria are so comprehensive that they may be fallacious, but since the same criteria were applied to all cases in each group a comparison between the incidence of predisposition to mental disorder thus estimated in the two groups is valid. Table VI shows that predisposition is more than twice as common in the chronic group.

If now the prognosis of all cases (acute and chronic together) in which there was evidence of predisposition is compared with that of the cases in which there was no

TABLE V—COMPARISON IN ACUTE AND CHRONIC CASES OF PROPORTION INVALIDED, EITHER IN HOSPITAL OR LATER, AND DURATION OF PTA

Duration of PTA	Acute		Chronic	
	Cases	Invalided	Cases	Invalided
Nil .. ..	28	3 (11%)	66	26 (39%)
Under 1 hour	75	8 (11%)	120	59 (49%)
1-24 hours..	65	8 (12%)	222	115 (52%)
1-7 days ..	34	8 (24%)	184	93 (51%)
Over 7 days	35	21 (60%)	121	72 (60%)
No record ..	..	..	5	5
Total .. ..	237	48 (20%)	718	370 (52%)

evidence of predisposition, we find (table VII) that the percentage of those finally invalided is nearly twice as high in the predisposed group as in the other. It may be argued that our knowledge of the predisposition gave us a bias towards unfavourable disposal in this group, but analysis of the figures shows that, of those who returned to duty, the number who relapsed and were invalided later was also much higher in the predisposed group. Among the predisposed, 38% of the 207 cases returned to duty were invalided later, whereas in the control series only 20% of the 505 cases returned to duty, were invalided later.

Our criteria for predisposition were deliberately chosen to include all data that might possibly be of value in this connexion, and need sifting. Even on this inclusive basis, 33% of the predisposed were returned to, and remained on, duty. We conclude, not that predisposition as assessed by our criteria carries a bad prognosis, but that among the criteria which we have used there are some which have an adverse effect on prognosis, and that this adverse effect was a factor in determining:

TABLE VI—INCIDENCE OF FAMILY AND/OR PERSONAL HISTORY OF MENTAL INSTABILITY IN 237 ACUTE AND 718 CHRONIC CASES COMPARED

	Acute	Chronic
Personal history "mental" .. ..	18	113
Family history "mental" .. ..	13	113
Personal and family history "mental"	10	78
Total .. .. .	41 (17%)	304 (42%)

(1) the unsatisfactory progress of the chronic group, on account of which they were selected for admission to this hospital; and (2) the relatively bad ultimate prognosis for this group as compared with the unselected acute group.

A further opportunity of comparison between the mental constitution before injury and prognosis was

TABLE VII—DISPOSAL OF CASES WITH FAMILY AND/OR PERSONAL HISTORY OF MENTAL INSTABILITY. ACUTE AND CHRONIC CASES TOGETHER

	Cases	Invalided in hospital or later	Follow-up		No follow-up
			Full duty	Light duty	
Personal history "mental" .. ..	131	76 (58%)	31	21	3
Family history "mental" .. ..	126	74 (59%)	31	13	8
Personal and family history "mental" ..	88	64 (73%)	11	9	4
Total .. .. .	345	214 (62%)	73 (21%)	43 (12%)	15 (4%)
All other cases	610	204 (33%)	268 (44%)	89 (15%)	49 (8%)

afforded by the presence in our series of 111 cases of head injury in RAF flying personnel. These men were primarily selected as of sound mental constitution, not by our criteria but by the aircrew selection boards and the aircrew medical boards, and by elimination of unsuitable types in the course of training.

Of these 111 cases (55 acute and 56 chronic), 8 were invalided from hospital and 5 of those returned to duty were invalided later, making a total of 13 (12%) invalided. Of 844 cases other than flying personnel, 405 (48%) were invalided either in hospital or later. From these figures it is clear that the prognosis for return to duty is much better for flying personnel than for other cases as a whole. Analysis of this group shows that this relatively good prognosis is not to be explained by less severe injury as measured by the duration of the PTA. There are possibly other factors, connected with the duties of flying personnel—in some respects less arduous than those of ground personnel or soldiers—which have a bearing on this good prognosis; but a relatively good mental constitution appears to us to be the most probable explanation. This conclusion is supported by analysis of predisposition in terms of the criteria used for this investigation, for there were 20 (18%) of flying personnel with a family or personal history of mental instability, compared with 325 (38%) of the other 844 cases.

Our data therefore suggest that if two men of dissimilar mental constitution suffer head injury of comparable severity, as judged by the duration of the PTA, the prognosis is much worse for the man with a latent or evinced liability to mental disorder. A similar conclusion has been reached by Lewis (1942) working from another angle. Comparing the past records, in relation to liability to psychiatric illness, of a group of patients admitted to hospital for postcontusional symptoms with those of a group admitted for neurosis without antecedent head injury, he found no significant differences, and concludes "the striking thing is that the long standing, relatively intractable, postcontusional syndrome is apt to occur in much the same person as develops a psychiatric syndrome in other circumstances without any brain injury at all."

SUMMARY

In 242 consecutive cases of acute head injury in Service personnel, 91% of those who survived were returned to duty and 9% invalided. A follow-up showed that a further 11% were invalided later.

In this group of cases a long post-traumatic amnesia carried a relatively bad prognosis for return to duty. Analysis of the cases returned to duty and followed up shows that in 90% the duration of treatment (including rehabilitation) was less than 3 months, and that there was no difference in the length of treatment between those that relapsed and those that remained well.

The prognosis for return to duty in 718 cases of chronic head injury, largely selected for admission to a special hospital because of unsatisfactory progress was more than twice as bad as for the acute cases. This relatively bad prognosis did not depend on more severe injury, as judged by the duration of post-traumatic amnesia.

There is a correlation between the bad prognosis in the chronic group and a higher incidence in this group of predisposition to mental disorder, as judged by the criteria used in this investigation.

In 111 cases of acute and chronic head injury in flying personnel of the RAF, the prognosis for return to duty was four times as good as in all the other cases of the series. It is suggested that the main reason for this relatively good prognosis in flying personnel was that they are a highly selected group in respect of absence of predisposition to mental disorder. This is supported by a low incidence of such predisposition, as determined in this investigation.

Acknowledgements are due to Lieut.-Col. G. O. Chambers for permission to publish this paper, and to the medical officers whose case-notes made the investigation possible.

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POSTCONTUSIONAL HEADACHE

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THE nature and relationship to cerebral injury of the postconcussional syndrome (Symonds proposed the name "postcontusional") are still not clear. Headache, giddiness and lack of concentration are regarded as common after-effects of head injury, but little is known of the factors which cause them to develop and persist in some cases but not in others. It is agreed that headache is the most common residual complaint after head injury (Symonds 1940) but published figures of incidence vary widely. Those who see cases of head injury in the later stages only are liable to get a biased view, because patients who recover completely are seldom seen again.

Knoflach and Scholl (1937), studying over 1000 cases of head injury caused by blunt objects, found intense headache in 36.7% of the cases with cerebral injury and in 51.5% of the cases with fractures; and they state that "mild headaches occur in every head injury." Akerman (quoted by Knoflach and Scholl) found 18% free from complaints; Benon (1926) saw the general (i.e., postconcussional) syndrome in 60-80%; Scherwitz (1936) found headaches in 70%. Borchardt and Ball (1935)—probably referring to the late stages—noted severe subjective symptoms in 39% of their cases. Earley (1933) found headache in 19 out of 100 cases 5-13 years after the injury. Rowbotham (1942) examined "500 cases suffering from the effect of injury to the head" and found headache, unilateral or bilateral, in 80% of them; but these cases are probably a selection of bad risks and the time of the follow-up is not mentioned. Ritchie Russell (1932), examining 200 cases of head injury in the acute stage, noted headache in only 109 cases and no headache in 64; in the remaining 27 cases the patient's mental state was responsible for lack of data. He says that "the pain may continue for only a few hours, but in some cases causes distress for days, months, or years." When he examined 72 of his patients again, on an average 6 months after the injury, some degree of headache was present in 41; it was slight in 28, severe in 13 cases. These figures apply to cases in which there was no question of compensation outstanding. Of his grand total of 141 cases followed up, 86 had symptoms not described in detail—in other words, the percentage was probably roughly the same. His figures are not as well known as they deserve to be; there are no others giving so much detailed information on an unselected series.

The figures reported here refer to 200 unselected cases of head injury admitted to the accident service of the Radcliffe Infirmary. Not all 200 cases were available for study: 5 cases admitted as head injuries were found to be wrongly diagnosed as such (cerebral embolism, poisoning); the records of 3 cases were inaccessible; 2 babies and 1 deaf, dumb and defective patient were excluded; and 8 patients died. This leaves 181 cases, 27 of them being Service cases which were not followed up. Since the case-records were not taken with this special purpose in view they are incomplete. Only those cases are included, therefore, in which the presence or absence of headache was definitely noted at the time; in other words, a missing entry was not regarded as a

negative statement. Generally speaking, however, it is more likely that the absence of headache went unrecorded than its presence.

The types of accident in the 158 civilian cases were as follows:

Factory accidents	6
Children at play (not including road accidents)	8
Injuries in epileptic fits	4
Miscellaneous (falls down stairs, through windows, from horseback; brawls; hit by falling pieces of masonry, and so forth)	19
Road accidents	121

The road accidents can be subdivided as in table I.

TABLE I—ANALYSIS OF ROAD ACCIDENTS

Vehicle	Injured person			Total
	Driver	Passenger	Pedestrian	
Car	3	15	22	40
Lorry	4	2	4	10
Motor cycle	14	2	6	22
Bicycle	49	..	..	49
	70	19	32	121

As an indicator of the severity of the injury the duration of post-traumatic amnesia (PTA) was used, assessed on discharge, as suggested by Russell. In 2 cases the PTA could not be assessed; in a few children the observed duration of deeply clouded consciousness was used. In 179 cases the findings were:

Group	O	PTA up to:	Cases
"	A	5 min.	33
"	B	1 hour	85
"	C	24 hours	39
"	D	7 days	19
"		>7 days	3

The presence or absence of headaches was recorded at six stages (table II).

TABLE II—INCIDENCE OF HEADACHE AT SIX STAGES

Stage 1: on admission or when first able to answer questions.  
 Stage 2: during stay in hospital.  
 Stage 3: on discharge from hospital.  
 Stage 4: when expected to be fit for work.  
 Stage 5: three months after accident (patients who had resumed work only.)  
 Stage 6: six months after accident.

Group	Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
	Cases	HP	Cases	HP	Cases	HP	Cases	HP	Cases	HP	Cases	HP
O	28	14	27	13	27	9	27	10	22	2	26	5
A	81	47	81	44	73	16	56	25	52	14	55	9
B	34	14	38	16	36	6	28	10	27	4	34	6
C	17	0	17	3	16	1	13	2	11	4	13	3
D	3	0	3	0	2	0	3	1	2	0	2	0
Total	163	75 46%	166	76 46%	154	32 21%	127	48 38%	114	24 21%	130	23 18%

HP = headache present.

Less than half of the patients complained of headache when awakening from unconsciousness, and the proportion grows smaller the longer the unconsciousness lasted. This may be due to the fact that patients with severe injuries may not be equal when waking up to observing and describing their sensations; but it would also be explained if the pain-producing stimulus, whatever it may be, wears off during the unconsciousness when this lasts long enough. At stage 1 the 16 missing records were mostly of patients suffering from injuries elsewhere which absorbed their own and the house-officer's attention.

The second stage analysed covered the whole period of the patient's stay in hospital. No distinction was made between mild and severe or between transient or permanent headache. If during his whole time in hospital, the patient complained even once of headache he was counted as positive, and he was put down as negative only if

there was at least one statement to that effect in the notes and none to the contrary.

At this stage, headaches are slightly less common in cases with shorter periods of unconsciousness and somewhat more common among patients with longer unconsciousness. These slight differences, however, are fallacious; they do not allow the conclusion that the clearing up of the patient's unconsciousness makes him more aware of his pains, for the severe cases stayed longer in hospital and so the chances were greater that at some time or the other they might complain of headache. At this stage, the 13 missing numbers were mainly accounted for by patients who stayed so short a time in hospital that there was no detailed entry between their admission and discharge notes.

Of the patients examined on discharge from hospital (stage 3) some were suddenly discharged—owing to pressure on beds—before they could be re-examined by the head injury team, so that the total number analysed at this stage was 154; a special discharge note was only gradually introduced. It can be presumed that discharge without examination happened mainly in cases with no complaints, where there was no doubt about their fitness to go home.

All patients living within a reasonable distance were given a follow-up appointment at a date when it was assumed they would be fit for work again (stage 4). No Service cases are included in this stage; these account for 4 cases in group O, 13 in Group A, 3 in group B and 5 in group C; 25 in all. Of the 27 cases not re-examined at this stage 18 were seen at some other date and had then a negative record.

All patients seen at the follow-up clinic were given another appointment, approximately 3 months after the accident (stage 5); an attempt was then made to find out whether the return to full work had had any influence on the subjective complaints, if any. Only patients who had resumed work at the time of the examination were included in the list, and again any headache was counted, mild or severe, short or continuous; thus a few were included which almost certainly were due to intercurrent infections—cold, influenza and so forth.

Six months after the accident each patient was given another appointment, and those that had not been seen before were written to or visited (stage 6). Any headache during the whole period since the accident not previously counted was put down at this stage. Seven cases not included among the 130 in table II, col. 6, were followed up for three months, and only one of them had complained of headache at an earlier stage. It is therefore probably safe to assume that they did not attend for another examination because they felt fit. Three cases were not further followed up because they were old and invalid; 2 had been called up. The remainder of the cases not seen at this stage were people living far away injured during visits to Oxford, or labourers moved from one place to the other. It is unlikely that they introduce a systematic error into this survey, certainly not one of relevant size.

At each of the six stages less than half the patients complained of headache; 45 cases (a quarter of the total) had no headache whatever at any stage.

As the number of severe injuries in this series may appear to be low, I collected 9 cases, seen before the start of the accident service on account of their severity. All had post-traumatic amnesia lasting more than 7 days. They were followed up at more or less irregular intervals for periods between 7 and 20 months; 6 of them never complained of headaches, 2 had mild headaches at their first follow-up visit but none afterwards; the case of the 9th patient, who complained of headaches at various times, was complicated by an orbital cellulitis and meningitis.

I do not propose to discuss why some cases complain of headache and others do not, or to describe the pathology and to compare the intracranial pressure or the amount of blood in the cerebrospinal fluid with the subjective symptoms. These things have been done before and the results are indecisive. It is unlikely that such laboratory findings would have much bearing on the symptoms several months after the injury. Accepting the duration of post-traumatic amnesia as an indicator of the severity, one can compare the mild and the severer cases at the different stages.

The percentages of cases with headaches given below were calculated from the finding at the six examinations.

	Stage—					
	I	II	III	IV	V	VI
Mild cases (O + A)	55.9	52.8	25.0	42.2	21.6	17.3
Severe cases (B + C + D)	25.9	32.9	12.9	29.5	20.0	18.3

Up to and including the first follow-up examination the percentage of headaches in the milder cases was persistently and significantly higher than in the severe cases. At 3 and 6 months after the injury the difference disappears. This seems to point to causative factors not immediately connected with the mechanical injury. If the duration of the post-traumatic amnesia is a rough measure of the severity of the accident, one would expect some correlation between symptoms and severity, quite independent of the pathology pictured in a given case. In order to get an idea of the causative factor or factors, one has to review the cases clinically. This can be done here only in a brief outline, and the 23 patients who had a history of headache when examined 6 months after the accident have been chosen for this purpose.

The age-distribution in these 23 cases was: under 10 years, 3 cases; 10–20, 2; 20–30, 7; 30–40, 3; 40–50, 4; 50–60, 1; 60–70, 3. This distribution—roughly 25% under 20, 25% above 50, and half between 21 and 50—shows that age is not a very important factor. Only 5 of these 25 patients were off work on account of their headaches and other symptoms, and 1 case can be discounted, because his headaches were explained by an acute attack of otitis media. In 6 cases, the history taken at the time of their inpatient treatment noted that they had been suffering from headaches all their lives, and the patients admitted that their present headaches did not differ either in type or in severity from their previous ones; 2 patients reported spontaneously that the migrainous headaches, from which they had been suffering before, disappeared during the time of observation. One patient was an elderly spinster who for many years had attended a doctor for nervous exhaustion; and one was a nervous, hyperkinetic child whose over-protective mother insisted on his having a headache, though he never complained; another was a defective, emotionally unstable girl who all her life had had variable nervous symptoms.

Fairly obvious psychogenesis was noted in 9 cases—that is to say, during a short interview factors could be brought to light which, in view of the patient's personality, seemed to account for his symptoms. This, of course, does not exclude an organic basis of the symptoms; but since we know that most patients with similar injuries do not complain of headache it seems fair to assume that either the symptom itself or the patient's attitude to it (the degree to which he suffers from it and to which it influences his behaviour) is determined by the demonstrable psychological factors rather than by the hypothetical organic basis. Two cases may be quoted.

CASE 1.—A laboratory assistant, aged 17. On Sept. 9, 1941, he was knocked off his bicycle. Retrograde amnesia nil; post-traumatic amnesia 15 min. Discharged free from symptoms and signs 3 days after accident; back to work 4 weeks after accident; 3 months after accident some headache; 6 months after accident very bad headaches, 2 or 3 a day. Had to change his job because he could not work with the microscope. History taken from parents shortly after patient's discharge from hospital: only child, mother's boy; shy, blushing type. Won scholarship, but not keen on school. Likes music and theatre. Games: watches football in preference to playing. Got himself a job as a clerk, but head teacher insisted on his staying on till end of term; meanwhile his post was filled. Head teacher got him lab job which he disliked. Complained of being moved about from one department to the other; another change mooted while he was away after his accident. Mother, who dominates family, suffers from periodic headache diagnosed as nervous. While husband out of work she took up dress-making; when he was earning again she gave it up because it caused her so much eyestrain and headache. The purpose of the boy's headache—to get him out of the job into which he had been forced and which he disliked—was obvious, and the mother's example was probably an important factor in shaping his reaction. The injury was

probably not more than the opportunity for this escape mechanism to start.

CASE 2.—A fitter's mate, aged 64. On Nov. 7, 1941, he was hit by a falling piece of iron pipe. Unconscious for a few minutes. No retrograde amnesia; post-traumatic amnesia about 15 min. Complained of headache and some giddiness. No signs. X rays negative. No red cells in cerebrospinal fluid. Discharged free from symptoms on Nov. 11. First follow-up: slight giddiness; no headache. After 3 months: giddy attacks on lying down, slight morning headache; goes out for walks, but refuses any other occupation, including gardening in his own garden. "The compensation people would not allow it." Six months after accident: awful headache every second day; dizzy and faint feelings; bad memory; not back to work because he is afraid of falling down the ladder; cannot take on a job on the ground because that would interfere with his superannuation. Has been working at the gas works for 42 years and will be eligible for pension in another 6 months. Though I do not think that the financial gain is the cause of this compensation neurosis, it is obvious that the patient's social condition is responsible for his attitude towards his symptoms.

Thus, going over the cases one by one, including those off work at the end of six months, there are only 2 of the 25 patients in whom neither physical nor psychological factors could be found to account for the persistence of headache. Both cases were of the mildest type of injury, and there is every reason to suspect that the concussion itself did not explain the late symptoms.

#### DISCUSSION

These figures represent the findings in entirely unselected material, which necessarily includes a large proportion of mild cases. The 200 consecutive admissions came from a limited area served in effect by this hospital only. The proportion of cases followed up, though not 100%, was fairly high, and the figures for the incidence of headache are probably on the high side because most of the patients who escaped the follow-up had probably recovered. The low incidence of headache may seem startling, and it is thought that the results of this study warrant at least a review of the customary conception of the frequency and importance of post-concussional headache. They will help to counter-balance the clinical impression which one is liable to form from seeing at a late stage only those suffering from headache related to a head injury. The new impression formed in the light of these observations would be, roughly, that head injury is liable to produce headaches, but only half the injured notice or remember them. With active treatment it would seem possible to discharge 80% of cases from hospital free from complaints. Less than half of those discharged are left with some liability to headaches. This predisposition is psychosomatic—that is, psychological factors are as important in precipitating headaches as physical ones (stooping, heat, exertion). My own impression is that they are even more important. Six months after the injury this predisposition still manifests itself in less than 20% of the cases, and in some cases one can trace liability to headache in the history before the accident; in most of the others social and psychological factors either precipitate the headaches or determine the patient's attitude towards them.

#### SUMMARY

An unselected series of head injuries admitted to an accident ward was examined for history of post-concussional headache. Including even the mildest and most transient, no more than half the patients had a headache at any stage. On discharge from hospital only 20% complained of headache.

During the period between discharge and first follow-up the ratio went up, probably owing to the adverse influence of environment.

In the earlier stage headache is commoner among the cases with short post-traumatic amnesia than in those with a longer memory gap. This difference disappears in the later stages.

In most cases which complained of headache 6 months after the injury the symptom was either precipitated by psychological causes or the patient's attitude towards it was determined by such factors.

Some of the patients with persistent or recurrent headache had been suffering from such headaches before the accident.

I wish to thank Prof. Hugh Cairns and Mr. J. C. Scott for permission to use their case material and for much criticism. This investigation was supported by a grant from the Rockefeller Foundation.

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## A METHOD OF CONTROLLING BRONCHIAL SECRETION IN THORACIC SURGERY

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IN major surgery of the lungs, the most important problem facing the anæsthetist is the presence of pus or infected secretions in one or more lobes of the lung and in the bronchi leading to them. These secretions are being continually expelled not only by normal reflexes, but by pressure on or handling of the diseased area during the operation; they enter the bronchi, and thence tend to spill over into another lobe on the same side or even into the opposite lung. Existing methods for controlling these secretions are beset with technical difficulties which one way or another frustrate the purpose for which they are designed. To overcome these difficulties, a simple occluding instrument has been constructed and a technique has been evolved for the application of it either blind or with direct vision.

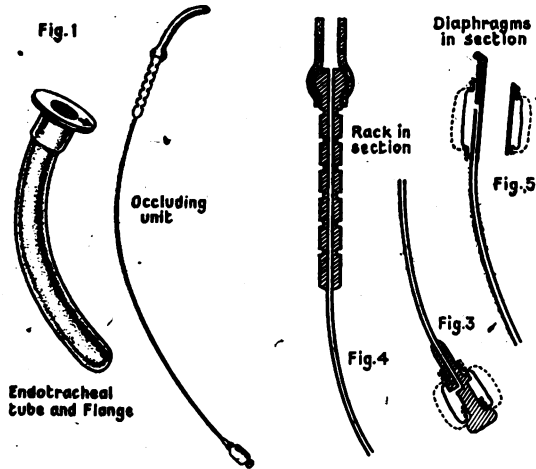
Three ways of controlling secretions are in use: continuous or intermittent removal of the secretion by suction; occlusion of the bronchus to the affected lobe by a gauze tampon; and occlusion by a catheter carrying an inflated cuff. Suction drainage used in conjunction with closed anæsthesia has many disadvantages: the possibilities of leakage in the anæsthetic circuit is considerably increased; unknown quantities of air or fresh gas must be introduced into the circuit from time to time to replace that which is removed by the suction, which upsets the composition of the gaseous mixture; suction may not be sufficiently immediate or complete to deal effectively with the sudden flooding of a bronchus during manipulation of the lung.

The use of ribbon gauze to pack the bronchus of the affected lobe or lobes is efficient but its introduction necessitates at least half an hour of preoperative bronchoscopy. Moreover, it is not possible to close an upper lobe bronchus yet leave the lower lobe bronchi patent; and when used to close a lower lobe bronchus the gauze may become trapped by the lung-clamp or tourniquet, leading in turn to unrecognised incomplete removal of the gauze, with imperfect closure of the bronchus and a bronchial fistula. The inflated-cuff endotracheal tube technique devised by Magill prevents the secretions passing over to the opposite lung but does not control their entry into a homolateral healthy lobe. Over-inflation coupled with the slightest weakness of the rubber wall of the cuff will cause it to balloon up the main bronchus into the trachea; as a result, the ventilation of the sound lung is impaired. Moreover the inflating orifice of such an over-distended cuff may become distorted and so prevent deflation; the withdrawal of the catheter can then only be achieved at the risk of trauma to the tracheal mucosa and the vocal cords.

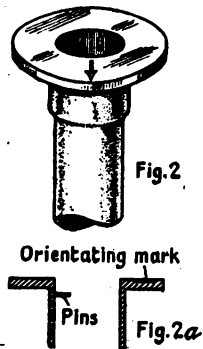
Experience of the last few years has shown that control of infected secretions during lung operations is practicable as well as essential, but no existing method is free from objections. I have devised an occluding diaphragm which permits of the blocking of the bronchial opening of one or more lobes.

DESCRIPTION OF THE OCCLUDER

The occluder is in two parts and consists of a wide-bore Magill endotracheal tube and a mobile occluding unit (fig. 1). The nasal end of the Magill tube is fitted with a flanged mount in such a way that an orientating mark engraved on the flat surface of the flange points to the concavity of the curve of the tube. Two pins project a short distance into the lumen of the mount and are designed to engage with a rack on the occluding unit (figs. 2 and 2a). The occluding diaphragm consists of a fine stainless steel tube, curved in the same arc as the Magill tube. At its distal end is mounted a hollow former, 1.5 cm. long and 0.33 cm. in diameter. This is



covered by a stout inflatable rubber sac, the interior of which communicates directly with the lumen of the steel tube (fig. 3). Round the proximal or nasal end of the steel tube is a rack 8 cm. long, notched at 1 cm. intervals (fig. 4). This rack engages with the pins fixed in the lumen of the flanged mount of the endotracheal tube. A short length of rubber pressure-tubing is slipped over the end of the rack and serves as a union for a well-fitting Record syringe; by this means the distal sac is inflated to form the occluding diaphragm. Saline is used to distend the sac, since it has been found that an accurate degree of inflation cannot be attained with air. The sac and tube are filled with saline before insertion, all the air being expelled by barbotage. When in position the sac is distended with a predetermined amount of saline. The rubber tube is then securely closed by a screw-clip and the syringe removed.



In practice, two sizes of endotracheal tubes are required for adults—Magill sizes 10 and 8. Two bronchial occluders 40 cm. and 36 cm. long are also necessary. In the longer occluder the first notch of the rack is 31 cm. from the centre of the distended diaphragm; in the shorter the distance is 27 cm. The selection of catheter size and occluder length depends on the sex of the patient and whether an upper lobe, a lower lobe or a whole lung is to be occluded. A slightly different type of occluder is used when it is desired to close an upper-lobe bronchus. In general, its structure is the same as the one described, but the metal former is replaced by a small hollow metal tube, 2.25 cm. long and 1.25 cm. in diameter, to which the rubber sac is attached. This tube, which has a bevelled end to facilitate introduction, is placed directly opposite the upper-lobe bronchial orifice. The lower-lobe bronchi can then be ventilated through the lumen of the tube (fig. 5).

TECHNIQUE OF USE

An essential principle in the use of this occluder is that it should be inserted so that the diaphragm is immediately above the bronchi which it is desired to shut off from the rest of the bronchial tree. In the case of the upper-lobe bronchus, the diaphragm must be opposite

its orifice. There are two methods of attaining this exact placing of the occluder—by "blind" introduction and by the direct visual method. For the blind method it is necessary to know how far the bronchial orifices are from the teeth or nares. Investigations<sup>1,2</sup> have shown that there is a striking constancy, for both males and females, in the distance of the various bronchial orifices from the carina, except for the eparterial bronchus. I have made, in addition, measurements from a series of X-ray plates after injecting iodised oil, also in fresh post-mortem specimens and by direct bronchoscopy. These show that while the distance between the external nares or the teeth and the carina varies slightly with posture and the position of the head, if the adult subject is placed in the position usually adopted for blind intratracheal intubation; the measurements from the nares or the teeth to the orifices of the lobar bronchi show little variation in the male and female. The average measurements for a man are as follows; for a woman they are 2 cm. less.

		Right cm.	Left cm.
Nares	to centre of upper-lobe bronchial orifice ..	30.75	34.25
	Teeth	23.75	27.27
Nares	to centre of middle-lobe bronchial orifice ..	33.75	
	Teeth	26.75	

These figures show that there is a sufficient margin between the upper and middle lobes to allow for small individual variations. Nevertheless it is advisable when possible to check the measurements for each patient before operation on iodised-oil bronchograms. Blind introduction of the occluder is impracticable in children. It will be clear from the figures that if the occluding diaphragm is to be effective in closing off the lower bronchi and is yet to leave the orifices above it patent, it must be placed at distances beyond those tabulated. These measurements are as follows.

To occlude the right lower and middle lobes in the male, the occluder must lie 33 cm. from the nares or 26 cm. from the teeth. To occlude the right lower lobe alone it is placed 35 cm. from the nares; 28 cm. from the teeth. On the left side, the lower lobe is occluded at a distance of 36 cm. from the nares or 29 cm. from the teeth. Again 2 cm. should be subtracted for the female patient.

It has been further demonstrated that if a suitably curved tube is passed into the trachea, through either the nose or mouth, and is placed so that its tip lies at the bifurcation of the trachea with the concavity of its curve facing directly forwards, further advancement with rotation through an angle of 45° to the left or right will cause it to pass automatically into the left or right main bronchus. This is possible even when pathological changes have caused considerable distortion of the bronchial tree.

*The blind technique.*—The patient having been anaesthetised, the endotracheal tube, with the occluder placed inside it but as yet not projecting beyond the bevelled end, is passed through the nose or mouth and advanced until the flange is close to the nares or the teeth. If the instrument is to be passed into the left bronchus, the patient's neck is flexed towards the right shoulder and the flange is turned through 45° until the orientating arrow points towards the left cheek. The occluder is now pushed down until the notch of the rack corresponding to the required distance can be engaged with the pins of the flange. Entrance to the right bronchus is effected by flexing the neck to the left and turning the flange to the right. When the occluder is in position a 5 c.cm. syringe filled with saline is attached to the rubber tube and the predetermined amount is injected. The tube is then securely clamped with a screw clip and the syringe removed. At this stage proof that the occluder is in the correct position should always be obtained by listening to the chest. The flange can now be secured with strapping and the anaesthetic mask fitted to the patient's face, care being taken to see that the protruding end of the occluder is housed safely in the dome of the mask. At the conclusion of the operation the patient is turned on the affected side, the screw clip is loosened and the saline

1. Neil, J. H. Gilmour, W. and Gwynne, F. J. *Med. J. Aust.* 1937, ii, 165.  
2. Foster-Carter, A. F. *Brit. J. Tuberc.* 1942, 36, 19.

allowed to escape. The occluder is then withdrawn through the endotracheal tube or out of the trachea and any secretion which may have become lodged between the cut end of the bronchus and the occluding diaphragm is removed by a fine suction catheter down the endotracheal tube.

*Visual method.*—The endotracheal tube is not needed. The occluder alone is passed through the nose or mouth under direct laryngoscopic vision. When it is seen to be in the trachea, the laryngoscope is exchanged for a bronchoscope. The occluder is now advanced alongside the bronchoscope until it is seen to be in the desired position. It is then inflated, fixed in place and the bronchoscope withdrawn. A plain Magill endotracheal catheter is inserted by the nasal or oral route and anaesthesia can be proceeded with. A special clip for fixing the occluder in position is being designed.

I wish to thank Mr. H. Morriston Davies and Mr. Ronald Edwards for their help in these investigations; the department of anaesthetics at Oxford for their assistance in procuring materials; and Mr. J. Blease of Messrs. Alexander and Fowler for constructing the occluder.

## PERURETHRAL METHODS IN BENIGN PROSTATIC HYPERTROPHY

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PERURETHRAL prostatic resection is a form of treatment which has aroused considerable antagonism in the past and there are still many who restrict its use to a small field or who are prepared to condemn it outright; but if it can produce results equal to those of open operation it is obviously to be preferred to any suprapubic or perineal method. Few patients would wish to have an abdominal wound if it could be avoided and few doctors would advise an old man to lie in bed longer than is absolutely necessary. Moreover it is unjustifiable to condemn perurethral prostatic resection out of hand while great improvements in technique are still being introduced.

The methods employed at the Mayo Clinic with the Gershom Thompson resectoscope have eliminated many of the disadvantages of earlier procedures. Results have been equal or superior in most respects to those obtained by open operation. I have employed this technique since the beginning of 1938 and have maintained contact with patients or their doctors. The results have been far short of Mayo Clinic standards but a discussion of 100 consecutive cases of benign hypertrophy treated in this way may be of value. It is chiefly in the benign group that the choice between suprapubic and perurethral methods arises.

### TECHNIQUE

*Instruments.*—The Gershom Thompson resectoscope is a development of the Braasch Bumpus punch. It has a large and small channel passing through the shaft; the larger channel contains a circular knife which can be moved up and down the sheath so as to open and close the fenestrum on the lower aspect, and the operator looks through the lumen of the circular knife. The smaller channel contains the electrode. In the instrument described by Robinson (1939) the blade rotates as it cuts and the electrode and knife are on different attachments. Both of these instruments have been used in the present series. Where hæmorrhage is brisk it is sometimes an advantage to have the electrode constantly in position as in the Gershom Thompson instrument. In many cases no hæmostasis is necessary until the end of the operation; in such cases the Robinson instrument is excellent because it cuts larger pieces of tissue.

The prostatic tissue is excised with the circular knife. Diathermy is used only to control the bleeding points. The minimum of coagulated tissue is left and the danger of sepsis reduced; this is a distinct advantage over the "cutting loop" types of operation. The bladder is alternately filled and emptied during the whole course of the operation. The resectoscope is of the direct vision type, the operator looking through fluid which is on its way into the bladder; vision is therefore excellent even in the presence of considerable hæmorrhage. During the phase of bladder filling the most important parts of the operation

are carried out: tissue to be excised is inspected; the fenestrum of the instrument is opened by withdrawing the blade and the obstructing tissue is engaged; the tissue is excised by advancing the blade; and bleeding points are coagulated by the electrode. During the phase of bladder emptying the excised pieces of tissue are washed out and are caught in a wire basket.

It is often supposed that these methods merely "bore a hole" or "cut a channel" in the prostate. This is far from being true. The great bulk of the hypertrophied prostatic tissue is excised. The Mayo Clinic surgeons have removed as much as 110 g. of tissue from a prostate. The largest quantity removed in my series was 42 g. In order to remove large quantities of tissue a definite technique must be acquired; the obstructing tissue must be approached from different angles at successive cuts. In general the plan is to remove tissue nearest to the bladder first; it is necessary at times to exert fairly firm downward or lateral pressure on the shaft of the instrument. Sometimes the pieces do not return as the bladder empties and it is necessary to employ a syringe or a Freyer's aspirator. Spouting vessels are controlled by diathermy but perfect hæmostasis is not attempted since it is desirable to limit the coagulation of tissue. At the end of the operation a catheter is inserted.

All obstructing tissue must be removed; failure to achieve this seems to be the chief cause of difficulties, immediate and late. In treating aged feeble patients it is not desirable to prolong the operation much over 45 min., so that it is as well to have replacements of all parts of the instrument ready and a staff experienced enough to reduce the time of a "technical hitch" to a minimum.

### AFTER-TREATMENT

The chief danger to be avoided is clot retention. At the Mayo Clinic a staff of orderlies has been trained to wash out the bladders by means of small syringes. I have found it more convenient to use the St. Mark's Hospital irrigating apparatus; fluid passes into the bladder when one clip is released, and the bladder empties when the other clip is released; any blockage of the catheter is at once obvious and steps are taken to deal with it. Various fluids have been tried and the following combination has been found the most effective. The bladder is filled with sodium citrate solution at the end of the operation and the catheter is clipped. This prevents the formation of clot while the patient is being moved from the operating-theatre to the ward and the irrigating apparatus is being fixed up. After this has been accomplished the citrate is washed out and thereafter silver nitrate, 1 in 10,000, is employed. The catheter is removed usually on the third day and the patient should then pass urine naturally and easily. Occasionally he does not, and the catheter must be replaced for a time. It may even be necessary to resect more tissue.

### SELECTION OF CASES

During the period January, 1938, to June, 1941, all cases of benign prostatic enlargement in which it was considered wise to remove the obstruction were treated by this method with 3 exceptions. In one the perurethral method failed and the suprapubic also failed; this case will be described later. In another there was a dumbbell calculus partly inside a diverticulum; the bladder had to be opened to remove the calculus so the prostate was enucleated. In the third case it was not possible to pass the instrument without great difficulty and suprapubic prostatectomy was preferred. During the same period some patients have been condemned to permanent suprapubic cystostomy; only those with definite renal failure or advanced disease in other systems of the body were treated in this way. Some patients suffering from benign prostatic enlargement were also advised against operation, where the symptoms were mild and there was little or no residual urine and where the disease process seemed unlikely to be progressive. The size of the prostate was not considered a contra-indication to perurethral operation. Where stones were present, they were in most cases treated by lithotripsy. Cases of frank malignant disease of the prostate were also seen during this period and were treated by perurethral prostatic resection. They are not included in the present discussion as recurrence of symptoms must be expected in a fair number of cases.



Deaths from metastases have been more common in these cases, however, than recurrent obstruction.

#### RESULTS

**Mortality.**—In this series of 100 cases of clinically benign hypertrophy 6 cases died. This does not compare favourably with the Mayo Clinic experience, where several thousand cases have been treated with a mortality of under 2%. Series of suprapubic prostatectomies have also been performed with lower mortality; but these are not comparable with the present series where a large proportion of cases were referred by surgeons and practitioners as unfit for the suprapubic operation. The perurethral method can often be applied successfully to feeble and decrepit patients and it seems justifiable to risk a small mortality in extending its benefits to this type of case; most of the mortality has been encountered in this group. Wardill (1941) has expressed a similar view from his experience of this operation.

**Relief of obstruction.**—Urethral micturition was achieved by 93 out of the 94 patients who survived operation. The one complete failure was a patient whose senile degeneration was mental rather than physical. After the failure by the perurethral method a suprapubic enucleation of the remaining prostatic tissue was carried out, but he still failed to pass urine naturally. This man had been on suprapubic drainage for a long time and the ward sister's theory that he had "just forgotten how to pass urine" may well have been correct. In 10 others micturition was rather sluggish and was associated with some difficulty and hesitancy; 4 of these had been on suprapubic drainage for a long time and were advised to continue thus. The remaining 6 were reasonably satisfied, and as they had little or no residual urine were allowed to go home. In 83 cases there was a strong urinary flow after operation.

**Permanence of operative results.**—Contact has been maintained with these patients or their doctors in all but one case. Deaths have been inevitable in a group of men who have reached the allotted span, and many of them were known at the time of operation to be suffering from diseases outside of the urinary tract; 37 of them were over 70 years of age. One case died from uræmia; 18 months after operation this patient stated that his general health was satisfactory and his bladder action normal; 6 months later he was sent to hospital suffering from symptoms of urinary infection and uræmia from which he died. He had a large vesical calculus and gross cystitis; whether the calculus was due to a slight recurrence of prostatic obstruction it was not possible to say. Another patient had slight recurrence of obstruction and on investigation was found to have evidence of malignant change in the remnants of his prostate; he died of widespread metastases, and his case will be discussed more fully later. A third who died of pneumonia 3 years after operation had symptoms of urinary infection in the last few months of life. Other deaths have been due to causes unconnected with disease of the urinary tract. In the group where function was somewhat imperfect after operation, progress has been variable; sometimes the urinary flow is good, at others the hesitancy and difficulty recur; 2 of these patients have had brief attacks of acute retention since operation, and it is difficult to say whether they were due to regrowth of tissue or to an imperfect original operation.

These 5 were all the cases where there was any evidence of recurrence of obstruction. I have followed up 61 cases for over a year, 36 of these for over 2 years, and 19 for 3-4 years. With few exceptions all these patients had suffered from acute or chronic retention before operation.

At the Mayo Clinic between 1913 and 1935 1694 patients were treated by perurethral methods; evidence of recurrence was found in under 3% of cases (Thompson 1935). Despite efforts to trace patients treated elsewhere no evidence of a higher recurrence-rate had been found in 1939 (Thompson 1939).

If benign prostatic enlargement is regarded as a tumour growth this low recurrence-rate might seem remarkable, but the view most widely held is that the condition is a disorder of involution of the gland. Normal involution is of limited duration, and there is no reason to assume that abnormal involution continues indefinitely. These patients are treated at various stages in

the process but it must be remembered that a moderate amount of growth will be of no importance unless it is so placed as to obstruct the urinary outflow.

**Malignant change.**—The one case which was clinically benign at operation and later showed malignant change is worthy of further consideration. Whether the patient might have been saved by suprapubic operation when first seen depends on the view accepted of the pathology of the condition. If the malignant disease begins as a change in the nature of the cells of the hypertrophied portion then there is an advantage in the suprapubic operation, but much evidence supports a different view. First, the normal point of origin of benign prostatic hypertrophy is close to the urethra. This is constantly observed by surgeons performing suprapubic prostatectomy and is so definite that Motz and Pearnau put forward the view in 1905 that the condition called prostatic hypertrophy is really a tumour of the sub-mucous glands near the neck of the bladder. This has been supported by Marion (1921) and other French authorities. The normal site of origin of carcinoma of prostate, on the other hand, appears to be posterior and marginal. Rich (1935), in a search for occult carcinoma of prostate, found the tumours most often at the outer margins of the gland. Moore (1935), after a study of small prostatic carcinomata, concluded that though carcinoma may arise anywhere in the prostate it is predominantly a disease of the posterior lobe. He considered that carcinoma and benign enlargement are independent diseases. This view is shared by Young and Lewis (1936) who say: "We have observed areas of carcinoma within lobes of hypertrophy but it appears that those areas were extensions of tumour from the posterior lamella or had their origin in non-hypertrophied acini occurring between lobes of hypertrophy." Bibus (1938) examined 430 operation specimens from suprapubic prostatectomy by serial sections; in 4-5% of these he found areas of carcinoma but the position of these in every case indicated that the area of benign hypertrophy was being invaded from outside.

These findings suggest that the suprapubic prostatectomist has no better chance of performing a complete excision of the malignant area than has the perurethral operator. Boyd (1938) states: "Even when a very early growth is discovered accidentally in a prostate which has been removed for simple hypertrophy the patient is likely to die of recurrence or metastases."

**Incontinence of urine.**—Detractors of the method claim that urinary incontinence is a common complication. A few days after operation the sphincter mechanism is suddenly called on to cope with the hypertrophied bladder with no intervening obstruction and there is a brief period of incontinence in a few cases. Complete control is usually re-established within a few days. Incontinence was persistent in one of my cases; he was treated successfully by the operation introduced by Millin (1939, 1941). He can now sleep 8 hours without being disturbed and can undertake normal exertions without accident.

Some frequency and urgency may be produced in the early days after operation by the same mechanism as produces incontinence, but this also has been found to be transient and after a few weeks most patients rise at most once a night.

#### SUMMARY

Perurethral prostatic resection can be applied widely in prostatic obstruction, especially to patients too feeble for open operation.

Of 100 cases of clinically benign hypertrophy treated in this way 6 died. In 93 of the 94 survivors urethral micturition was achieved; the one failure was in a patient with mental deterioration. In 10 of these cases micturition was sluggish and 4 of them were advised to continue with suprapubic drainage.

In 3 cases there was evidence of recurrence of obstruction and in 2 others some suspicion of such recurrence. Function was maintained in the remaining cases. The follow-up extended for periods up to 4 years.

One case clinically benign at operation later showed malignant change. Evidence is quoted to show that suprapubic prostatectomy offers little or no advantage over a perurethral prostatectomy in the removal of early foci of malignancy.

Incontinence of urine was a rare complication and has responded to treatment.

I wish to thank Mr. James Russell for advice and encouragement; most of the patients were treated in his wards at the Victoria Infirmary, Glasgow.

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## Reviews of Books

## Evolution: the Modern Synthesis

JULIAN HUXLEY, MA, DSc, FRSc. London: Allen and Unwin. Pp. 645. 25s.

BIOLOGISTS have been springing surprises upon each other since the beginning of the century so that we deserve a reasoned and reasonable statement of the modern version of evolution. Dr. Huxley gives us one which evaluates the methods, old and new, by which evolution has been studied, and strives to throw the findings, theories and beliefs which have risen from them into relation, so that the reader may see them in perspective. Controversial topics are not avoided—indeed, most of the book is in a sense controversial—but there is a notable absence of special pleading, and the logic is robust and never smart. The book is a serious and valuable contribution to the subject, not a popular work in the accepted sense of the term, but intended for those who have studied biology and desire to learn how they must modify their background to conform to modern knowledge. He begins at the beginning and tries to convey the real content of conceptions commonly denoted by a word or phrase such as "adaptation," "natural selection" or "evolutionary progress." The reader is therefore fortified against sweeping statements he may encounter elsewhere in which writers have used such words in a special sense. The book is well documented, with 35 pages of references to original works and three indexes—to subjects, organisms and authorities. Geographical, ecological and genetic factors in speciation are treated at length, and the problems of taxonomy discussed. The importance to the mechanism of evolution of Mendelian inheritance and genic interaction is indicated by reference to the modern interpretation of these processes; and the power of natural selection as an instrument is emphasised by quantitative evidence. Adaptation and trends are fully discussed, and the nettle of evolutionary progress firmly grasped. The strength of the book does not however lie in the number of topics covered, but in the thorough interweaving of all available types of evidence. To differ from the author on this or that interpretation would be to misrepresent, by implication, the character of the work. While stating his own position unequivocally, Huxley himself indicates clearly where others may differ from him. Such differences are unlikely to affect his general thesis, or to shake the solid structure of the book.

## A Manual of Endocrine Therapy

B. L. CINBERG, MD, lecturer in obstetrics, New York Polytechnic Medical School and Hospital. London: Macmillan and Co. Pp. 178. 17s.

THIS book is exactly what the title suggests. Except where he writes, expertly and in some detail as befits an obstetrician, on the diagnosis of sterility, the author leaves pathology and diagnosis severely alone. He has produced an accurate, well-balanced, and pleasantly sceptical manual of treatment; but so rigid an insistence on treatment alone makes it seem little more than a cookery book. It is hard to say for whom the manual is written. The expert in endocrinology does not need it, and the tyro, with no knowledge of diagnosis, will be unable to use it. Dr. Cinberg is usually accurate, though many would doubt that "treatment with oestrogens is of definite value in painful breasts"; or that menstrual oedema is due to dysfunction of the adrenal cortex; or

that oestrogens are of no value in the treatment of kraurosis vulvæ, which in England is regarded as an important indication for their use; and there is ample evidence that lactation is suppressed by oestrogens or androgens. He makes no mention of the use of androgens in chronic mastitis, and believes that no physiological actions can be assigned to epinephrine; he also continues the outmoded fiction of  $\beta$ -oxidation of the carbohydrates. His suggestion, vaguely thrown out, that thyroid extract may usefully be "included in any scheme of endocrine medication" is uncharacteristic, and smacks of that therapeutic optimism against which he tilts. But against these venial faults must be set many virtues; for instance he warns his reader in almost every chapter against the inactive preparations on the market, and names them. He might have gone farther and omitted from his lists those unstandardised preparations which still abound. Ovarian and testicular extracts, oral parathyroid preparations, and thymus gland extract should have joined mammary substance, whole pancreas, pineal gland, placenta, prostate and spleen in the condemned cell of chapter 13.

## Management of Fractures, Dislocations, and Sprains

(3rd ed.) JOHN ALBERT KEY, MD; H. EARLE CONWELL, MD, FACS. London: Henry Kimpton. Pp. 1303. 63s.

THIS well-known work is a full account of injuries of bones and joints, obviously written from experience. The introduction of chemotherapy and the uses of non-corrosive metals have changed the views of the authors on treatment, especially of compound fractures; otherwise, no radical changes appear in the work, which deals first with general principles of bone and joint surgery, and then with their application to fractures in various regions. There has been a swing of the pendulum in favour of operative treatment of fractures in the past few years, and it is noteworthy that these authors are conservative in the treatment of two conditions for which their fellows have been advocating surgical methods: prolapse of the nucleus pulposus with sciatic pain, and tibiofibular diastasis. In general, the lines of treatment they adopt will find favour with British surgeons. They describe the "hanging cast" method of treatment of fractures of the upper end of the humerus, and say they have given up abduction methods in its favour for the treatment of adduction or abduction types of fractures of the humeral neck. They nail all basal and trochanteric fractures of the femur, and describe methods of overcoming the technical difficulties of this operation. There are good accounts of the various types of spinal column fractures and spinal cord injuries. The chapters on faciomaxillary and skull fractures have been well written by specialists in these branches. The illustrations show careful selection and preparation.

## Nutrition and Chemical Growth in Childhood

Vol. 1. *Evaluation*. ICIE G. MACY, PhD, director of the research laboratory of the Children's Fund of Michigan. London: Baillière, Tindall and Cox. Pp. 436. 27s. 6d.

THIS volume embodies the results of chemical and biological investigations carried out on the development of normal children between the ages of 4 and 12 by large teams of research workers. The second volume, which is yet to come, will interpret the findings now published. The children were studied under exceptionally favourable conditions from an investigator's point of view, since they lived in the Methodist Children's village in Detroit and could be isolated in a separate cottage and fed on a uniform diet during the period of experiment; they were besides well trained in the technique of providing specimens. Only a small number were studied but the investigations made on them were elaborate—perhaps too elaborate. Thus they were subjected to inquiries into their height, weight, growth, metabolism, digestion, excretion, blood, diet, energy and rest. The result is a collection of data of varying importance. The authors, diligent and enthusiastic though they were, do not seem to have appreciated that much of the physiology of childhood had been investigated already, or that some of it hardly calls for formal study. In the hæmatological section there is a mass of detailed information about the composition of red cells and plasma; the studies of red-cell measurements duplicate previous work, but the chemical section contains much information hardly to be had elsewhere.

# THE LANCET

LONDON: SATURDAY, JANUARY 2, 1943

## DISINFECTION OF AIR

COMPARED with the immense reduction achieved in water-borne disease the progress made in the control of air-borne disease has been small. The fundamental reason for this is that an adult only ingests about one-sixteenth of a cubic foot of water per day, and that at long intervals, whereas the volume of air inspired is about 500 cubic feet per day, and the need is continuous. Hence, although it is at least as easy to sterilise air as water, it is very difficult to provide populations with continuously aseptic air. Since the days of LISTER's phenol spray air disinfection has been largely neglected until recently, and the common complaint that "Doctors can't even stop colds" is significant of a very real defect in public hygiene. In the last few years a considerable volume of work has been done in the United States on the control of air-borne infection, especially by W. F. WELLS and his colleagues. The European work is less conspicuous, but studies on chemical disinfection of air were initiated by TRILLAT in France and continued in this country by PULVERTAFT and by TWORT and his colleagues. Since 1939 a good deal has been done by the Medical Research Council, but much of their findings remain unpublished owing to the war. Lately American workers, with two British contributors, ANDREWES and VAN DEN ENDE, published a collection of 37 papers on air-borne infection of outstanding importance under the title *Aerobiology*.<sup>1</sup> This symposium includes both "extramural" and "intramural" transmission of viable particles. Extramural transmission is mainly of interest to those concerned with plant diseases, with asthma and hay-fever, or with viruses such as foot-and-mouth disease, of which the means of transmission are still obscure. Most of the papers deal with intramural transmission, and in particular with the use of ultraviolet radiation for disinfecting air.

It is now certain that radiation of wave-lengths between 2500 Å and 3000 Å will rapidly kill moist air-borne bacteria when freshly sprayed, either naturally from mouth and nose or artificially from laboratory cultures. The resistance of the majority of moulds and dried organisms found in dust is, however, much higher, and ultraviolet radiation will only kill them with certainty when used in considerable intensity or for relatively long exposures. The practical use of ultraviolet radiation for aerial disinfection is simplified by the introduction of low pressure mercury-vapour lamps emitting a high percentage of their energy on the wave-length of 2537 Å. These are sold as "germicidal lamps" both here and in the USA, and as a rule are used at a height of 7 or 8 ft. above the floor, with reflectors below them so as to protect the eyes of people in the room from direct radiation. Under these conditions there is no need to wear goggles. In operating-theatres it has been customary to use more intense irradiation and to protect the surgeon and theatre staff with goggles.

1. *Aerobiology*. Washington, DC: American Association for the Advancement of Science, 1942, pp. 230.

HART has claimed a large reduction in postoperative sepsis from this use of ultraviolet lamps. It is difficult to determine the actual effects of such procedures in diminishing cross-infection in hospitals or epidemics in schools. This symposium includes five accounts of apparent gains from the use of UVR in institutions, and one paper recording more equivocal results. In this case an apparent large reduction in cross-infection was obtained from the use of UVR in an infants hospital in 1940, but a negligible result in 1941, in spite of a diminution in the bacterial counts obtained on air sampling. The most striking results were those recorded by WELLS, WELLS and WILDER, in the large fall in incidence of measles and chickenpox in the irradiated sections of three schools in Philadelphia. Their results cover a period of 4 years and seem strong evidence in favour of ultraviolet radiation. If they are confirmed it seems safe to predict the widespread adoption of this method of aerial disinfection in the postwar years.

One alternative method of aerial disinfection by the volatilisation of propylene glycol already mentioned in these columns<sup>2</sup> is discussed by ROBERTSON and others in the symposium. To be effective this substance needs to be present in relatively high concentration compared with hypochlorous acid gas or some resorcinol derivatives, but its very low toxicity will favour its adoption. Chemical disinfection of air is more troublesome than ultraviolet disinfection, the dosage is much less easy to control, and with most agents there is some fear of noxious effects if local overdosage does occur. But it is cheaper to instal and easier to improvise in a sudden emergency, and is likely to compete with ultraviolet radiation at least in certain situations. With the choice of effective methods now available disinfection of air should become a common practice in crowded places before long.

## DESERT SURGERY

FEW first-hand accounts of surgery in the desert have so far been published, though they have been eagerly awaited by surgeons here and in America. Much information has come back but mostly to committees or in personal letters. In a war of mobility it is of course difficult to collect data, to trace the final outcome of cases, and to check one's reasoning and enthusiasm by discussion with colleagues. Cold science is apt to tilt its nose at mere surgical gossip, yet this is an early pointer to the drift of surgical thought and action, and clinical impressions formed from experience on the battlefield stimulate surgeons at home to compare, to ask and to seek the reason why. Most of the value of this battlefield experience will be lost if it is filed for the official historian, and much may be lost in the minutes of committees.

A few weeks ago, two surgeons home from the Middle East, Lieut.-Colonel E. G. MUIR and Lieut.-Colonel A. E. PORRITT, told the Medical Society of London a heartening story of the high standard of desert surgery. Lessons of the blitz had been assimilated, wound conferences had been held, and there was an orderly rationale in wound treatment. The old system of three units—the field surgical unit, the casualty clearing station and the base hospital—seems likely to be altered. The days of the casualty clearing station are numbered. The CCS is idle in slack

2. See *Lancet*, 1942, ii, 491 and 671.

periods, and in battle the more seriously wounded who cannot be transported back are deprived of the skill of the most experienced surgeons if these are left in the rear. It is up to the surgeon to go to the patient, and nothing gives the soldier more confidence than the knowledge that if he is wounded immediate attention will be available. Mobile surgical teams have therefore been established, and arrangements made whereby operation cases can be kept for at least 48 hours in small wards erected in sunken tents, the trench protecting them from blast and splinters. MUIR, in his paper published on another page, and PORRITT both paid tribute to the Royal Engineers, who have perfected a system for the rapid construction of such small hospitals. Delay—not always avoidable—in the start of treatment is still the surgeon's nightmare; 14 hours was the average time before coming to operation, and immobility of transport at night was partly responsible. Air transport was being more and more employed, but in the selection of cases the surgeon has sometimes to adapt his views to the realities of military needs. The "interesting" severely wounded case will rarely be a soldier again, and it is militarily more sound to utilise air transport for the small wound than, say, for the extensive fractured femur. The well-organised transfusion services called for the highest praise. The dangers of unnecessary or excess morphia in resuscitation had been recognised; often the large wound causes the least pain—if immobilised. MUIR and PORRITT treat their soft-tissue wounds as well as fractures in plaster, and MUIR urged especially that the compound femur—always a problem—travels best in plaster. The point d'appui of the treatment is the wound, and here PORRITT urged that "toilet" of the wound rather than "debridement" or "excision" is the term of choice, for the treatment required varies in each case. All dying and dead tissue must be removed, and he urged that however long after injury the case reached the surgeon, it is not too late to remove dead tissue. He had no hesitation in cleaning or re-cleaning the late wound, keeping of course to the wound limits. For the fresh wound excision is not enough—counter drainage has to be established—and, especially in the thigh, he used relaxing incisions transversely cutting the fascia. Despite the repeated emphasis that primary suture is not to be done for the war wound the young tyro persists in doing it; in the intervals, when casualties are few, "thorough" surgery is a great temptation for the beginner. On the battlefield, amputation through the sites of election is contra-indicated; MUIR and PORRITT do a guillotine or flap amputation at or near the site of injury, followed by secondary suture, and at a much later date the ideal amputation.

Local sulphanilamide or sulphapyridine has been almost the routine for all wounds, applied either as a spray or sprinkled from a gauze bag. PORRITT mentioned the danger of severe reaction following sulphanilamide absorption, especially from burns; in wounds the bleeding probably washes out much of the powder. He has found that if the sulphonamide is suspended in a cod-liver oil or olive oil emulsion it is only slowly absorbed and maintains a continuous local action. The dressings were not touched till healed, and the outside dressing was merely moistened with olive oil. Nine out of ten burns, said PORRITT, arrived late and septic, and tanning, however good

the results in civilian or town casualties, was not suitable in the forward areas of war. Plasma had been life-saving, and MUIR gave all his severe burns a plasma drip until the hæmoglobin fell to 100%. PORRITT has found in the later treatment of some burns—he has treated over 450 cases—that it is difficult to get the hæmoglobin up to normal, and concentrated corpuscle transfusions are then helpful. Burns of the hands, knees and other exposed areas would be much reduced, he thought, if tank crews took the trouble to protect these surfaces; this is now insisted on in the Navy and Air Force. The mistakes in wound surgery that MUIR saw most were excision of too much skin, excessive removal of bone fragments, failure to remove devitalised muscle and the too tight plaster. Skin-grafting was still not sufficiently employed in the late healing of the wound. Most foreign bodies, unless large, were better removed late; if likely to give trouble they presented readily and easily in a small abscess after about 7–10 days. For anaesthesia, intravenous barbiturates, such as 'Pentothal Sodium,' were used in three-quarters of the cases; they appeared to add nothing to the risks of the shocked patient. Because of the heat, chloroform had often to replace ether as the anaesthetic agent. Neither MUIR nor PORRITT could share the relative optimism about abdominal wounds based on blitz experience; a fatality of 70–80% could be expected where a delay of 24 hours was common between wound and operation, and where peritonitis was the rule on arrival. Conservative treatment for the chest wound is one of the outstanding trends in this war; extensive thoracotomies are no longer practised in the forward areas; the wound is merely excised and closed. MUIR prefers a temporary pack until the patient reaches suitable surgical surroundings, followed by aspiration; foreign bodies are left till much later. Both MUIR and PORRITT are general surgeons, and both maintained that the segregation of patients to special centres can be overdone. A particularly touchy question is what belongs to the orthopaedic surgeon; PORRITT's answer was: Segregation should be at the discretion of the officer commanding the division and only those cases thought to be beyond the abilities of the general surgeon should be segregated.

#### KIDNEY FUNCTION AND HYPERTENSION

THE fact that many cases of hypertension have apparently normal kidney function has been used as an argument against the view that hypertension is almost always a symptom of renal disorder. It is becoming clear, however, that the renal disturbance necessary to cause hypertension can be very slight, and may often be detected if the correct tests are applied. The type of test required to detect it has been discussed by CORCORAN and PAGE.<sup>1</sup> The urea-clearance test, as they point out, may be normal in many hypertensives though their ability to concentrate urine or to excrete inulin or diodone is impaired. The simple urine-concentration test of Addis measures the specific gravity of the urine after a 12-hour fluid fast. Normally this is greater than 1026; values lower than this may give the first indication of renal dysfunction. The inulin and diodone clearance tests have been developed chiefly by HOMER SMITH and his

1. Corcoran, A. C. and Page, I. H. *J. lab. clin. Med.* 1941, 26, 1713.

colleagues.<sup>2</sup> Inulin is excreted by glomerular filtration, and diodone by tubular secretion; if the clearances of the two substances are measured simultaneously, values are obtained for the volume of glomerular filtrate and total renal plasma flow. The ratio of inulin clearance to diodone clearance (filtration fraction) is therefore the index of intraglomerular pressure. In hypertensives the inulin clearance remains normal, while the diodone clearance is decreased. This shows that there is an increase in intraglomerular pressure due to constriction of the efferent glomerular arterioles; the increased pressure cannot be caused by afferent arteriolar dilatation or by the increased systemic blood-pressure, either of which would produce an increase of renal blood-flow and consequent increase in diodone clearance. Therefore the maintenance of normal inulin or urea clearance in hypertension cannot be taken as evidence of the functional integrity of the kidney; in such cases the filtration fraction may be increased from the normal value of 0.2 to 0.3, which means that the renal blood-flow has fallen from approximately 1000 ml. to 600 ml. per minute. The results of these detailed investigations of kidney function in hypertension link up with our present knowledge of angiotonin (hypertensin). This substance, which is formed by the action of renin on the blood globulins, when injected into normal people produces a rise in blood-pressure, a decrease in renal blood-flow and an increase in filtration fraction, so that there is little change in the rate of glomerular filtration<sup>3</sup> and its effects may therefore be said to duplicate the normal picture in human hypertension. The experimental findings may thus go further than is yet realised in explaining the cause of high blood-pressure in man.

The reverse conclusion—that all renal disturbances will lead to hypertension—is by no means so sure. In the case of pyelonephritis, the controversy persists: in unilateral pyelonephritis with hypertension removal of the affected kidney may<sup>4</sup> or may not<sup>5</sup> produce a dramatic fall in blood-pressure. WEISS and PARKER<sup>6</sup> in a series of over 100 pyelonephritic patients often found thickening of the arterial intima of the renal arteries and hyperplastic arteriosclerosis. These changes were most definite and diffuse in cases with hypertension, and in the affected kidney in unilateral cases; they were absent or slight in cases without hypertension. In unilateral pyelonephritis, if vascular lesions were found in both kidneys, then hypertension was always present. In cases with normal blood-pressure with or without uræmia, there was usually slight arteriosclerosis; in those with high blood-pressure, with or without uræmia, the arteriolar changes were much more pronounced. This suggests that the arteriolar changes precede the hypertension. WEISS and PARKER conclude that pyelonephritis is responsible for 15–20% of all cases of malignant hypertension, and that chronic or healed pyelonephritis is one type of Bright's disease. KIMMEL<sup>7</sup> found hypertension in 8 of 75 pyelonephritic

cases, and suspect in a further 8, and he also reported a high proportion of arteriosclerosis, not necessarily associated with hypertension. A different method of approach was used by SHURE,<sup>8</sup> who has analysed the incidence of hypertension from the case-histories of 290 pyelonephritic patients who came to autopsy. He found 44% had had hypertension as compared with 35% of a group of controls selected at random. He does not regard the difference as significant, since the greater incidence was almost wholly confined to older patients with bilateral pyelonephritis. The incidence of hypertension and of well-marked renal vascular damage ran parallel with the age of the patient. The investigation of autopsy records is unsatisfactory in some respects—the period during which the infection persisted is unknown, nor is there any division of acute, chronic and healed pyelonephritis. The evidence seems to suggest that pyelonephritis does predispose the patient to develop hypertension, but that the chances of such development are not much greater than in normal cases.

## Annotations

### AMATEUR MEDICAL STATISTICIANS

THE issue a few weeks ago of a third edition of Bradford Hill's *Principles of Medical Statistics*<sup>9</sup>—i.e., within six years of its original publication—points various morals. The obvious one (that the book is good) we pass over, mindful of Falstaff's tailor's objection to the security offered by Bardolf, but may refer to others. As even examiners require some knowledge of statistical methods from candidates for public-health qualifications, a demand for textbooks will grow with the popularity of preventive medicine as a career. That, however, will not wholly account for a rising demand in war-time, when postgraduate examinations are largely suspended, although it may be that those who have been forced to postpone their examinations wish to study subjects which can be learned to some extent away from medical schools. Our experience of the last few years proves that writers on clinical subjects are more figure-conscious than their elder brothers. It is less common to draw startling conclusions from (say) six cases, and complete reliance on percentages divorced from absolute figures is now the hall-mark not of registered medical practitioners but of broadcasters on war production. It seems that both the practical value and the intrinsic interest of statistical research, on however modest a scale, are being realised. Some diffident students are terrified by the formidable algebra of much modern statistical work. It is not everybody who can persuade determinants to eat out of his hand or matrices to perch on his shoulders, however keen his interest in the psychological testing of school-children. But neither John Graunt nor William Farr knew anything of matrices, yet they made discoveries of great importance. Dr. Hill neither puzzles his readers with symbols, nor, going to the opposite extreme, does he suggest that a little statistical arithmetic is enough to turn any man into a Farr; but he does make it clear that arithmetic applied to the varied data which pass through the hands of all medical men and women can lead to novel and important conclusions. This aspect of the subject is worth stressing in these years of endurance, when we are all thrown on our own resources for study and amusement. Most fortunate are those who can combine both. War-time experiences are novel and their statistical utilisation can be interesting. Francis

2. Smith, H. W. *Harvey Lect.* 1939–40, 35, 166.  
 3. Corcoran, A. C., Kohlstadt, K. G. and Page, I. H. *Proc. Soc. exp. Biol., N.Y.* 1941, 46, 244.  
 4. Barker, N. W. and Walters, W. J. *J. Amer. med. Ass.* 1940, 115, 912; Wilson, C. L. and Chamberlain, C. T. *J. Urol.* 1942, 47, 421.  
 5. Benjamin, B. and Ratner, M. *Amer. J. Dis. Child.* 1941, 61, 1051.  
 6. Weiss, S. and Parker, F. *Medicine*, 1939, 19, 221; *New Engl. J. Med.* 1940, 223, 959.  
 7. Kimmel, G. C. *Amer. J. Dis. Child.* 1942, 63, 60.

8. Shure, N. M. *Arch. intern. Med.* 1942, 70, 284.  
 9. London: *The Lancet*. Pp. 189. 7s. 6d.

Galton tells us of his little devices for obtaining statistics of the number of ugly men (or perhaps it was women) observed in omnibuses, his psychological measurements and so on. If Galton could take a long walk through the London of 1943 he would certainly register statistical observations on the distribution of bomb damage and draw deductions which had escaped the diligence of the experts. A medically trained amateur of statistics might reach conclusions of interest. If he knows his "Hill" the mare's nests he discovers will be recognised by him for what they are; there will remain real nests, some of them even containing eggs.

### CARDIAC RESUSCITATION

THE principles underlying treatment of cardiac arrest on the operating table were discussed lately in our columns.<sup>1</sup> So-called cardiac tonics are of secondary importance; the two mainstays of treatment are artificial respiration and cardiac massage. Prognosis depends on the speed with which cardiac action is re-established, the extent to which the central nervous system is damaged as a result of anoxia, and the condition of the myocardium. Recovery is unlikely if cardiac arrest has exceeded 5-6 min., though a case has been recorded of cardiac arrest for 20 min. with complete recovery<sup>2</sup> in spite of signs of temporary damage to the central nervous system. Vernon's cases (p. 6) still showed signs of central nervous damage some 5 years after operation. Thompson and his colleagues<sup>3</sup> distinguish between cardiac arrest due to the interruption of stimulus formation (which results in cardiac standstill) and "electrodynamic dissolution of the cardiac cycle"—for example, ventricular fibrillation. They suggest that adequate pulmonary ventilation must first be established, preferably by using a mechanical resuscitator, but alternatively by pressure on and release of the anæsthetic bag or by manual artificial respiration. In chest operations, cardiac massage can be started immediately; if it is not successful within a minute or two, adrenaline should be injected into the right auricle; and if adrenaline is not available, it is worth injecting the needle alone. They insist that the injection be made into the right auricle because injection into the ventricle may produce ventricular fibrillation which they hold to be incompatible with life, whereas auricular fibrillation is not. Some surgeons contend, however, that cardiac massage is not uncommonly followed by ventricular fibrillation before normal rhythm is resumed. Thompson and his colleagues advocate the use of the "artificial pacemaker" of Hyman<sup>4</sup> who considered that electrical stimuli applied directly to the right auricle were often of value in starting the heart beat again. In abdominal operations it is possible to use Nicholson's<sup>5</sup> approach to the heart, between the attachments of the two sides of the diaphragm just behind the xiphoid process. When arrest is due to ventricular fibrillation Thompson and his colleagues believe in direct methods of "defibrillation." Beck<sup>6</sup> has devised a "defibrillator" which applies electric shocks to the ventricle, bringing fibrillation to an end; he also recommends intracardiac injection of procaine hydrochloride followed by an electric shock. On the basis of animal experiments, Scherf<sup>7</sup> proposes the intracardiac injection of 1% potassium chloride followed by cardiac massage. Intracardiac adrenaline and cardiac massage are not supposed to restore normal rhythm in a case of ventricular fibrillation, but one case of the kind reported by Thompson and his colleagues responded to this treatment. Their scheme

of treatment is much more complicated than that advocated by Hamilton Bailey.<sup>8</sup> Cardiac arrest is commoner under war conditions because thoracic operations are more numerous than at other times. Simplicity should be the keynote of surgery whenever possible, and if a simple technique is adequate in this catastrophe surgeons and anæsthetists should be instructed accordingly; but if the more complicated American procedure is of value, then "field resuscitators" should be supplied to Service surgical units as these workers suggest. These resuscitators carry an "artificial pacemaker," no larger than a pocket flashlight. In fighting men the myocardium is nearly always healthy and no lives should be lost through neglect of necessary precautions. There is thus every reason to investigate this problem further.

### PATHOLOGICAL SUPPLIES

EVERY pathological laboratory requires, besides its "fixed" equipment of microscopes, incubators and the like, a supply of "consumable" equipment—test-tubes, petri dishes, slides and coverslips, flasks and bottles, culture media, stains, chemicals, agglutinating antisera and so on. Most laboratories of any size try to supply their own requirements, with the result that the laboratory staff has to spend much time and energy in the preparation of culture media, stains and antisera. Such work may be useful for the training of junior technicians but must detract from the efficiency of the laboratory as a diagnostic service. A step away from this system of every pathologist his own purveyor was made when the Medical Research Council established the Standards Laboratory at Oxford to supply standardised agglutinating antisera and bacterial suspensions for use in diagnosis. A further step towards centralisation of pathological supplies was made by the London County Council when the system of group and hospital laboratories was created as a skeleton pathological service for their many and diverse hospitals. Under this system, the group laboratory (of which there are now seven plus a central histological laboratory) acts with its pathologist, two assistant pathologists and technical staff as parent to smaller laboratories in most of the general and special hospitals situated within an easy radius. The hospital laboratory is staffed by qualified technicians whose work the pathologist supervises by regular visits. Obviously it would be a great waste of effort if each laboratory had to prepare its own culture media and other reagents. This part of the service was therefore centralised in one laboratory (the Southern Group Laboratory) under the direction of Dr. J. E. McCartney, and from this centre culture media, stains, chemical reagents (prepared at Lewisham Group Laboratory), &c., as well as all consumable glassware and other equipment is dispatched weekly by van to the group and hospital laboratories. Supplied with the ready-made tools, the pathological staff can give the maximum attention and effort to collaboration with their clinical colleagues in the diagnosis of disease and control of treatment. Any group laboratory may, of course, prepare special culture media or other reagents for its own use.

At the outbreak of the present war the Ministry of Health became the responsible body for the equipment of the Emergency Hospital Service and with it many new laboratories whose current needs the parent body found very difficult to meet. As a result the LCC was asked, and agreed, to supply all the emergency laboratories in the London Region with its standard list of consumable requisites as well as culture media and other reagents. Further, the Army, which had adopted the screw-capped container (introduced and popularised by the council's pathological service), decided that it would be the simplest and most economical way to obtain its culture media from the LCC, and Major McCartney,

8. Bailey, H. *Brit. med. J.* 1941, ii, 84.

1. *Lancet*, 1942, i, 298.

2. Adams, H. D. and Hand, L. V. *J. Amer. med. Ass.* 1942, 118, 133.

3. Thompson, S. A., Birnbaum, G. L. and Shiner, I. S. *Ibid.*, 1942, 119, 1479.

4. Hyman, A. S. *Arch. intern. Med.* 1932, 50, 283.

5. Nicholson, J. C. *Brit. med. J.* 1942, i, 385.

6. Beck, C. S. *Amer. J. Surg.* 1941, 54, 273.

7. Scherf, D. and Boyd, L. J. *Clinical Electrocardiography*, 1940, London.

mobilised with the Territorial Army, was appointed officer commanding Media Manufacturing Centre, and remained attached to his group laboratory for the purpose. The efficiency of the service and the increasing difficulty experienced by other bodies in obtaining pathological supplies have resulted in increasing demands on this central depot, and arrangements have now been made to supply media and other laboratory products to the provincial laboratories being set up by the Ministry of Health. A special tribute is due to Major McCartney for his prescience and organising ability which have enabled the LCC to meet fully this new and extending commitment towards the war effort. Centralisation of pathological supplies, which should include such specialised products as agglutinating and precipitating sera to the streptococcus and pneumococcus families, might well be adopted in other regions throughout the country.

### 68,372 ADDRESSES

THE new Medical Directory reached us well before the end of the old year. Let us hope that before the end of 1943 there may be more stability about the 68,372 accommodation addresses which it contains. They are no doubt mostly good serviceable addresses if the instruction "please forward" is added, for the revised directory provides us with our only hope of getting in touch with our friends at home or overseas, on land or water, or in the air. Of this large total 1632 of the addressees are with us "for the duration," being registered in pursuance of an order made in 1941 under Defence Regulation 32B. The permanent directory contains 1346 more names than last year, the increment being almost the same as the average (1329) for the previous five years. It is a healthy and heartening growth, and with all the plans, new and old, for making doctors busy there need be no fear of unemployment. The volume is bigger only by 32 pages and its size would have been actually less had the publishers been free to continue with the resetting in closer and clearer type which still stops, like the ridge on a new finger-nail, at page 1056, although the lists of MOHs have been reset. If it is true that as with certain other things we get the directory we deserve the medical profession is indeed a noble one, for there is none like it anywhere for compendiousness and ease of reference, and as the years have gone by experience has removed the only blemishes. But J. & A. Churchill, Ltd., will expect £3 3s. a copy for their trouble whatever meed of praise-accompanies the order.

### ÆTIOLOGY OF ERYTHEMA NODOSUM

VIEWS of the causation of erythema nodosum have varied over a long period between a tuberculous or streptococcal origin, an allergic response to various noxæ, or even an acute infection sui generis. The present opinion in this country is probably that most cases are tuberculous, a minority streptococcal, with a few whose ætiology cannot be defined. Poppel and Melamed<sup>1</sup> have analysed 88 cases discharged from Mount Sinai Hospital during 1928-41 with the clinical diagnosis of erythema nodosum. There were three times as many females as males in their series. In 13 of their cases no accompanying disease was found; of the remaining 75 in which there was some concomitant condition by far the commonest was an upper respiratory streptococcal infection, present in 49 cases. There were also 7 cases with definite and 10 with doubtful rheumatic heart disease, but only 4 cases were directly associated with tuberculosis. The remainder were associated with a variety of conditions, including the ingestion of various drugs. The surprising finding in this series is the small number of cases directly associated with tubercle and

the very large proportion accompanying streptococcal infection. Of 44 tuberculin tests carried out 33 were positive in a dilution of 1 in 1000 or less, but this proportion is probably not higher than would be found in a random sample of the population. Even if one tries to "make a case" for tuberculosis as an ætiological factor it is impossible from the data given even to suspect more than 4 cases in addition to the 4 already included, so that (excluding evidence based merely on a positive tuberculin test) the highest figure that can be claimed to be associated with tubercle is rather less than 10 per cent. of the total, and the true figure is probably less. Wallgren's<sup>2</sup> demonstration that 95% of cases of erythema nodosum in Scandinavian children are due to tubercle is in sharp contrast, and it seems probable that equally careful studies in other countries will produce very different percentages and possibly other ætiological factors. Lately Jersild and Iversen<sup>3</sup> have described 9 cases of a lesion indistinguishable from erythema nodosum in 307 patients under treatment with sulphathiazole, and it may be prophesied that the proportion of cases associated with drugs will increase as the range of chemotherapeutic agents extends.

### THROMBOSIS IN DISSEMINATED SCLEROSIS

THE thesis that the plaques of disseminated sclerosis may be due to venous thrombosis is an intriguing one, which has been developed largely by workers from the Boston school. Exacerbations of the disease may follow trauma, operation, exposure, pregnancy and infections, and all these states cause alterations in the blood-pressure which may lead to thrombosis. Simon and Solomon<sup>4</sup> consequently studied the coagulation responses of the blood in subjects of disseminated sclerosis and of other patients with diseases of the nervous system. They found that, while intravenous injection of typhoid vaccine and of adrenaline caused a drop in the coagulation-time in both groups, the fall was most marked in those with disseminated sclerosis. Putnam and his colleagues<sup>5,6</sup> examined the vascular architecture of the brain, brain-stem and cord of subjects with disseminated sclerosis. They described vascular changes in 14 cases consisting of thrombosis of venules, with engorgement, tortuosity, and proliferation of veins in the neighbourhood of plaques. Similar changes were not present around areas of old softening in other disorders. In a later paper<sup>7</sup> Putnam concluded that the thromboses were not due to changes in the vessel walls, but that the cause existed in the blood itself. He went on to postulate that in disseminated sclerosis there is an abnormal lability in the blood plasma, facilitating clotting in response to unknown exogenous or endogenous factors, of which an increase in fibrinogen may be one. These views have been hotly contested and it is fair to say that they have more opponents than supporters among neuropathologists, some of whom have disagreed with the interpretation Putnam put upon his histological findings. In such a variable disease as disseminated sclerosis it is essential for argument to be advanced in an orderly series of observations. The fact that the workers quoted have done this compels attention in a subject which has produced so many disappointments and a few unsubstantiated claims. Simon<sup>8</sup> has now repeated in this country the experiments in blood-coagulation, and has confirmed his previous observations with Solomon. This time the decrease in clotting-time in 10 subjects of disseminated sclerosis was significantly greater than in 10 control patients, thus adding weight

1. Poppel, M. H. and Melamed, A. M. *New Engl. J. Med.* 1942, **227**, 325.

2. Wallgren, A. *Lancet*, 1938, **1**, 359.

3. Jersild, T. and Iversen, K. *Acta med. scand.* 1942, **111**, 105.

4. Simon, B. and Solomon, P. *Arch. Neurol. Psychiat.* 1935, **34**, 1286.

5. Putnam, T. J., McKenna, J. B. and Morrison, L. R. *J. Amer. med. Ass.* 1931, **97**, 1591.

6. Putnam, T. J. *Arch. Neurol. Psychiat.* 1935, **33**, 929.

7. Putnam, T. J. *Ibid.* 1937, **37**, 1298.

8. Simon, B. *Ibid.* 1942, **48**, 509.

to a line of investigation which has at least as much to justify it as have those based on the theories of virus infection, primary demyelination, sensitisation to demyelinating substances, and introduction of organic and inorganic toxins. It is nevertheless disappointing that there are no therapeutic results to support the thesis, although it must be borne in mind that the assessment of therapy in disseminated sclerosis is probably more difficult than in any other disease.

### SHARING ST. DUNSTAN'S

AMERICAN soldiers in Britain who may be temporarily or permanently blinded are to be sent to St. Dunstan's for a few weeks while waiting to go home, and at the lunch given by St. Dunstan's to senior officers of the American and Canadian army medical services Sir Ian Fraser announced that the first American guest, an upper turret gunner who was blinded during enemy action, is already in residence. In his report on the association's work Sir Ian compared the eye casualties of the two wars. Two-thirds of those blinded in action during the last war were wounded by high-explosive shells and hand-grenades. In nearly all the eyes were penetrated by metal fragments. The remaining third were the result of bullet wounds. In this war more have been blinded by concussion changes in the eye, causing collapse or irreparable damage through hæmorrhage. With less damage to sinuses surgery had become more plastic in character. The tendency of modern weapons, including aerial bombs, was to increase the high explosive and decrease the metal until it was merely a container. Much of the metal being non-ferrous, the electro-magnet had become less important.

Of the 288 Service and civil defence casualties known to St. Dunstan's, 88 had recovered some useful sight. Of the others, 100 were in training or had been trained at St. Dunstan's in England, 30 were prisoners of war, 30 were in South Africa or India, and Sir Ian estimated there would be 40 more from recent fighting in Africa. St. Dunstan's now had units in Cairo, India, and South Africa.

Brigadier Paul Hawley, chief surgeon of the US Army in the European theatre of operations, said that St. Dunstan's training would help the blinded American soldier to return to his family walking with confidence and facing the world with courage. He foreshadowed that accommodation at American hospitals in this country might soon, in emergencies, be available for English casualties.

### A CONTRIBUTION TO EPIDEMIOLOGICAL METHOD<sup>1</sup>

"Epidemiology is something more than the total of its established facts. It includes their orderly arrangement into chains of inference which extend more or less beyond the bounds of direct observation. Such of those chains as are well and truly laid guide investigation to the facts of the future; those that are ill made fetter progress."

These words were written by the late Wade Hampton Frost, professor of epidemiology at the Johns Hopkins school of hygiene, and no-one better exemplified their meaning than their author, whose influence as a leader of epidemiological progress and as teacher of his subject has rather tardily become appreciated in America. Here his name and work have been known only to the few, but the circle will be enlarged by this publication, with help from the Commonwealth Fund, of twenty of his papers, with biographical notes. The first group of papers are studies on epidemics of typhoid fever, milk-borne tonsillitis, and poliomyelitis. Each shows the same painstaking collection and marshalling of evidence which denotes the born epidemiologist; written more

than 30 years ago, they can be read with profit today by anyone interested in epidemiological methods. The next section deals with studies on water-supplies and stream pollution, an urgent problem at the time in America, but now of less general interest. Then come five papers on influenza, the common cold and minor respiratory infections in which Frost developed the use of the family unit as the basis for measuring the tendency of diseases to spread in the immediate environment of a recognised case—a concept originated by Chapin. In the same section are two papers on infection and immunity to diphtheria in relation to artificial immunisation and carrier prevalence, studies of considerable interest to us now in Great Britain. In the fourth section, Frost expresses his broad philosophy of epidemiological principles and public health practice, and pays tribute to John Snow, of cholera fame, who by logical inference from observed facts gave the germ theory of infection scientific status before it was bacteriologically established. In the last 10 years of his life Frost was particularly interested in the epidemiology of tuberculosis; because of the chronicity of the infection, he had to develop a new technique entailing studies in longitudinal section instead—as with the acute infections—in cross-section. He used a modified form of life-table analysis applied to family groups. The early results of such studies are reported here in two papers but the more mature work is to be found in the publications of his pupils. The last paper, on control of tuberculosis, is the distilled wisdom of a man who had thought much about the problem. As he says, the two conditions which most favour tuberculosis are intimate exposure and poverty; but he adds "the tubercle bacillus is losing ground, and the eventual eradication of tuberculosis requires only that the present balance against it be maintained." Epidemiology has been too much neglected in this country; here is a volume which should be a real stimulus to those engaged in its teaching and practice.

Sir JOHN LEDINGHAM, FRS, is to retire on March 31 from the post of director of the Lister Institute of Preventive Medicine, which he has held since 1930. His successor will be Dr. A. N. DRURY, FRS, Huddersfield lecturer in special pathology in the University of Cambridge, and a member of the scientific staff of the Medical Research Council.

Dr. E. R. A. MEREWETHER will become senior medical inspector of factories in succession to Dr. J. C. BRIDGE who retired at the end of the year.

**CONTROL OF TUBERCULOSIS.**—The Minister of Health's proposed circular to local authorities on the development of the tuberculosis service has now been issued (No. 2741), and miniature radiography units are to be offered to the following authorities: Essex, Lancs, London, Middlesex, Northants, Staffs, Surrey, Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Norwich, Nottingham, Portsmouth and Sheffield. The first sets should be ready early in 1943 and it is hoped that delivery will be completed during the year. Arrangements for training the necessary staff are being made and the Minister is anxious that the methods of examination by miniature radiography should be standardised throughout the country. He also undertakes to allocate additional beds for tuberculosis and to help sanatoriums in securing nursing and domestic staff. Particulars of the scheme for relieving patients of financial anxiety for themselves and their dependants will soon be available and the general principles have already been worked out. Assistance, usually in the form of maintenance allowances, is to be made available for everyone with a dependant who loses income through giving up his occupation while being treated for pulmonary tuberculosis. Reasonable obligations, such as rent, insurance policies, hire purchase of furniture, education of children, will be taken into account. These allowances will be reimbursed to local authorities by the Ministry.

1. Papers of Wade Hampton Frost, MD. Editor: Kenneth F. Macey, MD. London: Humphrey Milford, Oxford University Press. Pp. 628. 16s. 6d.



## Special Articles

## THE NATURE, METHODS AND PURPOSE OF DIAGNOSIS\*

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AN abiding interest of all practitioners of medicine is that "so noble a part of Physicke," diagnosis, of which over 300 years ago Hart wrote, "And this part of Physicke doth far excel the other, to wit, the Therapeutike, the which without Diagnosticke is of small use and profit."

## WHAT IS DIAGNOSIS ?

Since the dawn of medical history two main trends are discernible in our conception of disease. That which saw its fruition in Hippocratic medicine stressed the patient—his complaints, his appearance, his habits, his work, his environment, his relatives, his sputum, urine, vomit, sweat, and the like—in the belief that by observing this picture of illness, its course and response to treatment in one patient, the physician would be able when later he met a similar picture of disease to forecast its outcome. The emphasis of the Hippocratic school was thus naturally on prognosis rather than diagnosis. Theirs was the method of recognising an elephant by having seen one before. Man, his disease, his environment and all appertaining to him were inseparable; their concern was for the "whole man." Disease was a struggle in which the contending parties were the destructive processes (*materies morbi*) on the one hand, and the natural reparative processes of the body (*physis*) on the other; treatment, therefore, aimed at reinforcing repair by all available means. Diagnosis implied an intensive study of the individual: it was a complete account of the patient. Teaching was by example and records of illness were individual, detailed and lengthy.

The second idea of disease was demoniacal—the conception that it resulted from an evil spirit entering the body or from part of the righteous soul being abstracted from it. In its later dress it was the logical outcome of the prevailing Platonic philosophy. For the "conventional" or "rationalist" physicians who adopted this view the word "disease" conveyed a notion—a metaphysical abstraction—equivalent in essence to that suggested by the word "dog," or "triangle," or "nation," the qualities of which could be described without reference to any particular dog, or triangle, or nation. For them there were laid up in heaven ideal diseases of which the actual diseases of man were more or less imperfect types. For them diseases were as real as the biological species and genera of Linnæus: "*Species tot sunt diversae quot diversae formae ab initio sunt creatae.*" In the words of Sydenham in the seventeenth century, diseases were "to be reduced to certain and determinate kinds, with the same exactness as we see it done by botanic writers in their treatises of plants," and possessed "certain distinguishing signs which Nature has particularly affixed to every species."

The dominant trend in medicine remained, and is still, ontological. Our textbooks describe "entities"—model and composite pictures of such diseases as typhoid fever, paralysis agitans, rheumatoid arthritis, cancer and the like—which are to be recognised in the patient. We aim at discovering pathognomonic signs and "specific" treatments so that we may attain the perfection of mechanical simplicity and certainty in diagnosis. Our goal has been a diagnostic penny-in-the-slot machine, for then treatment and prognosis too follow automatically. Not a few physicians act as if, by a combination of X rays with clinical pathological reports, that goal has been achieved. From time to time, voices have been raised stressing the importance of the patient, of his environment, of the mental reaction to, and the mental components of his illness, but they have gone unheeded; or their possessors too have adopted the conventional outlook and reduced bodily and mental reactions to "types"—extroverts, introverts, and the like—as transcendental as any of those described by realist physicians.

Two concepts, then, of diagnosis in disease have dominated medical thought and practice. The first (Hippocratic, Coan, naturalist or sensualist) is concerned primarily with an intensive study of all that the senses can learn about the patient so that similar pictures in patients subsequently seen shall be better understood and their outcome forecast; then by modifying the patient's diet, environment and habits those bodily functions disturbed in disease might be restored to normal. Here diagnosis is intensive and specialised. The second (Platonic, Cnidian, conventional, rationalist, realist) stressed types of disease, to one of which each illness conforms more or less closely. Here diagnosis is the process of recognising the type or class to which an illness belongs and of giving it the appropriate label. To adapt Trousseau's aphorism, for the Hippocratics, "Il n'y a que des malades," whilst for the Platonics "Il n'y a que des maladies."

## DISEASES OR DISEASE ?

Has the store of medical knowledge, accumulated in the centuries since these two conceptions were first formulated, lent support to one or the other? Or shall we start afresh, reassess our knowledge, reorientate our outlook, and try to achieve a notion of diagnosis more in keeping with contemporary knowledge and more useful in practice?

What is common to symptoms and signs—the subjective discomforts and the objective manifestations of disease—is that both indicate deviations from the normal. But what is "normal"? Not an unvarying standard expressed in precise mathematical formulae. It is no more reasonable to expect a rigid answer to the question "What is the normal blood-pressure?" than to the question "What is the normal length of the nose?" The normal is a variable. Deviations can occur either as excess or defect. Diarrhoea, polyuria, tachycardia, polycythaemia, menorrhagia, indicate simple quantitative deviations from the normal in the direction of excess; while constipation, oliguria, bradycardia, anaemia, amenorrhoea, are the corresponding deviations in defect.

It is natural that when we meet these deviations from the normal we should ask ourselves, "Why do they occur? What are the causes of this disease?" We see a young man of thirty with a hemiplegia. What is its cause? A cerebral thrombosis. What caused the thrombosis? An endarteritis. What caused the arteritis? Syphilis. What caused the syphilis? Not simply the *Treponema pallidum*. This was a necessary but not a completely sufficient cause. A whole host of causes—physical and psychological, acquired and hereditary—went to his taking the step which led to his hemiplegia. It is indeed arguable that no event in the history of the cosmos or the patient was without its effect on the causation of his hemiplegia. Think of the influence of social conditions, of housing, or poverty and the like on such diseases as tuberculosis and nutritional deficiencies and you will readily appreciate the complexity of the concept of causation. But doctors cannot tarry over theoretical polemics. We are concerned with unmasking those salient factors which enable us to control disease, and though we recognise that, for example, no disease is wholly acquired or wholly inherited, and no disease is wholly physical or wholly psychological, we answer our question "Why has disease arisen?" by stressing only necessary and sufficient factors. In investigating disease from a research standpoint, with the purpose of advancing the frontiers of knowledge, we must of course take a broader view.

Observation soon taught our forbears that many apparently simple deviations from the normal—the symptoms and signs of disease—constantly recur in the same groupings. We are now able to recognise that these recurring patterns, these so-called syndromes or symptom-complexes, indicate not diseases but disease. The Charcot triad does not point to a disease—disseminated sclerosis—but to structural change in a circumscribed area of the cerebellar mechanism, with resulting functional disturbance; the cardinal signs of diabetes mellitus simply indicate an impairment of carbohydrate tolerance; the Hutchinsonian triad suggests a cause of structural changes and functional disturbances. This concept is of fundamental significance. When we read the description of "a disease" we shall find that

\*Abridged from the Skinner lecture delivered to the Faculty of Radiologists on March 20, 1942.

all its symptoms and signs can be grouped so that they indicate one of these three aspects of disease: first, its site seen directly, or indirectly with instrumental aid or inferred from associated disturbances of function; secondly functional disturbances, even when the site remains unmasked; and thirdly, the causes of the structural changes and disorders of function. Hence a complete diagnosis must tell us where disease is, what functional disturbances are present and how these have arisen; and only in so far as diagnosis answers all these questions is it complete.

All our diagnoses should lay bare our ignorance as well as reveal our knowledge. What, for example, does the diagnosis "diabetes mellitus" tell us? Not where disease is to be found nor, indeed, the cause of that functional disturbance of whose presence the label "diabetes mellitus" does inform us. To show that one of the methods of causing this disturbance of function is excision of the major portion of the pancreas, and then to assume that the presence of this disturbed function always indicates disease of the pancreas, is to fall victim to the most elementary of logical fallacies. No-one reading the history of diabetes mellitus can fail to support Horder's thesis that the best textbook of medicine is *Jevons's Primer of Logic*.

All diagnoses are provisional formulæ designed for action. They must not put our reason in the fetters of the Platonic type. In brief, there are no diseases, only disease. I am not unmindful or ignorant of the convenience of classifying disease and the causes of disease, but I am concerned in breaking the shackles of disease types in which medicine has been, and still is, enmeshed to its detriment as a science.

#### STEPS IN DIAGNOSIS

In diagnosis as I conceive it there are three stages: observation; interpretation; and symbolisation or labelling. Observation of the patient is divisible into two parts: elucidation of the history and the physical examination. In recent years emphasis has rightly been placed on the importance of the history of a patient's disease. It alone can show the evolution and the significance of the present state as revealed by examination. A careful history points to the diagnosis in most patients. The examination is like the single picture—a "still"—taken from a moving picture; only by a knowledge of what has gone before can the significance of the still be appreciated. To elicit an accurate history reveals the quality of the practising physician; it demands care and courtesy, time and patience. Failure to take careful histories is an expression of the economic structure of the present-day practice of medicine, with its resultant hurry. Like the judge, the good physician must assess the significance of an answer to a question and determine what weight he will give it in his final summing up. "Let the patient talk" is a good guide, though the over-garrulous must often be curbed. It is important to understand what the words used by a patient imply. What notion or fact does he attempt to convey by the words "dizziness" or "flatulence" or "weakness"? Examination whether by the unaided senses or methods of extended perception, gives us a cross section of the patient at any moment of time; re-examination at a later date will reveal the changes since the first examination and often render obvious what has been obscure.

The second stage in diagnostic method is the interpretation of one's observations, and for this knowledge of anatomy, physiology and pathology—the fundamental tripod of medicine—is essential. No-one can interpret the significance of wasting of the intrinsic muscles of the hand associated with sensory disturbance unless he knows something of the anatomy of the nervous system; no radiologist can interpret the significance of shadows in the chest unless he is well acquainted with anatomy and pathology. A reiterated criticism of preclinical education is that the student regards anatomy and physiology as hurdles, erected by ill-disposed and misguided professors, which must be surmounted before he can come to grips with the real business of medicine in the wards. Nothing can be more damning of the methods of teaching these vital subjects: students should be made to understand that anatomy and physiology are as much a part of medicine proper as is a description of typhoid fever. This view of the relative useless-

ness of anatomy and physiology to the clinician can be traced directly to the concept of diseases as "entities."

In the interpretation of observations, both wisdom and judgment play an essential part. Experience of the sick should for ever be the doctor's textbook. There should also be, as far as is humanly possible, freedom from bias. Only too often in diagnosis "affection sways the reason." We know of the cardiologists who see hearts in everything, of the abdominal surgeons who see the chronic appendix in all obscure abdominal discomforts, and of radiologists who see "kinks and bands." And bias not only finds disease where it is not; it overlooks disease where it is.

Some diagnoses are complementary. Thus the diagnosis of parkinsonism, and the diagnosis of chronic encephalitis are not mutually exclusive; the more complete diagnosis would be chronic encephalitic parkinsonism. The diagnosis of osteoporosis and hyperparathyroidism are complementary, and whereas the former is only a partial diagnosis, the latter answers the two queries—where and what? To say that a patient has a parathyroid adenoma completes the diagnosis and answers, in the light of present-day knowledge, all three questions: where, what, and why?

I have spoken as if interpretation, always followed a conscious sorting of observations into the syndromes we have discussed, but clearly with experience this becomes largely subconscious. Indeed, in some cases—for example in acromegaly or Graves's disease—the picture presented by a patient is so striking in its recurring pattern that its origin is obvious. These patients show the face of disease. Beware of those who claim to have inborn clinical instinct and who hint at the possession of supernatural powers which enable them to come to a diagnosis withheld from their fellow man. This is not to deny that some men will make better diagnosticians than others; there are always those who see things to which lesser men are blind, who observe next where no relationship is recognised by others. Only in this sense are they "born diagnosticians." They too will fall by the wayside if they neglect the fundamental precepts and dispense with adequate observation. On the other hand, there will always be those to whom the motto of the University of Salamanca applies: "What Nature hath denied this university cannot provide." Their place is not in the practice of medicine.

It is tempting to compare methods of diagnosis with those of crime detection. A criminal may be caught in the act—the pediculi responsible for scalp infections and the threadworms for pruritus ani—or there may be such obvious clues as the facies of acromegaly and jaundice; or clues may be obtained only after careful searching by the ordinary methods of examination or by means of the extended perception given us by instrumental measures, for example an abdominal aneurysm, or a pleural effusion. But in all cases the solution is suggested by the history. It is the history which provides circumstantial evidence, as for example in the case of biliary colic where there might be no observable abnormal signs whatever on examination, except those subsequently unmasked by accessory measures, but where we are led straight from the history to the necessary crucial tests. No observation, however small or apparently trivial, which does not fit into the tentative diagnosis should be put on one side as unimportant.

Karl Pearson in his *Grammar of Science* wrote

"An inference which is scientifically valid is that which could be drawn by every logically trained normal mind if it were in possession of the conceptions upon which the inference has been based."

He should have written "perceptions," but, thus corrected, his statement would be accepted by most scientists and can be simply restated in relation to diagnosis. "Confronted by the same patient, every adequately trained doctor should make observations and inferences which lead to the same diagnosis." Why is it, then, that two doctors confronted with the same patient may come to different diagnoses, and thus must face the shafts of that untutored taunt: "Doctors always differ"?

The answer lies first in inaccurate or inadequate observation; and incomplete observation may lie in failure to re-examine after an interval. To overlook evidence of disease may imply apathy, laziness, or undue

hurry: if either of the first two, the doctor has mistaken his vocation; if the last, his purpose. Education and experience will tend to correct that inadequate observation arising from ignorance of the methods by which the signs of disease can be revealed. Absence of hurry will rectify sins of omission. But whatever the cause of faulty observations, these exclude fruitful interpretation. Secondly, doctors differ in their knowledge of the symptoms and signs and syndromes of disease. An adequate knowledge of anatomy, physiology, and pathology is essential to diagnosis in all its branches; but recognition of cerebellar dysfunction, of cystinuria and Boeck's sarcoid is impossible without knowledge of their pattern conveyed either through the doctor's own experience or through medical literature. Thirdly, it may result from differences in those qualities of judgment and powers of interpretation which depend so largely on inherent mental capacity; though right educational methods will make even a good brain, a better. And fourthly it may depend on differences in labelling. So often doctors are accused of differing in diagnosis and understanding of disease, when in fact they have differed only in the label they have applied to it. It is as if one man calls an object a florin and another says it is a two-shilling piece, and they are accused of having contradicted one another. The time has come for a relabelling of disease on the lines I have discussed. We must use labels which indicate all three groups or syndromes which constitute the complete picture of disease. If the label fails to indicate one or more of these groups, it is because of the shortcomings of medicine itself or the diagnostician's ignorance of what is known to medicine.

#### THE PURPOSE OF DIAGNOSIS

It is a commonplace to say that accurate diagnosis is of paramount importance because without it treatment is empirical and prognosis irrational; but it is not so commonly appreciated that only when diagnosis is complete—when we know where disease is situated, what functional disturbances are associated with it and how they have arisen—have we adequate data for rational therapeutics. If we know simply where disease is situated, then we must perforce follow, where it is feasible, the most primitive and barbaric of therapeutic precepts, "If thy right hand offend thee, cut it off." Much general surgery belongs to this category. It sees disease in a given site and recognises in it the contending forces, the invader and the defender, struggling for supremacy on the battlefield. The physician aims at victory by reinforcing the defence, and weakening or destroying the invader, but the surgeon ends the battle by eliminating both contestants and battlefield. Sometimes our therapy is limited to restoring disturbed function; such is the therapy of pernicious anæmia, of diabetes mellitus, of myxœdema and the like. But we can only reach the highest goal of therapeutic endeavour when we have recognised by our groupings the causative factors, and either eliminated or neutralised them.

Another purpose of our diagnostic method is that it may extend knowledge. Thus if we know that parkinsonism results from a circumscribed lesion in the nervous system, then there have been, or there will sooner or later be described cases of parkinsonism due to congenital, traumatic, inflammatory, toxic, degenerative, vascular and neoplastic causes. In this way hitherto unrecorded associations of disease can be recognised.

A further function of diagnosis is to serve as a conceptual shorthand by which experience can be pooled. But we must clearly avoid using the same name for dissimilar notions, or different labels for the same notion. Thus every label should be as informative as is compatible with lucid brevity—not "gout," for example, but "gouty arthritis" if the joint disease is the major manifestation of the metabolic disturbance. And eponyms, such as Addison's disease, hallowed though they be by long use and historic interest, may well at this stage be dropped. To some there must also be the rather selfish intellectual pleasure of having pieced together the component parts of the patterns of disease—much the same kind of pleasure as that of solving jigsaw and crossword puzzles or problems in pure mathematics but one which combines service with satisfaction.

The main aim of diagnosis—that of providing the rational basis for treatment and prognosis—might well seem frustrated when the evidence available admits of more than one interpretation, and two or more diagnoses are equally, or almost equally, feasible. Science is often confronted by this temporary impasse, and sometimes doubts seem resolved only to appear again when further evidence is acquired. Twenty years ago the wave theory of light seemed firmly established and the corpuscular theory had long been relegated to the background of historical curiosity; now we are not so certain; both seem to contain a facet of truth. But diagnosis cannot stay for final demonstrations. As Sherrington wrote in his Rede lecture: "Science nobly declines as proof anything but complete proof; but common sense pressed for time, accepts and acts on acceptance." We physicians are often confronted with a situation in which we have to give a provisional verdict on the admittedly inadequate available evidence. We must act. Here again we should follow general principles. We must recognise for example that the commonest lesions are the commonest and that of two equally probable diagnoses on the evidence available we should act as if the commoner were that responsible for disease. The diagnosis of aneurysm of the hepatic artery as the cause of an obstructive jaundice is to be deprecated if a gall-stone is an equally plausible possibility. Occasionally however expediency decides our choice of action; even if of two possibilities one is the commoner but not amenable to treatment, common sense demands that we deal with the patient as if he were suffering from the less common but more hopeful lesion. But all such diagnoses, though necessary for action, are tentative. Let us keep an open mind, though not a mind which is constantly open, for as G. K. Chesterton said, "the object of opening the mind as of opening the mouth is to shut it again on something solid."

Diagnosis then implies an understanding of disease processes, their sites and their causes. If this orientation is adopted in medicine it cannot but affect clinical teaching and must lead to revision of textbooks. "You cannot learn men from books." Only by skill in observation, and interpretation in the light of knowledge and experience, only by exercising care and patience and by cultivating wisdom and judgment can be reached that most desirable of medical achievements—ability to diagnose disease.

#### CLEAN MILK AND SAFE MILK

A DISCUSSION on the compulsory pasteurisation of milk recently arranged by the Parliamentary and Scientific Committee was attended by more than forty members of parliament and representatives of technical and scientific organisations were present. Sir JOHN LEDINGHAM, FRS (Lister Institute of Preventive Medicine), opened by pointing out that the alternative to compulsory pasteurisation was liberty to sell raw milk, the consumption of which was responsible for some 4000 deaths from tuberculosis of bovine origin annually, and for some 2000 fresh cases every year; it was besides the vehicle for other important human pathogens. Deputations to Parliament from the People's League of Health, asking for permissive powers for municipalities to enforce pasteurisation, had been without effect, and proposals from the Royal College of Physicians to secure safe milk for children in reception areas had been passed on to the Milk Marketing Board. Thus the first need was to educate members of parliament. Wilson's book, "The Pasteurisation of Milk," should be in the hands of every member. The interests of the small producer-retailer must be covered in some other way than by allowing him to poison an urban community with tubercle-infected milk. A few months ago a report on over 100 samples of raw milk from small producer-retailers showed that half the samples failed to reach required standards of cleanliness, while no less than 20% (a very high proportion) contained tubercle bacilli. The difference between clean milk and safe milk is still not appreciated.

Dr. A. H. MACDONALD (formerly chief medical officer to Dr. Barnardo's Homes) said that attention had been focused on milk because it was an important food, and was popular with every kind of germ including the tubercle bacillus. Pasteurisation had been hailed as a way out

of the difficulty, but was it? Milk was not the only source of infection; tubercle bacilli bred in the dust and air and other articles of food were infected by it. Children brought up on tubercle-free (TT) milk were liable, if for any reason they had to drink raw milk containing tubercle bacilli, to develop tuberculous glands and peritonitis because their tissues had not had "pin-pricks" with this particular scourge and so contained insufficient antitoxin to deal with the invader. In recent years tuberculosis was said to be on the increase, owing, he believed, to the fact that more pasteurised milk had been consumed. In his own series of 8500 children on raw milk the incidence of tuberculosis was so small that it was not necessary to have a separate sanatorium. In one home of 750 boys who had received a daily pint over 5 years there was only one case of non-pulmonary tuberculosis in that time; in the year preceding this period when a similar number of boys were receiving pasteurised milk there were 14 cases.

Prof. G. S. WILSON (Medical Research Council) said there was sure evidence that raw milk in this country is often infected with organisms capable of producing disease in man; an average of 5-10% of farms send out milk containing tubercle bacilli, and 20-40% milk containing *Brucella abortus*—both infections deriving from diseased udder. Milk is also exposed to contamination from human sources—cough spray or dirty fingers; sewage-polluted water and fouling by rats and mice are other possible sources of infection. The ideal way to ensure the distribution of safe milk would be to prevent contamination at source: but about 40% of cattle in this country are infected with tuberculosis, and a high proportion of herds with *Br. abortus*. Elimination of these two diseases will take many years, and control of human personnel offers many practical difficulties. Since it is at present impossible to produce milk free from contamination the only satisfactory way of protecting the consumer is by destroying organisms that gain access to milk, and the simplest and most reliable way is by pasteurisation. There is every reason to believe that compulsory pasteurisation will save at least 1500 lives a year from tuberculosis alone.

Mr. DAVID QUIBELL, MP, shared the view of Dr. Macdonald that if we could secure cleanliness of herds raw milk was best. Pasteurisation, he considers, is starting at the wrong end. Parliament has never enforced the idea of cleanliness.—Prof. H. D. KAY, DSc (National Institute for Research in Dairying), did not think cleanliness was mainly an agricultural question; most farmers now have little more concern with it than with the processing of the beef they produce. At one time scientists feared that pasteurisation might have an adverse effect on the vitamin content of milk, and hence on its nutritive value; but there was now a consensus of scientific opinion that commercial pasteurisation properly carried out had no ill effects on the nutritive value of milk, and this had been confirmed on calves, rats and 2000 children. Moreover, of 11 calves given raw milk 8 became infected with tubercle bacilli, while of 11 given pasteurised milk only 1 became infected. Producer-retailers could now buy small reliable pasteuriser plants; if any milk was not pasteurised it should be insisted that the herds from which it came were tuberculin tested. The hope that in due course we shall have our milk produced from herds absolutely free from animal disease and by human personnel free from risk of contamination is, from the public health angle, no more than an academic possibility at present.

Mr. A. W. STABLEFORTH, DSc (Ministry of Agriculture and Fisheries), thought that no-one could say it would be possible within the next 30 years to control all disease in such a way that enough safe milk would be available for the public. Pasteurisation and clean milk are not antagonistic ideals and neither should be allowed to hinder an effort to get the other. You could not pasteurise bad milk, he said, and make it good; and he was supported by Mr. E. B. Anderson (chief chemist of United Dairies, Ltd.) who said that the daily prayer of the pasteurising plant manager was for clean milk: any dirt organisms which survive pasteurisation, though harmless to health, make milk go sour much quicker.

Mr. W. R. WOOLDRIDGE (National Veterinary Medical Association) pointed out that the real bone of contention in the topic of pasteurisation was the fear

that Parliament would not start or continue the measures necessary to make herds fitter if compulsory pasteurisation was introduced; and farmers realised the damage done to the livestock industries from the free passage of diseased animals through the country. It is, in fact, essential to improve the health of herds in parallel with the pasteurisation of bulked milk.

Captain LANE (National Association of Creamery Proprietors) asked that in laying down their requirements Parliament should leave it to the trade to decide on the best methods of carrying them out. Sometimes methods of pasteurisation go out of date in a short time and are replaced by better ones.

### THE JOB OF THE WORKS DOCTOR

At a special meeting of the Association of Industrial Medical Officers on Nov. 21, at which Dr. M. W. GOLDBLATT presided, representatives were present from the Royal College of Nursing, the Association of Examining Factory Surgeons, and the Association of Scientific Workers. In opening a discussion on industrial medical services in war-time, the chairman pointed out that strategy was needed to allocate the available doctors in industrial medicine and to determine their duties and status once they were in it. The new industrial medical officers must, he thinks, give thought to schemes for dental and ophthalmic services, the provision of suitable canteens, training of first-aiders, and the education of workers in elementary principles of hygiene. He asked whether the new medical service was bearing these urgent needs in mind, and whether the toxic risks of industry were receiving adequate thought and ante-mortem attention.

Sir DAVID MUNRO (Ministry of Supply) described Mr. Bevin's July, 1940, order as a magna carta for industrial medicine. The industrial doctor's job, just now when labour is scarce, is to make sure that we use available man-power economically and to avoid wastage by ill health and accident. To achieve this, dental, ophthalmic, X-ray and rehabilitation services are all necessary, and he would like to see the establishment of an institute of industrial medicine, which would be a centre of research especially into toxic substances. He believes that in time industrial medicine should have its own diploma. Mrs. A. PERRY (Royal College of Nursing) remarked that the scope of the industrial nurse's work varied according to the size of the factory medical department. In a large works with its own medical officer she should be responsible to him and should enjoy a status equal to that of the welfare officer and the personnel assistants. In smaller factories she should be responsible to the managing director or other responsible officer, and if trained in welfare and personnel work could combine the duties of nurse and labour officer with advantage to everyone.

Dr. J. H. HUMPHREY (Association of Scientific Workers) raised some questions which had been submitted to his association. At present 75% of workers in the country are in factories of less than 1000 workers, and so are unlikely to have any medical service; how can they get it? In some factories the medical officer is distrusted because he is employed by the management; would state control of the industrial medical service, he asked, remedy this? Workers often think of the medical officer as sitting in an office treating those who came to him; should he not spend more time in the work-room practising preventive medicine? How far could specially trained laymen supplement medical and nursing personnel in these times when work for the doctor and nurse is heavy? How far are the results of experience in industrial medicine being recorded and analysed statistically? Dr. M. W. PATERSON (Association of Examining Surgeons) discussed the training of first-aiders, who are doing good work in the prompt treatment of industrial injuries. The well-trained first-aiders know conditions in his own factory and has the confidence of his fellows. Women first-aiders could be used more freely. Training should be given during working hours, and existing methods and training manuals should be revised, he thinks. Dr. E. H. STRANGE (Association of Examining Surgeons) emphasised the value of canteens. Young workers often come long distances to work without having had a proper breakfast. Attendances at a canteen are the measure

of its efficiency: canteens which are not used fully are generally offering poor food and poor service; and sometimes hygienic conditions are really bad. Proper washing of dishes and control of waste should come under the inspection of the doctor. In the subsequent discussion Dr. N. HOWARD MUMMERY suggested that in war-time state registered nurses should take more responsibility and thus relieve the doctor from much routine work. He added that the salaries of nurses in industry need standardising. Dr. T. O. GARLAND thought it clear that the present industrial medical services are inadequate and suggested expanding them to bring in all workers, especially those in small factories. To achieve this, he believed, state control would be necessary. Dr. J. C. BRIDGE (Senior Inspector of Factories) mentioned that when he joined the factory department there was only one whole-time medical officer in industry. He considers that the industrial medical officer should go round the factory and look after people as they work.

## In England Now

### *A Running Commentary by Peripatetic Correspondents*

HEREABOUTS the year ended in a blaze of culture. One of the evacuated schools gave us scenes from "The Dream" at the end of term, and after Christmas there was a Nativity mime, with organ and full choral accompaniment, in the village church. Another "concert"—the word we rightly use for any sort of theatrical performance requiring a concerted effort—took place at the next village along the turnpike; a production of Mr. Shaw's "Androcles and the Lion" which twice packed the modest hall to capacity. As the lion Tom naturally stole a good deal of the thunder and caused shivers of apprehension to run down the spine of his small nephew in the front row "although he knew it was only Uncle Tom really." Androcles, by a combination of simplicity and comeliness, won all the girls' hearts and the producer himself actually stooped to playing—in masterly style, of course—not only the handsome captain but also the despised Spintho, a "double" that required a wellnigh miraculously quick change of costume and make-up. Megara's shrewishness brought the house down and Lavinia's lovely appearance and voice instantly reduced to silence the few noisy groundlings in the back rows. As Ferrovius the massive Jim moved us as deeply by his sincerity as he awed us by his strength; small wonder that Lentulus—in private life a mere musician who plays not more than half a dozen instruments, makes wonderful bortsch and conducts symphony orchestras in his spare time—was overcome by his efforts at conversion. Bill's clear and cheerful voice came across well in the parts of editor and centurion and a word of praise is due to Ern for a gloriously phlegmatic rendering of the rôles of bullock-driver and menagerie-keeper. With such an all-star cast it was not difficult for even the poor old doctor to keep his end more or less up as the degenerate emperor. But it was a little shocking to see how delighted everybody was to see him bolting frantically down the aisle with the lion in hot pursuit. The smaller parts were adequately sustained (as they say) and it would be fair to add that an enjoyable time was had by all. The cast was milking cows and feeding bullocks at the usual time next morning.

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The urge to feel superior is almost an instinct, and the people of all nations have equal rations of it. It has been said that the English do not boast, but the impartial observer (*c'est moi*) refuses to let them get away with a halo like that. They boast as much as any other nation, but they usually do it obliquely. Sometimes, though, their boasting takes strangely direct forms. I came across an example of this when I spent a night in a much-bombed seaport town. From late until dawn I was able to observe the demeanour of my fellow hotel guests in the air-raid shelter. A battery of ack-ack guns seemed to be on top of the hotel and bombs were scoring near misses all round. The noise was so great that we had to shout to be heard, but no-one took any notice of the air-raid. A fierce argument developed as to which town in the British Isles had had most bomb damage. Each town of any size seemed to

have sent its champion for the night's tourney. The Londoners adopted the attitude that there was really nothing to argue about, London was the biggest town and therefore the blitzes on it were bigger and better than those on the provincial towns, which were merely of local interest. That started it. "Have you seen Liverpool?" shouted its champion, and from round the room the gages were flung into the middle. "What about Plymouth?"—or Bristol, Sheffield, Coventry, Hull, Birmingham, Manchester and so on. The solitary Scot in the party stated with emphasis and finality that none of the tuppenny ha'penny English blitzes could compare in magnitude with the one on Glasgow. His contribution was immediately followed by an ear-splitting burst of ack-ack fire and the nearby explosions of a string of bombs. It sounded like applause or derision for the Scot, depending on where one's sympathies lay. In any case the Englishmen achieved national unity on the instant and tried to smite the Scot hip and thigh, but he would capitulate to none of them. The English soon forgot about him and began again their intertribal quarrels. "Do you know the street running from the town hall to the cathedral in Z?" "You do? well it's absolutely flattened, nothing left!" "But it surely can't be as bad as the area round the market square in Y?" "And how many people were killed altogether in your town?" Plomp! (an extra-large bomb bursting near by). "How many did you say? . . . Oh, that's not nearly as many as were killed in one night in ours." Humphrey Pakington's lady came into my mind, the one who was convinced the autumn tints on her trees were much better than those on lesser trees elsewhere, in spite of the fact that her property marched with Sandringham (and incidentally added to the tone of Sandringham). The argument swirled and eddied and wove a pattern with the noises of the bombardment, until one of the admirals who was lying on a chaise longue could bear it no longer. He rose, twitched his dressing-gown and tightened its girdle. "Do you know," he thundered, "that there are people in this air-raid shelter, who, curious as it may seem, have jobs of work to do in the morning. It is necessary that they should get some sleep. Gentlemen, will you please refrain from making any more noise?" This breath of salt air woke up two boon companions who had spent the earlier part of the evening spying the horizon through the bottoms of whisky tumblers. One was a magnificent blond merchant sea-captain, and the other a small, paunchy business man with a husky voice and the assured manner of those in the know. They immediately began swapping experiences and opinions of life and high politics. I sidled closer to listen, because the merchant seaman looked as if he might have something interesting to say. The admirals evidently thought the same, because they strained their ears too. The sea-captain told of his experiences in Vladivostok (in his condition a difficult word to pronounce) and Odessa, and how he ran down to Durban; what he thought of the Russian Air Force and its women pilots; of his adventures in Constantinople, and what he said to some Germans in a café there; and how there was a scuffle with a bunch of spies in an alleyway leading down to the harbour—real thriller stuff, in the best tradition of William le Queux and Bernard Newman! And then he began to say things he didn't ought to about the war at sea. An admiral leaned over and bade him be silent. The magnificent Viking sea-captain half saluted and muttered "Aye, aye, sir." Then the business man gave his opinions of Germany and what he saw there in '37 and how he came back and told Whitehall all about it, and nobody took any notice of him. The sea-captain wasn't listening to him; he began to mutter more things about Odessa, Singapore and Aden, and was again told by the admiral to dry up. "Aye, aye, sir." At the other end of the shelter an enterprising waiter had opened up a temporary bar and the argument about the worst-bombed town in England broke out afresh. It never occurred to any of the champions that the seaport in which they were staying for the night had had more raids than any other town in England, with proportionately more damage and casualties: which, statistically, was a fact. But the fiery admiral became exasperated with all the chatter, went over towards the temporary bar and shouted to no-one in particular, "Do you realise, sir, that this is

an air-raid shelter and that people are trying to sleep?" One slightly inebriated man replied, aptly I thought, "Do you realise sir, that this is an air-raid shelter, and not a quarter deck?" There was a lull in the noise of the bombardment and I went out to look at the fires; but inside the shelter they were still boasting of the superior damage inflicted on their own towns.

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Plenty of unconscious humour is to be found among the bills, letters of advice and prescriptions of north-country doctors in the closing years of the 17th and early years of the 18th century, collected by Mr. J. W. Walker, FRCS, president of the Yorkshire Archaeological Society. Take, for instance, the case of Dr. Edmund Jackson who was practising at Doncaster in 1700. On 31 occasions during that year he provided for one Mr. Lionel Copley and his family professional attendance and medicines ranging from pectoral powders and lambative ointments to consumptive plaisters and emulsions of asafoetida. For all this devoted service he demanded only the modest fee of £6 15s. 2d., adding meekly "upon other accts. up to date £80 3s. 8d." without so much as the usual tactful hint of the effect that an early settlement would oblige. Mark the reward of patience; his accounts were paid in full—just 13 years later. A striking feature of these bills is the relatively high charge made for medicines as compared with that for professional attendance; thus, Dr. P. Spendelow of Wakefield charged his patient Mr. John Walker £1 7s. 8d. for drugs but only 15s. for attendance, and it is noteworthy that he asked twopence each for bottles which seem to have been almost as valuable a commodity then as now. Mr. Walker might have got off more lightly had he not required (in his doctor's opinion, at any rate) a bottle of "Ye Restoration Water" which, it is to be hoped, was a drop of the right stuff because it set him back 12s. Another Dr. Spendelow of Wakefield—Thomas this time—seems to have been casual about entering prescriptions in his day-book. Thus, writing to his patient Mr. John Watson, he begins airily: "I suppose I have sent ye same vomitts you mention." There is a sting in the tail of this letter, the postscript of which runs: "By your water Bleeding is required"—rather depressing news for Mr. Watson, who, up till then, had got away with "a few vomitts taken in a thin posset drink, ye syrup as often as you have a mind and applying ye plaster to ye part affected." In May, 1710, we find Dr. H. Hall of Leeds taking a pretty firm line with his patient, Mr. Isaac Smith. "Eat only wheat bread and none else," he commands, "but let it not be leavened." Mr. Smith is further enjoined to drink "good claret or clear, well-brewed, smooth ale," but forbidden "bottled drink, small beer and anything yt is windy." Perhaps Mr. Smith was dissatisfied with Dr. Hall's advice, for in 1712 we find another doctor, Thos. Amphlett, in attendance and plying him with vomits, pills and electuaries. Tough guy that he was, Mr. Smith survived all this and it was left to a third doctor, Wm. Grosvenor, to administer the coup de grâce to him ten years later. Amphlett was conventionally sorry to hear of Mr. Smith's demise, commenting, a trifle sententiously perhaps, that "God knows wt is mozt fitt for us" and turning briskly to other topics. Numerous and complex are the prescriptions advocated for rickets, a pathetic reminder no doubt of its prevalence and intractability in those days. Dr. James of Rochdale and Dr. Edmund Taylor of Heywood fancied themselves at curing "stomach ake and cholick in Christians." Mr. Walker drily observes that "possibly agnostics, Jews or Mahomedans were not afflicted with such pains"; or possibly the worthy doctors would have no truck with such infidels. Dr. John Simpson of Knaresborough knew what was good for "ye Biting of a Mad Dog"; his concoction of herbs, garlic and ale—the liquid taken internally, the dregs applied to the wound—"has never been known to faile Man, Woman or Childe"; a modest assertion. With more reason Dr. Benjamin Watkinson of Wakefield claimed good results against the Itch by the application of an oily suspension of brimstone (with other irrelevant materials) and the use of clean linen. Quicksilver, boiled in water, is recommended by Dr. Ratte of Melton as "a constant drink in Fevers." It is difficult to see the rationale of this—unless it be that, with the mercury down, the fever must abate.

## Parliament

### FROM THE PRESS GALLERY

#### Medical Treatment of the Home Guard

In the House of Lords on Dec. 15 Viscount ELIBANK asked HM Government whether they would cancel the instructions issued to the deputy directors of medical services of all commands by the War Office that officers of the Home Guard were for all financial purposes, including medical attendance and hospital treatment, to be regarded as private soldiers, and that the admission of officers of the Home Guard to officers' convalescent hospitals was therefore unauthorised. He asked that instructions would be given that all officers of the Home Guard, so long as the injury or illness treated arose out of their military duties, should in future be entitled to medical and hospital treatment on the same basis as officers of the regular Services; and that Home Guardsmen of all other ranks should be entitled to medical and hospital treatment according to their ranks, when the injury or illness arose out of their military duties. The noble lord, who moves for Papers, said he was staggered when he saw the letter from the War Office. Officers of the Home Guard were giving up all their leisure in the interests of the country and of the Service. The Home Guard was raised in war-time and its members were entitled to be treated as a serious fighting force and their officers should have the same privileges as officers of other fighting forces.

Lord CROFT in his reply reminded their lordships that the policy which has never been questioned until recently was that all ranks of the Home Guard should be treated alike. If members of the Home Guard had to enter a civil hospital for treatment they would naturally be treated exactly the same as any other civilian patients. If they entered a military hospital or convalescent home it was desirable that they should be treated in wards or room specially reserved for them. The Government proposed therefore to give instructions for this procedure to be adopted in military hospitals whenever it was possible to reserve separate rooms for the purpose. In that way he thought they would meet a legitimate desire which Lord Elibank told the House was felt in the Home Guard, but he could not go further and accept the suggestion put forward without infringing the principle of equality of treatment for all ranks.

### QUESTION TIME

#### Food for Enemy-occupied Europe

Replying to questions Mr. D. M. FOOT, parliamentary secretary to the Ministry of Economic Warfare, said that food conditions in countries occupied by the Axis forces had not substantially changed since his answer on July 2. While special provision was generally made for nursing mothers and very young children, it was broadly true to say that in Belgium, Holland, France and Norway the food shortages were most acutely felt among children of school age and adolescents. Shipments to Greece from Canada had so far been regularly maintained, but he was not yet completely satisfied as to the working of the safeguards for the protection of Greek domestic produce.

#### Beveridge Report and National Medical Service

Sir HENRY MORRIS-JONES asked the Minister of Health whether he was instituting any special inquiry by his department into the implications of the recommendation in the Beveridge report that a national medical service should be set up in the country as part of a social security scheme.—Mr. E. BROWN replied: Yes. Considerable preliminary work in regard to the hospital services has been going on for some time, and the implications of the remainder of assumption B in the report are under consideration.

#### State Training for Amputees

Mr. E. A. RADFORD asked the Minister if he would consider the possibilities of a state-aided scheme under which all persons who suffered amputations might be supplied with artificial limbs, taught to make the best use of them, and be given every chance of re-establishing themselves as useful citizens.—Mr. BROWN replied: War-time arrangements are already in force for the provision of artificial limbs with

instruction in their use, free of charge to Service cases, civilian casualties and war-service injuries in civil defence, and in the Merchant Navy. These arrangements now extend, on a contributory basis, to other civilians provided that they are capable of taking up useful occupation if supplied with limbs. The question of long-term postwar arrangements will be reviewed as part of the whole subject of hospital and medical services.

#### Soldiers and Venereal Disease

Mr. T. E. GROVES asked the Secretary of State for War whether, in the interest of the health of the Army, he would cause all men returning from leave to be medically examined and, if found to be suffering from venereal disease, to be treated immediately, without loss of proficiency and other pay and without having to go to a hospital known to treat mainly such diseases, so as to ensure that the nature of his disability should not be known to his family and friends.—Sir JAMES GIGG replied: All soldiers returning from leave are medically examined and if found to be suffering from venereal disease are admitted to the venereal disease departments of certain military hospitals, none of which is designated as a venereal disease hospital. If a soldier loses his physical efficiency as a result of his own action he loses his proficiency pay, but it is restored to him as soon as he regains his full efficiency as a soldier. This rule applies to soldiers who contract venereal disease.

#### Milk Allowance for Invalids

Sir ROBERT YOUNG asked the Parliamentary Secretary to the Ministry of Food if he was aware that there were a number of diseases and physical conditions of patients, not stated in group 1 or 2, for which doctors thought a liberal supply of milk was necessary; and whether he would make arrangements whereby patients who were not covered by group 1 list of diseases but were considered to be permanently ill could have two pints of milk per day provided the need for such an allowance of milk was certified by his or her doctor.—Mr. W. MABANE replied: I am aware that certain doctors hold this view. The comparative needs of different groups of people for liquid milk have been most carefully considered in conjunction with the Food Rationing (Special Diets) Advisory Committee of the Medical Research Council. In view of the supply position and the need for maintaining at least a small supply for the healthy population, it has been possible to grant full priority only to those for whom a liberal supply of milk is a therapeutic necessity, and a smaller priority allowance to those for whom a moderate amount of milk is necessary. In the circumstances the Minister would not feel justified in extending priority to other classes of temporary or permanent invalids for whom additional supplies of milk can only be regarded as a comfort and not a necessity.

#### Insulin at Reduced Prices

Mr. GEORGE GRIFFITHS asked the Minister of Health what arrangements existed outside the poor law for enabling persons suffering from diabetes to obtain insulin free or at reduced prices.—Mr. BROWN replied: A person who is insured under the NHI Acts is entitled to obtain insulin as a part of his medical benefit if it is prescribed by the doctor attending him. Local education authorities may provide insulin free or at reduced rates for children and young persons attending schools and educational institutions if the necessary sanction to this arrangement has been obtained. A general sanction is now being given. Local authorities have power with my approval to provide temporary supplies of insulin for the poorer inhabitants of their districts. I am issuing a circular drawing attention to this power and conveying my approval to its exercise during the war. Mr. Brown added that it was not possible for diabetics to obtain their insulin from the county councils as the councils were not among the authorities who could exercise this power under the law.

#### Batteries for Deaf-aid

Mr. A. C. M. SPEARMAN asked the President of the Board of Trade if he was aware that there was an acute shortage of batteries for deaf-aid which was causing hardship for the deaf; if he would take steps to remedy this; and if he would remove the purchase tax from the batteries as they were necessary surgical instruments.—Captain C. WATERHOUSE replied: Arrangements were recently made to increase production of high-tension batteries for hearing-aids and supplies of this type of battery appear to be satisfactory. There have been difficulties in the production of some low-

tension types due to the placing of certain urgent Service contracts. These difficulties have been overcome and supplies of low-tension batteries should shortly be adequate to meet the needs of the deaf. The matter of the purchase tax is under consideration.

#### Pensions Appeal Tribunals

Mr. WILFRID ROBERTS asked the Minister of Pensions what steps had been taken to ascertain the total number of qualified medical practitioners not now in general practice who would be able and willing to act as members of appeal tribunals.—Sir W. WOMERSLEY replied: I have made inquiries of the bodies responsible for the allocation of medical men and of the Service departments, but I have now arranged to set up a subcommittee of my central advisory committee to assist me in a further examination of this problem.

#### Constant Attendance Allowances

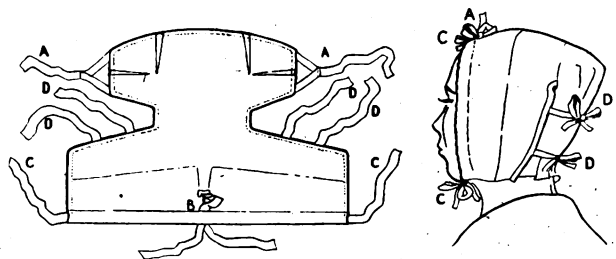
Miss I. WARD asked the Minister if he was now in a position to state his decision in regard to granting constant-attendance allowances to civilians injured by enemy action on the same conditions as applied to service cases.—Sir W. WOMERSLEY replied: I have obtained authority to give constant-attendance allowances in civilian cases on similar conditions to those applying to private soldiers in the Army.

#### Protection of Practices

Sir ERNEST GRAHAM-LITTLE asked the Minister of Health whether his department was enforcing through the Central Medical War Committee the agreements between local practitioners designed to protect the practices of those absent on National Service or deceased; whether acceptance of the scheme by doctors was allowed to be made a condition of admission to panel practice; and to what extent the operation of this private scheme remained within the unchecked authority of the British Medical Association.—Mr. BROWN replied: I have no power either to interpret or to enforce the private agreements made between practitioners for the purpose of the protection of the practices of their colleagues, though I am aware of the scheme, and in view of the general participation of insurance practitioners therein, and the importance of safeguarding the interests of practitioners who undertake National Service, I have recommended insurance committees to assist in its operation so far as it relates to insurance practice. The right of a registered practitioner to join an insurance medical list cannot be limited to participants in the protection of practices scheme.

#### A BONNET BANDAGE

THE head bandage here illustrated, designed by Miss J. E. Scolah, matron of the Borough Isolation Hospital, Derby, is economical in material, capable of adjustment



to fit any head snugly, comfortable to wear and easy to launder. At first sight the numerous tapes give an impression of unnecessary complexity, but they are all needed for nice adjustment and to prevent slipping. The back tapes, A, are passed through the buttonhole B and tied above the forehead; the fixed strap of tape behind the buttonhole prevents the bow from slipping back through the hole and spoiling the close fit. Tapes D are tied across back of head and tapes C under the chin. The fit round the face is adjusted by tightening up the free ends of tapes C, which come out above the forehead and thus act as a draw-string. The cap formed by the adjusted bandage will keep dressings neatly and firmly in place. Miss Scolah also advocates its use in first-aid and in preventing the spread of pediculi in nurseries. The bandage is made in four sizes by Messrs. F. Longdon & Co., Agard Street, Derby.

## Obituary

### LEONARD RALPH BRAITHWAITE

MB LEEDS, FRCS, JP

Mr. L. R. Braithwaite, emeritus professor of clinical surgery in the University of Leeds and a vice-president of the Royal College of Surgeons of England, died at his home on Dec. 18 after a short illness. He was born at Halifax sixty-four years ago and studied medicine at Leeds, graduating with first-class honours in 1903. He acquitted himself with distinction in the usual house-appointments at the General Infirmary, was appointed assistant surgeon in 1909, surgeon with charge of outpatients ten years later and full surgeon in 1924. He was closely associated with Moynihan to whom he had become private assistant in 1916 and during the last war accompanied him to France as his ADC. Like a true disciple Braithwaite modelled his work on that of his teacher and did much to perpetuate the Moynihan technique and tradition. During the 1914-18 war Braithwaite was also attached to the Second Northern General Hospital in Leeds and served with the Mediterranean expeditionary force in Salonika.

Braithwaite was an excellent teacher—clear, crisp and practical—and though he did not care for public speaking his opinion commanded attention at many committees, for he had a way of marshalling his arguments, generally late in the discussion, which showed his clear grasp of the subject and more often than not got him what he thought was right. He was a valued member of the executive committee of the British Cancer Campaign, but he took most delight and pride in his work as a member of the council of the Royal College of Surgeons.

A. W.-J. writes: "Braithwaite was elected vice-president of the college in 1941 and was serving for a second year at the time of his death. He welcomed the tributes of his colleagues with grateful humility, but took pride in the thought that honours bestowed upon him brought honour also to his great medical school. He was greatly appreciated on the council for his sound judgment, wise counsel, loyal service and supporting strength. He was direct and sometimes even blunt in speech. But his directness and his honesty of purpose had great value and earned him the respect and confidence of his colleagues, while the charm of his personality and his simple sympathetic courtesy won him their affection. He had abiding faith in the mission of the college—the advancement of surgery for the benefit of mankind. Its great traditions appealed strongly to him, but he always regarded the council not only as treasurers of a magnificent past, but as trustees responsible for the encouragement of new advances."

As a surgeon he was sound in his judgment, neat, painstaking and safe. In the flawless artistry of his work and in his gentleness of touch he even rivalled Moynihan. "Perhaps the most exquisite operation that I have ever witnessed by any surgeon in any country," writes G. G.-T., "was a gastrojejunostomy performed by him on the occasion of a visit of the surgical section of the RSM to Leeds. As in the fingers of his master, the  $\frac{1}{2}$  circle intestinal needle was a beautiful tool in his skilful hands. Though possessed of sublime surgical courage, he was essentially a sure and safe surgeon; the desperate adventure and forlorn hope made less appeal to his artistic temperament than to those who are more frequently confronted with the cancer problem." He kept his patients' interests and safety in the forefront and never attempted anything he thought too near the limits of what they could endure. But he did not hesitate to use surgery experimentally where it could be done without prejudice to the patient and seemed sound in principle. The two pieces of work for which he is best known are bilification and the flow of lymph from the ileocaecal angle, and its possible bearing on the cause of duodenal and gastric ulcer. In short Braithwaite was a general surgeon, specialising in abdominal work.

Last year Braithwaite delivered the Moynihan lectures, he was also a former Arris and Gale lecturer and not many weeks before his death he gave his Bradshaw lecture on the rôle of bile in duodenal regurgitation. During this war as EMS medical superintendent of the General Infirmary he helped in the preparations for air-raid

casualties with his usual thoroughness. He was also an inspector for British Red Cross hospitals in Yorkshire.

A man of great charm, Braithwaite had many friends and he was always willing to go out of his way to help them. In his cult of punctuality he was almost an ascetic, but the meticulous orderings of his days and his evenings was dictated by a supreme desire to give of his very best to those who entrusted their lives to his hands. He knew his own mind and though not of a pushing nature he was difficult to turn once he was convinced he was right. He was a connoisseur in many forms of art and liked nothing better than to entertain his friends in the home he loved and talk about his pictures, and he could often be found at the Leeds Club at his accustomed time and place always ready for a chat and treating any subject with an equable and humorous outlook. He leaves a widow and three daughters.

### ALASTAIR BAIRD KENNEDY

LSA; SURGEON LIEUTENANT RNVR

Alastair Kennedy was born in Glasgow in 1906, the only son of Mr. A. A. Kennedy, now of Seaton, Devon. He was always determined to be a doctor and had started his preclinical subjects at University College Hospital when ill health forced him to give up medicine for several years. Later he entered St. Bartholomew's Hospital and qualified at the end of 1940. The next year he spent in house-appointments at Wellhouse Hospital, Barnet, and in the children's department at Bart's.

Dr. Charles Harris writes: "Kennedy would be the last person to claim academic distinction. Yet without it, by a mixture of robust common sense and unquenchable cheerfulness, he made for himself a place unequalled by his contemporaries. He lived in Bart's from 1939 till the end of 1940 as one of a group of students ready to deal at all times with whatever the war brought forth. Towards the end of 1940 it brought forth a good deal. Kennedy became a leader among his fellows; not only they but all who were his companions during those months were vastly helped by his bustling enthusiasm. The same qualities made him a successful children's house-physician, thoroughly approved of by his patients and trusted by their parents." At the beginning of this year Kennedy received a commission in the RNVR and was drafted as MO to a flotilla of mine-sweepers. The sea-going life pleased him and he spoke with enthusiasm of his work among the men under his charge. After some months in home waters he was sent abroad with the Allied Expeditionary Forces. During November he was reported "missing, presumed killed" on active service during the course of operations connected with the occupation of French North Africa. Any hopes of his survival must apparently be abandoned.

Kennedy married in February of last year Miss Gillian Norris, a member of Bart's nursing staff.

### GEORGE FREDERICK POYNDER

M R C S; LIEUT.-COLONEL R A M C RETD

Colonel G. F. Poynder, who died at Fleet, Hants. on Dec. 13 at the end of his ninety-first year, qualified from St. Thomas's Hospital in 1875, and entered the Army as surgeon five years later. In 1901 with the rank of lieutenant-colonel he took up a retired-pay appointment at Bedford, which he held till 1917 when he offered his services to the Mildmay Mission to the Jews. One of his colleagues there writes: "From the beginning Poynder won the hearts and confidence of his patients, and the gratitude of many difficult cases. He was genial, good-tempered and warm-hearted, and he encouraged his patients to rely on God's blessing on the means used, and on the good words spoken to their souls."

ALTERNATIVE KEY TO THE NEW AGE?—Correspondents point out that Social Credit did not fail in Alberta. It was not tried there. The enactment was disallowed by the Dominion Government.





## Letters to the Editor

### NEUROTICS IN THE FORCES

SIR,—The question of keeping potential neurotics out of the Services has been much discussed. At a recent meeting of the section of medicine of the Royal Society of Medicine General Tidy warned us that if one found ways of excluding all candidates who might break down under Service conditions one would probably turn down a large number of useful recruits. The usual method employed by would-be reformers is to go through the histories of patients who have developed neuroses while serving in the Forces and collect a number of factors which these cases have in common. It is suggested that these illnesses could have been avoided if the medical boards used a short questionnaire in which these points received consideration. I remember 8 questions which we were told, at a previous meeting of the RSM, would have eliminated a high proportion of the cases investigated. If I were to publish a new serological reaction for syphilis it would not be sufficient to state that my test was positive in 90% of all syphilitics; I should be required to show that it is only rarely positive in patients who have not had syphilis. I venture to write this letter because I see a chance of the authorities issuing instructions to the medical boards to use one or other of these questionnaires, and I do not think that any of them should be adopted without having been tested on a large number of members of the Forces who have not broken down.

Runwell Hospital, Essex.

S. L. LAST.

### SMALLPOX CONTACTS

SIR,—In his paper (*Lancet*, Dec. 12, p. 697) Dr. Tyrrell gives a partly tabulated account of febrile reactions to primary vaccination and revaccination in two groups of persons, the one composed of contacts with cases of smallpox, the other of non-contacts. The general conclusion drawn was that the two groups showed no significant differences. Table I of the paper shows that the contrasted groups of contacts and non-contacts were comparable as regards age; also that roughly the same proportion of each group were subjected to primary vaccination. Two further tables show respectively the duration of febrile reaction and the day of onset of same as noted in a total of 50 persons (18 contacts and 32 non-contacts) among the 134 observed. In these two tables the 12 contacts and 20 non-contacts primarily vaccinated are not grouped separately from those revaccinated. It is evident from table I of the paper that 21 of the total of 50 febrile reactions noted occurred among the 32 persons primarily vaccinated and, although the numbers dealt with are clearly too small to admit of statistical analysis, it would I feel enhance the value of the paper for record purposes if Dr. Tyrrell would subdivide the contact and non-contact groups in his tables II and III on the basis of primary vaccination and revaccination.

London, S.W.1.

E. T. CONYBEARE.

### NON-IRRITANT EMULSIFIERS

SIR,—In your issue of Dec. 20, 1941, a method was described for treating bedclothes with mineral oil emulsions for dust-laying (van den Ende and Thomas). Since then one of us (J. M. T.) has been continuing investigations on the effect of prolonged contact of the skin with a variety of these emulsifiable oils. Mice received daily applications of the oils to the skin of the back over a period of many weeks. It is evident from the results of these experiments that some emulsifiable oils, including several mentioned by van den Ende and Thomas, will produce dermatitis in mice. The substances responsible include sulpho-naphthenic acid and cresylic acid. The mineral oil itself is inert. Sulpho-naphthenic acid is commonly employed as an emulsifier, and cresylic acid is usually included for its stabilising property. In selecting emulsifying agents for use in the application of dust-laying oils to bedclothes it is therefore necessary to avoid these dermatitic substances, and to select only those which are known to be harmless to the skin even on prolonged contact. Investigations are now in progress with emulsifiers which are harmless to the

skin, and results so far have indicated that they are as effective in the application of dust-laying oils as those which have previously been used.

National Institute for  
Medical Research, N.W.3.

M. VAN DEN ENDE.  
J. M. TWORT.

### ALLERGY IN CHILDHOOD

SIR,—Your annotation of Dec. 19 (p. 731) misrepresents what I said at the Royal Society of Medicine. So far from advocating adrenaline as a routine treatment for asthmatic children, in my experience it is rarely required, as ephedrine and theophylline are generally sufficient to prevent attacks and to make it possible for the child to lead a life of normal activity. I drew attention to the work of Boland and his colleagues at the Guy's Asthma Clinic, which has conclusively demonstrated that injections of saline solution are as effective as injections of specific allergens—which, like so many earlier "cures" of asthma, act solely by suggestion. Nothing could be worse for the physical and mental well-being of an asthmatic child than a strict diet, limitation of exercise and coddling by over-anxious parents. Removal to a more healthy psychological environment is often followed by complete recovery without recourse to drugs or specific treatment of any kind.

Oxford.

ARTHUR HURST.

### THE BINDER IN INFANCY

SIR,—For the past 8 months I have been running child welfare clinics and have been amazed to find umbilical hernias in about 15% (at a conservative estimate) of infants attending. The infants have been brought to me at about the age of 5-6 weeks and the hernias range from a slight umbilical bulge to a protrusion as much as 1 in. long. Fully 70% of them have been born in hospitals or nursing-homes, and it is among these that hernias have developed. I understand it is the custom now to stop using a binder on the infant as soon as the umbilicus heals, usually before the mother leaves for home at the end of 2 weeks; and in fact this practice had been followed in every case which had a hernia. Further, the hernias were commonest in children who at birth weighed either 6 lb. or under, or 8½ lb. or over. Any physiological or pathological cause which provokes excessive crying (such as underfeeding, overfeeding and insufficient clothing) favours the development of hernia. I suggest that the use of binders should be continued until infants are 4-6 weeks old. The umbilical scar when newly formed will not withstand the increased abdominal pressure caused by crying. We control a laparotomy scar with a binder, and we should do the same with an umbilical scar until the contraction of fibrous tissue fortifies the weak area. A wide crepe bandage makes a good support, allowing a little expansion and contraction of the abdominal wall.

Chingford, Essex.

DONALD MACDONALD.

### NATIONALISED MEDICINE

SIR,—An American doctor, Frank G. Slaughter, has produced in popular form an exposition of what well might happen, in his recent novel *That None May Die*, which I commend to the profession and public alike; he also indicates an alternative. "Read not to confound or agree . . . but to weigh and consider." (Bacon, *Of Studies*.) Notices of medicated novels, so numerous of late, would be welcome to many; so would articles on doctors and medicine in recent fiction, which has considerable influence on contemporary public opinion, especially when filmed—witness *Arrowsmith* and *The Citadel*. This subject was considered worthy of a place in the *Bibliotheca Oesteriana*.

West Byfleet.

T. M. HARDY.

KING EDWARD'S HOSPITAL FUND.—This year £280,000 is being distributed by the fund to the voluntary hospitals of London and their convalescent homes. This sum (which was incorrectly given in our last issue) is about £20,000 less than last year, but the distribution committee felt they must hold the balance between the immediate needs of the hospitals and their probable postwar requirements.

## Public Health

## Annual Reports

## TROUBLE WITH MILK

Complaints of dirty milk are somewhat frequent. Dr. J. Hutchinson of *Northallerton* rural district told his council recently that, following complaints from many of the towns supplied with milk from the area, he had 300 samples from separate churns examined and 10 per cent. were found badly contaminated. Faults of precautions in production were numerous, all naturally attributed to war conditions. Shortage of labour, loss of expert milkers, &c. have made things more difficult for the dairy industry, but in many parts of the country reasons for complaint existed before the war. Dr. A. F. Adamson of *Hendon* mentions a number of complaints of milk being distributed in dirty bottles. Dr. F. A. Sharpe for *Preston* for 1941 gives the results of the bacteriological examination of 47 samples of ungraded raw milk. Coliform bacilli in 0.01 ml. were detected in 17 and tubercle bacilli in 3. If the samples were unselected this would condemn this milk as a highly dangerous fluid. But presumably the samples were taken because their purity was suspected. The presence of coliform bacilli is proof of faecal contamination, but does not tell us if it comes from bovine or human sources. Dr. Allan Semple of *Carlisle* gives the results of bacteriological examinations of 89 various milks of which 45 were found unsatisfactory. One sample out of 23 ordinary milks and one out of six accredited milk were positive for tubercle on inoculation. Taking all raw milks sold in the country, an average of 6% give positive evidence of tuberculosis. Only very rarely is tubercle found in milk alleged to have been pasteurised. The heavy rise since the war in non-respiratory tuberculosis, much of which is known to be due to the bovine strain of the bacillus spread mainly if not solely by milk, gives point to the recommendations of the M.R.C. Committee that all milk should be pasteurised, or where that is impossible that only boiled milk or dried milk should be given to children.

Dr. W. G. Booth for *Holland* county gives a table of action taken in regard to milk found deficient in fat or adulterated with water. Our legal standards (3.0 per cent. fat and 8.5 per cent. solids non-fat) are low; though some cows do occasionally give milk below this quality, the great majority give something much better. The Americans, who are keener on milk than we are, insist upon higher standards of content and defaults are not common. Our complicated process of bringing defaulters to trial and the trivial penalties imposed on conviction waste half the work of our food inspectors. Generally the defendant in a milk case can "earn" his fine by continuing his offence whilst his case is being heard. In one case in *Holland* the vendor was fined 5s. for adding 17 per cent. of water! Several got off with warnings for fat deficiencies of 10-14%.

## HEALTH OF CORK

Dr. J. C. Saunders, medical officer of health of Cork, issued a full-scale report for 1941 which was a healthy year. A sharp rise in the general death-rate from 14.6 to 16.1, the highest for many years, is attributed by Dr. Saunders to the emigration of young people from the city. The population of Cork fell by 4000, roughly 5%, in 1941, almost entirely made up of young men and women of the 20-35 age-groups. This fall was peculiar to Cork amongst the towns of *Eire*. The birth-rate was 21.8 as against 27.7 in 1881. Dr. Saunders gives a table of infantile mortality in *England* and *Wales*, *Eire* and *Cork* city for the sixty years 1881-1941. In *England* and *Wales*, the rate for the first thirty-five years varied between 163 in 1899 and 95 in 1912, when for the first time it fell below 100. Since 1916 it has never touched 100 and has fallen nearly regularly to the fifties, where it has remained for the past ten years. In *Eire* the rate has been below 100 in the whole sixty years except for 1897-1900 when it averaged 104. But whereas the rate in *England* was halved during the present century, that of *Eire* has fallen only about 25%. *Cork* city had a better record than *England* and *Wales* until 1905, but since then its rate has been generally higher and of

recent years about 30% higher than that of *England* and *Wales* and 20% higher than that of all *Eire*.

In *Cork* measles was epidemic in 1940 with 1613 notifications, of which 982 were reported in October, an unusual month for measles to peak. There were 18 deaths, 8 in infants under one year and 10 in children aged 1-5. Of the 140 deaths in all infants under one year 45 were attributed to diarrhoea, 8 to measles, 4 to bronchitis, 18 to bronchopneumonia, 10 to marasmus, 4 to meningitis and 7 to convulsions. The measles epidemic started in September and 67 of the 140 infant deaths occurred in the last four months of the year. Of the 37 deaths of children aged 1-5, 22 occurred during the same period. So that during the measles epidemic covering four months exactly half of the year's total of young deaths occurred. The measles epidemic tailed off to zero in the first half of 1941 and in the last five months only 2 cases were notified. Dr. Saunders gives a long and interesting review of this epidemic which was unparalleled in the history of the city. He concludes that but little of the increased mortality amongst young children can be attributed either directly or indirectly to measles. He reckons that the gross fatality which may reasonably be attributed to measles was 1.0% of notifications and 0.5-0.1% of all cases, for most cases were mild and it is known that only a small proportion were notified. Another interesting chapter in the *Cork* report for 1941 is an account of the prevalence of infantile diarrhoea which continues to be serious. Of the cases fully investigated 94.5% occurred in infants not breast-fed, and of the 1528 cases reported in the past seven years only 83 were in breast-fed infants.

Typhus used to be common in *Cork*. In 1881, the worst year since records started in 1879, there were 1406 cases, and as late as 1892 there were 162. The last case notified in the city was in 1929. Formerly typhus was endemic throughout *Ireland*, but its area has steadily contracted so that for the past fifteen years as an endemic disease it has been limited to the west of *Connaught*. This centre has flared up lately causing some anxiety. The recent epidemic of cerebrospinal fever did not spread to *Eire*; in *Cork* only 2 cases of the disease were reported in 1940 and the same number in 1941.

**SMALLPOX IN SCOTLAND.**—The *Scotsman* of Dec. 21 reports that a man of 56 has been removed to the *Edinburgh* City Hospital suffering from smallpox. This is the thirty-fifth case to be reported since the outbreak began on Nov. 1.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

## Births, Marriages and Deaths

## BIRTHS

AIRD.—On Dec. 17, the wife of Dr. J. Wilson Aird, of *Blackpool*—a son.  
 BUTLER.—On Dec. 18, in *London*, the wife of Mr. E. C. B. Butler, FRCS—a daughter.  
 EVANS.—On Dec. 23, at *Bourne End*, the wife of Dr. Courtenay Evans—a son.  
 ISRAËLS.—On Dec. 21, the wife of Flight-Lieutenant M. C. G. Israëls, MD, RAFVR, of *Baguley*, *Cheshire*—a daughter.  
 SUTCLIFFE.—On Dec. 23, at *Salisbury*, the wife of Major W. G. Sutcliffe, RAMC—a daughter.  
 WHARTON.—On Dec. 20, at *Maidenhead*, the wife of Dr. G. C. C. Wharton, RAFVR—a son.  
 WILLIAMSON.—On Dec. 19, at *Hove*, the wife of Major J. C. F. Lloyd Williamson, RAMC—a son.

## MARRIAGES

BURNET-JACQUES.—On Dec. 26, at *Hemel Hempstead*, Gilbert Burnet, MB, of *Bovingdon*, to Hilda Kathleen Jacques.  
 PARSONS-FOLEY.—On Dec. 19, in *London*, Howard Michael Parsons, Lieutenant RAMC, to Muriel Foley.

## DEATHS

BRAITHWAITE.—On Dec. 18, at *Headingley*, *Leeds*, Leonard Ralph Braithwaite, MB LEEDS, FRCS.  
 BUCHANAN.—On Dec. 17, at *Killyclogher*, *Omagh*, *Tyrone*, James Buchanan, MB RUI, of *Watford*, aged 78.  
 INGRAM.—On Dec. 15, in *Edinburgh*, Alexander Ingram, MD, EDIN., DTM, late of the *West African Medical Service*.  
 POTTER.—On Dec. 23, Charles Edward Potter, MD EDIN., of *Derby*.  
 RICHARDS.—On Dec. 25, at *Oxford*, Harold Meredith Richards, MD LOND, aged 78.

## Notes and News

## ACROSS EUROPE

UNDER the chairmanship of Sir Alfred Webb-Johnson the Anglo-Soviet Medical Council has now completed its first year of life. Even at this tender age it has a record of solid work behind it, and a full programme ahead. The aims have been to send to the USSR recent scientific and clinical information, to advise on medical supplies sent out from Great Britain, and to make Soviet medical work accessible to the profession here. Since 1939, the council has sent to Russia complete sets of the *Lancet* and *British Medical Journal*, the *Bulletins of War Medicine, Hygiene, and Tropical Diseases*, the *Proceedings of the Royal Society of Medicine*, the *Journal of the RAMC* and the *Journal of Mental Science*. Books and reprints of special articles have also been sent. Lately<sup>1</sup> *Reviews of British War Medicine*, a book of specially written articles, translated into and printed in Russian, was presented to Mrs. Maisky, and 3000 copies have been sent to the USSR. Volume I covers a wide range of topics including public health, vitamin therapy, bone surgery, treatment of burns and crushes, injuries to vision, blood-grouping and the care of stored blood, hospital infections of wounds, sulphonamides and penicillin, treatment of gonorrhoea, bacillary and amoebic dysentery, typhoid, typhus, malaria, tularemia and lymphogranuloma inguinale, and the laboratory diagnosis of the rickettsias. Volume II is to deal with thoracic surgery and will be ready shortly.

Articles from Russia have reached the council mainly through the kindness of the editor of *Soviet War News* and have appeared in English medical journals; the Society for Cultural Relations with Russia has also co-operated by handing over books and pamphlets for translation. An appeal for translators led to offers of help from 66 people, mostly doctors; their hard work has played a very large part in the exchange of information between our two countries. During the year Prof. J. A. Ryle has succeeded Sir Harold Scott as chairman of the executive committee. Financial help has been given to the work of the council by Mr. Maisky, by the Aid to Russia and Winter Comforts funds and the National Joint Committee for Soviet Aid, as well as by subscriptions and individual donations. The council reaches the end of the year with a balance in hand, but not a large enough one to meet its future commitments—a point which its friends should bear in mind.

## ELECTRO-MEDICAL APPARATUS

THE Board of Trade and Ministry of Supply have consulted the Ministry of Health about the future production in the UK of electro-medical apparatus and electric blankets and pads. Shortage of man-power and raw materials demand limitation to essential requirements, guaranteed by clearly established medical needs. Raw material will now only be released for apparatus of major importance and for treatment which cannot be carried out by alternative means. Apparatus of a luxury type or constructed to a luxury standard will no longer be available after existing stocks are exhausted and no material will in future be released for the production of equipment which has not a defined medical value.

Under the Machinery, Plant and Appliances (Control) (No. 3) Order, 1942 (SR&O. 1942, no. 2487, 2d.), manufacturers may supply apparatus of an electro-medical nature to members of the public only under licence from the Board of Trade. Applications for licence will require the support of a medical certificate setting out detailed particulars of the apparatus required, the condition for which its use in treatment is required, and certifying that the patient is unable to make use of hospitals, clinics or other existing facilities. The applications will be referred to the Ministry of Health for confirmation. Forms may be obtained from Industrial Supplies Department (Machinery Licences Division), Board of Trade, 1-6, Tavistock Square, London W.C.1.

Manufacturers licensed by the Board of Trade under the Electrical Appliances (Control of Manufacture and Supply) Order, 1942 (SR&O. 1942, no. 1453, 1d.), for the manufacture and supply of electrical heating pads and blankets may supply these to the public only on a

medical certificate that the supply is essential on medical grounds, and that the written approval of the Board of Trade and the Ministry of Health has been obtained. Applications for these licences should be addressed to the Board of Trade, Imperial Chemical House, Millbank, S.W.1.

Supplies to hospitals and institutions will be regulated by the issue of licences by the Board of Trade, but, while it is hoped to meet reasonable requests, strict scrutiny of applications will be necessary.

Medical practitioners are asked to realise that the limitation of production renders it essential, in the interests of really necessitous cases, that discrimination should be exercised in the issue of certificates, which should be given only where the need is imperative and alternative treatment is not practicable.

## A ROTA FOR NIGHT WORK

THE local medical and panel committee for the County of London have gone beyond the stage of saying that the burden of nightwork in general practice could be eased by a rota system; they have actually taken the first step in organising such rotas by submitting a scheme to all general medical practitioners in the London area. Those who enrol will be formed into groups, each member undertaking to serve on the roster. "Night" is taken to cover the hours between 9 PM on one day and 9 AM the next morning. Members of the service will attend patients for each other, and it is presumed that the question of a fee between members will not arise. Doctors not on duty will be free to attend calls from their own patients or to refer them to the doctor on call. Copies of the roster for each group will be sent to all members of each group, and to police stations, hospitals, fire stations, and civil defence posts in the various districts. The area to be covered will depend on the size of the group and is to be limited if possible to within a mile of the doctor's surgery. In a group of eight doctors with two on duty at a time, it is hoped that each member's period of duty would amount to a week in each month. This should mean a considerable lightening of the constant strain under which many civilian doctors are working at present.

The panel committee would be responsible for the scheme and for compiling the group rosters for about thirteen weeks in advance. Each group would appoint its own hon. secretary who would be a member of the executive committee of the service. The nominal subscription of 5s. a year would cover administrative expenses, it is thought. Midwifery will not normally form part of the night medical service, but intending members who undertake midwifery are asked to say so in order that one or more can be included in each group roster when possible—presumably in case of emergency. The committee hope that the service will not be merely a war-time measure, but the foundation for a system which could persist with benefit in times of peace. It will be instructive to see what response the London doctors make to this co-operative proposal.

## TIME FOR A HOT DRINK

WARS are a better excuse than most for a nice hot drink. Messrs. Cadbury have reminded us this year that they can provide the correct drink for any warlike occasion. Is a soldier tired and hungry? Hot sweet cocoa will make a different warrior of him. Is a fire-watcher trying to get his share of repose while his colleagues play pontoon and keep the wireless going? Bournvita is the thing for him. Does the fireman come in to breakfast after a warm night among the incendiaries? Cup-chocolate will restore his perspective. These good drinks promote that sociable and placid mood which made the chocolate houses of the eighteenth century into famous clubs.

## Royal College of Surgeons of Edinburgh

At a meeting of the college held on Dec. 18, with Mr. J. W. Struthers, the president, in the chair, the following were admitted to the fellowship:

J. C. BRASS, MRCS; I. M. Davidson, MD GLASG.; A. T. George, MB MADRAS, MRCS; A. M. Glen, MB EDIN.; J. R. E. James, MB WALES; G. B. Jones, MB LOND.; Harry Karn, MRCS; E. W. Knowles, MB LPOOL.; Jean Mason, MB MANCH.; John Potter, MB DUBL.; T. C. Skinner, MB ST. AND.; Kenneth Watson, MD DUBL.; and H. G. E. Williams, MD CAMB.

1. See *Lancet*, Dec. 5, p. 674.

**University of Cambridge**

At recent examinations the following were successful:

## FINAL EXAMINATION FOR MB

**Part II: Principles and Practice of Physic, Pathology and Pharmacology.**—J. N. Agate, O. B. Appleyard, D. J. ap Simon, H. W. A. Baron, D. J. Bauer, F. W. Blacklay, P. L. Blaxter, J. F. Bolton Carter, N. A. Campbell, A. W. Capon, E. F. Carr, R. J. D. Carrick, J. A. H. Collyns, H. M. Comely, M. C. Connell, W. N. Coombes, P. N. Cunliffe, V. A. dos Santos, W. K. Douglas, P. F. Early, F. M. P. Eckstein, P. D. Eeman, J. V. T. Gostling, A. J. Gray, D. W. H. Griffiths, A. G. Harrold, B. M. Heap, T. S. Hindle, S. C. H. Hood, G. F. S. Hooper, P. E. Hughesdon, H. R. Jolly, R. N. Jones, M. C. S. Kennedy, L. G. Kingdom, F. K. Lau, D. I. Lishman, G. C. Lloyd Roberts, T. G. E. Loosemore, J. K. F. Mason, P. H. N. Matthews, S. R. Mawson, H. R. A. Michelson, N. L. Mills, M. C. Mundle, J. F. Nell, Y. H. Ng, R. V. Peters, H. L. Pierce, B. Pownall, A. P. H. Randle, R. K. Reid, A. G. Richards, W. Rogers, P. H. Sanderson, P. B. Shaw, J. H. Simpson, R. D. Slack, I. M. Smith, H. C. Still, M. G. P. Stoker, R. N. Titchhurst, W. H. Trethowan, E. Tylden, B. P. Webber, B. C. Welshman, L. A. S. White, D. E. C. Whitmore.

**University of Oxford**

At a congregation on Dec. 12 the degree of DM was conferred on R. H. S. Thompson and the degree of BM on R. G. White.

**University of Leeds**

At recent examinations the following were successful:

MD—A. L. Taylor.

## FINAL EXAMINATION FOR MB, CH B

**Part I.**—Jean Bateman, Isabel H. M. Blyth, I. Bruce, P. S. R. Burrell, H. N. Burwell, H. S. Capoor, H. H. Collins, W. D. Fletcher, D. Fox, R. H. Foxton, R. Goldberg, Winifred M. Haigh, J. F. Hanratty, Cecilia Henry, M. Hutchinson, A. R. Hyslop, R. B. Jones, Ursula M. Kirk, A. C. Knight, E. R. Locutier, A. L. McKnight, O. Margison, Barbara J. Maxwell, M. M. Nagley, S. N. Nathan, Dorothy C. Newell, A. P. Percival, H. Shaw, Victoria M. D. N. Shaw, M. Stanton, D. R. K. Street, P. A. Thorpe, Gwenith Turnbull, W. N. Wild and J. R. Wilson.

**University of Liverpool**

At recent examinations the following were successful:

MD—H. F. Harwood.

## FINAL EXAMINATION FOR MB AND CH B

S. M. Green, S. E. Keidan, R. C. Nairn (with second-class honours).

**Part III.**—D. Annis, Margaret J. Blackburn, H. O. M. Bryant, Eva V. Cooper, K. H. Dalrymple, A. S. Davidson, J. G. K. Dean, J. N. Dearnaley, P. J. Devlin, J. F. Doherty, K. E. A. Donnellan, Ann Donnelly, H. G. Frank, H. Friend, F. D. Griffiths, F. E. D. Griffiths, Elizabeth M. Harper, F. A. H. Inman, A. Jolleys, D. A. Kininmonth, E. D. G. Kirkwood, H. Lewis, R. H. Martin, E. Martinez-Alonso, A. F. Murphy, J. S. Redfern, R. L. B. Roberts, A. J. Robertson, P. L. Robinson, M. J. R. Ryan, J. N. G. Sarson, Betty Schofield, H. R. Shepherd, G. H. Thomas, M. Doreen Watt, H. O. Williams, and Margaret Woolfenden.

**Part II.**—J. Ainsworth, A. M. Brenner, Constance M. Davis, P. S. Deardon, Margaret P. Diamond, E. G. Donovan, P. M. Edis, K. B. N. Freeman, J. Gould, N. J. Gourdi, A. Griffith, J. E. Hall, D. A. Harbord, Betty Hargreaves, E. T. Harrison, Ethel J. Higgit, H. Holden, Winifred L. Hollick, C. Hopkins, J. G. Jones, J. D. King, R. V. Kinnish, J. W. Langley, Constance G. Lee, V. Leitner, Margaret J. Lezama, A. McPherson, W. E. S. Marshall, J. W. Maybury, J. K. Meiring, Janet B. Mercer, E. W. Parry, Sheila L. Richardson, J. J. Rivlin, W. Sircus, Margaret Slater, A. Stone, A. H. Swinbank, Barbara K. Thompson, D. W. Townley, J. G. Warbrick, Elspeth M. Whittaker, Margaret A. Williams, R. S. Williams, and F. B. Wright.

**Medical Casualties**

The following RAMC officers have been posted as prisoners of war: WS/Captain G. A. Anderson, Captain J. B. Hannah, WS/Captain B. J. Smith. Major J. W. D. Bull, who was missing at Singapore, is also now officially reported to be a prisoner.

Dr. Ronald Tasker of the Burmah Oil Company is reported missing through enemy action at sea.

**Medical Honours**

The OBE has been awarded to Surgeon Lieut.-Commander (A/Surgeon Commander) T. C. Stevenson, MB Camb, RNVR, for outstanding devotion to duty in tending sick and wounded during and after the fall of Singapore. Captain S. A. Mian, MB, IMS, has received the MBE for gallant and distinguished services in Waziristan.

**Royal Society of Medicine**

The section of history of medicine will meet at 2.30 pm on Wednesday, Jan. 6, when Dr. H. P. Bayon will read a paper celebrating the tercentenary of the death of Galileo Galilei. Prof. E. N. da C. Andrade, FRS, will also speak on Newton and the science of his age, and Dr. E. Ashworth Underwood on Newton and his medical contemporaries. At the same hour at the section of surgery Lieut.-Colonel A. E. Porritt and Lieut.-Colonel E. G. Muir are to open a discussion on clinical surgery in the Middle East.

**Living in the Presence of History**

Those who have enjoyed the fascinating quotations in Warner's *Calendar of Medical History* will be glad to know that there are still some copies of these diaries for 1943 available to any doctors who would find them useful. They should apply to William R. Warner & Co. Ltd., Power Road, London, W.4; to comply with Paper Control Order, 1d. stamp must be enclosed.

**Association of Scientific Workers**

This society will hold a conference for workers in the medical sciences on Saturday, Jan. 9, at 2.15 pm, at the London School of Hygiene, Keppel Street, W.C.1, when the work of the medical sciences committee will be reviewed. Further information may be had from Dr. J. H. Humphrey, 81, Highgate West Hill, London, N.6.

**Medical Superintendents Society**

A meeting of the London and Home Counties branch of this society will be held at BMA House, Tavistock Square, London, W.C.1, on Saturday, Jan. 16, at 2.30 pm, when there will be a discussion on the relative merits of medical and lay administration of hospitals.

**British Standards**

The latest information regarding the issue, of new and revised British Standards, of which there are at present over a thousand, can be obtained from the library of the British Standards Institution, 28, Victoria Street, Westminster. Standards may be studied in the library from 10 am to 5 pm, Mondays to Fridays, and at other times by appointment.

The following libraries maintain a complete set of standards. London: British Museum, City and Guilds Engineering College, King's College, Science Library (Science Museum), University College.—Glasgow: Glasgow University, Royal Technical College, Mitchell Library.—Edinburgh: Edinburgh University, National Library of Scotland.—Cambridge: Cambridge University (Engineering Laboratory), University Library.—Oxford: Bodleian Library.—Nottingham: University College, Central Public Reference Library.—Newcastle-on-Tyne: Armstrong College, Central Public Reference Library.—Birmingham: Municipal Technical School, Central Public Reference Library.—Leeds: University of Leeds, Central Public Reference Library.—Manchester: Victoria University, Central Public Reference Library, College of Technology.—Dublin: Trinity College.—Aberystwyth: National Library of Wales.—Cardiff: Central Public Reference Library.—Middlesbrough: Central Public Reference Library.—Sheffield: Central Public Reference Library.

Messrs. SHARP AND DOHME have prepared a mixture of belladonna alkaloids in tablet form for the treatment of postencephalitic parkinsonism and paralysis agitans. Each tablet contains hyoscyamine hydrobromide, atropine sulphate and scopolamine hydrobromide yielding 0.5 mg. of total alkaloids calculated as hyoscyamine hydrobromide.

**Appointments**

BEBBINGTON, EVELYN F.: MB LPOOL, DPH: asst. MOH for Plymouth.

HALBERSTADTER, MAX, MB LOND., DMRE: asst. radiotherapist at the Middlesex Hospital, London.

McMURRAY, T. P., M CH, FRCS: medical referee for the county-court districts of Altrincham, Birkenhead, Chester, Crewe and Nantwich, Market Drayton, Northwich, Runcorn and Warrington (circuit No. 7).

WHEELER, F. F., MRCS: examining factory surgeon for Grays, Essex.

London County Council.—The following appointments have recently been made:

FORD, R. KELSON, MD LOND.: medical superintendent, St. Stephen's and St. Luke's Hospitals, and Chelsea Institution;

TAYLOR, R. THANE, MRCS: medical municipal representative to EMS sector III;

DAVIS, ELI, MD MANC., MRCP: deputy medical superintendent (Class II) and senior resident physician, St. Andrew's Hospital;

MORRIS, A. D., MD BRUX., MB LOND.: medical superintendent, St. Leonard's and St. Matthew's Hospitals;

LLEWYS-LLOYD, R. A. V., MB LOND., FRCS: medical superintendent, St. Olave's Hospital;

BRYNING, F. A., MB LOND.: medical superintendent, St. Peter's Hospital, acting at Hackney Hospital;

BREEN, G. E., MD NUI, DOMS: seconded to Ministry of Health Headquarters, EMS sector IV;

LILLIS, W. J., deputy medical superintendent (class III) at South Western Hospital;

RAMSAY, A. M., MD ABERD.: deputy medical superintendent (class III), North Western Hospital;

EVANS, J. CARADOC, MRCP: medical superintendent, Highgate Hospital;

HURFORD, J. V., MD BELF., MRCP: acting medical superintendent, High Wood Hospital.

## SULPHONAMIDE RESISTANCE IN GONORRHOEA

JOHN PETRO, M B CAMB

SURGEON LIEUT.-COMMANDER RNRV; GENITO-URINARY SPECIALIST AT A ROYAL NAVAL BASE; FORMERLY OF THE VENEREAL DEPARTMENT, ST. GEORGE'S HOSPITAL

There are considerable differences of opinion as to the incidence and cause of sulphonamide-resistant gonorrhoea, but it has been observed by most venereologists. Crean (1937), in the early days of sulphonamide therapy, drew attention to 6 failures in 100 cases of gonorrhoea treated with 'Prontosil.' He concluded that poor health was an adverse factor and that patients who failed to respond to this drug within 18 days were unlikely to react at all. Lloyd, in 1939, stressed the importance of intensive study of resistant cases. Accounts of drug-fast cases appeared in a comprehensive survey of chemotherapy in gonorrhoea by Harkness (1940). Primary and acquired drug resistance were described in the admirable review of modern treatment of gonorrhoea by Batchelor, Lees and Thomson (1940); they attributed primary resistance to personal idiosyncrasy. Sulphonamide resistance was noted in 14 cases of gonorrhoea treated by King and Williams (1941), who used the intensive dosage described by Bowie and others (1939). Fairbrother, Aymer and Ashton (1942) referred to a small percentage of sulphonamide-fast cases in a study of several schemes of dosage. Reports on the auxiliary use of artificial pyrexia in drug-fast cases by means of the Kettering hypertherm apparatus (Simpson, Rose and Kendell 1941), or by injection of TAB or Dmelcos vaccine (Harkness 1940), emphasise the difficulties which may be encountered in clearing up the failures of chemotherapy.

The definitions and observations which follow are based on a survey of 956 cases of acute gonorrhoea in naval ratings treated with sulphapyridine or sulphathiazole.

### DETAILS OF TREATMENT

The patients were treated under strict supervision and encouraged to rest in their hammocks during the period of sulphonamide therapy. No urethral irrigation or other local treatment was given. Fluids were not restricted or prescribed. Ratings had no access to alcohol. Treatment began as soon as the diagnosis of gonorrhoea was made.

Either 16 or 24 g. of sulphapyridine or sulphathiazole in tablet form was given in an initial course lasting 44 or 92 hours. A 16 g. course was given by an intensive method with a first dose of 4 g., second dose of 2 g. and subsequent four-hourly doses of 1 g. In a 24 g. course—a moderate and sustained method—1 g. was administered four-hourly throughout. With both methods the drug was given day and night. A subsequent course or courses of 12 g., given in 1 g. four-hourly doses, were prescribed to all patients who failed to respond satisfactorily to a first course, or showed early clinical and bacteriological relapse.

In most cases urethral discharge subsided and gonococci disappeared in 24–48 hours. If the gonococcal discharge persisted in spite of adequate dosage, and particularly after a third course of treatment, it was safe to diagnose resistance to the drug used.

### TYPES OF RESISTANCE

From the clinical point of view it is important to distinguish between (1) acquired, (2) relative, and (3) absolute sulphonamide resistance.

**Acquired resistance.**—When gonorrhoea is treated with subtherapeutic quantities of a sulphonamide and fails to clear up, subsequent adequate doses often fail to control the infection. This phenomenon is mentioned by Cokkinis (1938), Lloyd (1939), Batchelor, Lees and Thomson (1940), Laird (1940), Harkness (1940) and Petro (1940).

**Relative resistance.**—This term is applied to cases which do not respond to an adequate initial course of a sulphonamide, but begin to show clinical improvement, accompanied by the disappearance of gonococci, after a second or third course.

**Absolute resistance** is characterised by a persistence of gonococci in inflammatory discharge or adnexal secretions, often but not necessarily accompanied by gross signs of the disease, in spite of adequate and sustained administration of a

sulphonamide from the beginning of the attack. The drug must be one which is known to bring about a speedy clinical and bacteriological cure in the great majority of cases, without recourse to accessory methods of treatment.

Apart from the acquired resistance in patients who had received inadequate amounts of a sulphonamide before the routine treatment, instances of absolute and relative sulphonamide resistance were observed among the 956 cases, their percentage incidence being subject to much periodic variation. This incidence was much the same with both the intensive and moderate dosages. In the case of sulphapyridine an exhaustive chemical and biochemical analysis of various batches of the drug failed to show differences sufficient to account for the observed periodic fluctuation in numbers of resistant cases.

### CAUSES OF RESISTANCE

Disregarding the failures due to inadequate dosage, consideration may now be given to factors which may account for, or contribute to, sulphonamide resistance.

#### (1) Unduly low blood concentration of free sulphonamide.

—This condition is rare, and no doubt depends on individual anomalies in absorption, excretion or metabolism of the sulphonamides. Excessive fluid intake may be a contributing factor. While blood levels of sulphapyridine commonly reached 8–10 mg. per 100 c.cm. with the intensive dosage, they were subject to wide individual variations (3.5–14 mg.) though identical amounts of the drug had been given. Success or failure did not seem to bear any distinct relation to the blood concentration alone, provided that it was not less than about 3 mg. per 100 c.cm. Fairbrother, Aymer and Ashton (1942) showed that cases which were resistant to sulphapyridine registered blood levels comparable with those of responding cases.

#### (2) Obstruction to transport of sulphonamide to infected tissues.

—The success of sulphonamide therapy must depend on the ultimate arrival of the drug in the infected tissues where it exerts its bacteriostatic effect. Fortunately a large proportion of these drugs reach the tissues. This has been demonstrated by Marshall, Emerson and Cutting (1937), Marshall and Long (1939) and others. Since the delivery of the drug to the tissues partly depends on the presence of uninterrupted vascular and lymphatic channels, avascular or relatively avascular areas of infected tissue receive an inadequate supply of the drug and this precludes effective bacteriostasis. In gonorrhoea such conditions occur in foci of infection which are (a) surrounded by cicatricial fibrous tissue—e.g., at sites of former infiltration or in the vicinity of a stricture—or (b) deprived of a full blood-supply by a local vascular failure due to pressure from oedema or venous congestion. Local interference with sound or cautery, after the acute phase had subsided, was effective in bringing about a response to subsequent chemotherapy in some of the cases complicated by stricture or scarring (Petro 1940). Obstruction to the transport of sulphonamide is certainly a real cause of resistance, but it is an uncommon one and occurs mainly in second or later attacks of gonorrhoea.

#### (3) Obstruction to effective drainage of inflammatory products.

—An ill-draining focus of infection forms a bacterial reservoir besides harbouring products of bacterial activity. Some of the constituents of the purulent contents—e.g., the proteolytic digest of the tissues, and the large mass of organisms—tend to reverse or overcome the action of sulphonamides. MacLeod (1940) described the anti-sulphonamide activity of pus and other matter of human or animal origin which contain sulphonamide inhibitor. In gonorrhoea such foci of infection are represented by abscess formation in Tyson's, Littre's or Cowper's glands; by periurethral or prostatic abscess; or by the impaired drainage of the urethra or a para-urethral canal in the presence of an unduly narrow meatus. Most of these conditions were encountered in the present series; some responded promptly to sulphonamide therapy after drainage had been established, but others still showed no response. Harkness (1940), describing cases of gonorrhoea with glandular involvement which responded but little to chemotherapy, felt convinced that the primary cause of the resistant infectious process in the glands was invariably drug fastness.

(4) *Weakness of natural defences of the body.*—The major effect of sulphonamides being bacteriostasis, the final destruction of organisms depends on the action of phagocytic cells and antibodies. In gonorrhoea treated from the outset with sulphonamides, the gonococcal complement-fixation test often remains negative in spite of a successful response to treatment; the test then gives no clue to the part played by the reaction of the body in overcoming the infection. An accurate method of assessing the strength of the natural defences in gonorrhoea treated with the sulphonamides has not yet been recorded, but some venereologists believe that delay in beginning sulphonamide therapy leads to a better response, by allowing time for the mobilisation of body forces. Others maintain that the synergic effect of gonococcal vaccine, given early in the disease, leads to a successful response to chemotherapy in some cases which otherwise resist this form of treatment. While there was no direct evidence of poor natural defences in drug-resistant cases in this series, some of them were in sub-normal health or showed a leucopenia. In a few cases vaccine was effective as an adjuvant.

(5) *Infection with sulphonamide-resistant strains of gonococci.*—Some species of bacteria are susceptible to the inhibitory action of certain sulphonamides, whereas other species are less susceptible or entirely unsusceptible to these drugs. It is also known that different strains of the same species can display a varying degree of susceptibility to the action of one sulphonamide. Boak and Carpenter (1939) induced a tolerance to sulphanylamide in 6 strains of gonococcus by growing them in vitro in gradually increasing concentrations of this drug. Westphal, Charles and Carpenter (1940) reported in vitro methods by which they developed in 9 strains of gonococcus a resistance to 0.03% of sulphapyridine. In Denmark, Schmith and Reymann (1940) demonstrated a well-marked variation of the in vitro sensitivity to sulphapyridine of gonococcus strains, 355 of which were examined. Their investigation of 80 patients in respect of the correlation between strain sensitivity and clinical response to sulphapyridine showed that the effect of the treatment was convincingly dependant on the sensitivity of the strain; 75% of the strains were sensitive and 25% displayed varying degrees of resistance in vitro; of the 16 patients infected with resistant strains and refractory to routine sulphapyridine therapy, 2 were cured by a more intensive treatment with this drug and 1 responded to sulphathiazole; in 13 of 15 pairs of known contacts there was no apparent change in the sensitivity of transmitted strains, but in the remaining pairs a definite change was noted. Cohn, Steer and Seijo (1942) demonstrated in vitro differences in the behaviour of various gonococcal strains to sulphathiazole and showed that this strain variation corresponded with the clinical reaction of the patient.

**SULPHONAMIDE-RESISTANT STRAINS OF GONOCOCCUS**

A bacteriological and clinical investigation, aiming to establish or disprove a correlation between special strains of gonococcus and sulphonamide-resistant cases of gonorrhoea, was prompted by the occurrence of cases in which an exhaustive search for a cause of sulphonamide resistance was unsuccessful. Care was taken to select healthy ratings suffering from an untreated, primary attack of acute gonococcal urethritis, uncomplicated by developmental abnormalities or glandular involvement; 50 such patients formed the clinical material for this investigation.

As soon as the diagnosis of gonorrhoea was made, and before any treatment was given, urethral discharge from each case was spread on a Petri dish containing 10% human serum CCY agar<sup>1</sup> (prepared according to methods described by Gladstone and Fildes 1940) and incubated for 48 hours at 37° C. in 8-10% CO<sub>2</sub>. The patients began sulphonamide treatment immediately after the specimens of urethral discharge had been inoculated. Colonies of gonococci from the original cultures were picked out for primary subcultures on fresh serum CCY agar medium. Successful 48-hour-old subcultures, derived from cases under investigation, were submitted to a comparative study of sulphonamide sensitivity. The method em-

ployed was Fleming's (1940-41) impregnated strip technique by which organisms from 2-7 cases could be tested against one concentration of a sulphonamide, on a single Petri dish under identical conditions.

A strip of medium was cut out from a plate containing 10% human serum CCY agar. The trench thus formed was filled with a solution of 1 part sulphonamide in 5000 parts melted agar, which was allowed to solidify at 37° C. Gonococci from four or five 48-hour-old subcultures, derived from 4 or 5 cases, were suspended in tubes of sterile saline and diluted by a further addition of saline until comparable counts were obtained. Opacity tubes for the standardisation of bacterial vaccines were used as comparator, the count aimed at in each suspension being about 179 million gonococci per c.cm. A small loopful of each diluted suspension was spread evenly across the plate, from the impregnated strip to the periphery of the plate. The inoculated plate was then incubated for 48 hours at 37° C. in 8-10% CO<sub>2</sub>. The streaks of gonococcal growth were then examined and the distances of inhibition from the impregnated strip noted.

Gonococci from 44 cases were examined in this manner, cultures of gonococci failing to grow satisfactorily in the 6 remaining cases. Tests with 1st, 2nd, 3rd, &c. subcultures were made to ascertain the degree of stability of sulphonamide sensitivity in successive bacterial generations. Strains were selected from different batches of cases and their sulphonamide sensitivity compared on a single plate by Fleming's method. The in vitro sulphonamide sensitivity of the 44 strains of gonococci were compared with the clinical response to sulphonamide treatment in the corresponding cases of gonorrhoea. From the table it can be seen that cases 5, 12, 20, 23 and 35, clinically resistant to sulphapyridine, yielded strains of gonococci which proved resistant or insensitive to a 1/5000 concentration of this drug in vitro. Case 21, illustrating clinical relative resistance, was infected by a strain which showed only a partial sensitivity in vitro.

Fig. 1 demonstrates sulphapyridine resistance of strains from cases 5, 20, 23 and 21. There was no inhibition of growth in strains 5, 20 and 23, and slight

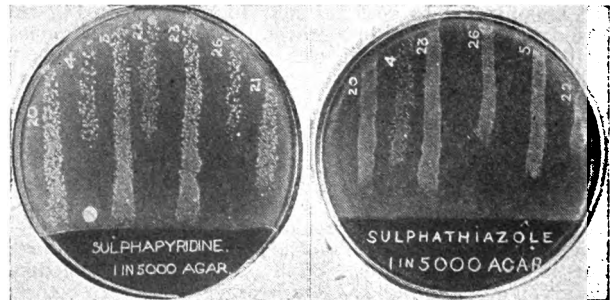


Fig. 1—A plate of CCY agar + 10% human serum with an agar strip impregnated with 0.02% sulphapyridine, showing three resistant strains (from cases 20, 5 and 23), one relatively resistant strain (from case 21) and three sensitive strains (from cases 4, 22 and 26).

Fig. 2—A similar plate with an agar strip impregnated with 0.02% sulphathiazole, showing the contrast in sensitivity between strains from cases 20, 23 and 5 and those from cases 4, 26 and 22.

inhibition in that of strain 21. By contrast, the three strains from cases 4, 22 and 26 show a well-marked sensitivity to sulphapyridine, their growth being greatly inhibited; these three cases responded to treatment promptly.

*Tests with sulphathiazole.*—Five sulphapyridine-resistant cases also proved resistant to sulphathiazole. The in vitro response to sulphathiazole of strains 5, 20 and 23, however, while exhibiting resistance when compared with strains 4, 22 and 26, showed a small degree of sensitivity to a 1/5000 concentration of this drug (fig. 2), in contrast with the complete insensitivity to 1/5000 sulphapyridine (fig. 1). This is in accordance with Fleming's (1941) results, which showed that sulphathiazole is, in vitro, a more powerful bacteriostatic agent than sulphapyridine.

*Characteristics of the six resistant strains.*—The in vitro response to sulphapyridine and sulphathiazole proved constant in at least 6 successive subcultures of each strain. This constancy in response conforms to the attested stability of drug-fast strains of other organisms. The in

1. CCY agar = hydrolysed casein, tryptic digest of casein, extract of yeast, sodium lactate, sodium glycerophosphate, cystine solution and agar.

vivo and in vitro drug resistance was not associated with changes in morphological, cultural or staining characteristics of these strains. The observed gross pathological changes due to infection with these strains appeared to differ in no way from those usually seen in gonococcal infections of the genito-urinary tract. It is noteworthy that case 20 developed a prostatitis in the second week of the disease. The immunological reactions and metabolic properties of these strains have not yet been determined.

TABLE OF RESULTS

Case	No. of tests	In vitro response to 1/5000 sulphapyridine			Clinical response
		Subculture			
		1st	2nd	5th	
1-4	7	+	+	+	Prompt
5	6	-	-	-	None
6-9	5	+	+	+	Prompt
11	5	+	+	+	Prompt
12	7	-	-	-	None
13-17	4	+	+	+	Prompt
20	10	-	-	-	None
21	8	±	±	±	Delayed
22	8	±	±	±	Prompt
23	12	-	-	-	None
24-27	4	+	+	+	Prompt
29-33	4	+	+	+	Prompt
35	6	-	-	-	None
36-46	4	+	+	+	Prompt
48-50	4	+	+	+	Prompt
Contact	7	-	-	-	None

+ = inhibition of growth for 15-25 mm. from impregnated strip.  
 ± = inhibition of growth for 5-15 mm. from impregnated strip.  
 - = no inhibition or inhibition of growth for less than 5 mm. from impregnated strip.

In cases 10, 18, 19, 28, 34 and 47, no satisfactory cultures were available for experiment.

CASE-RECORD AND SOURCE OF INFECTION

Case 23 is chosen for a detailed description because it is representative of the sulphonamide-resistant cases 5, 12, 20 and 35 and because of a special investigation which was carried out on the female source of this particular infection.

A rating, aged 32, reported with a profuse urethral discharge of 2 days' duration. Urethral smears showed many intra- and extra-cellular gonococci. He had not had gonorrhoea previously and had received no treatment for the urethritis. He was of fine physique and had always been healthy. He admitted to a repeated exposure to possible infection from one woman only. White-cell blood count was 10,000 per c.mm.; Wassermann and Kahn reactions were negative. There were no developmental abnormalities of the urethra and no glandular involvement. After the inoculation of a culture plate with the urethral discharge, the patient was given 1 g. of sulphapyridine by mouth four-hourly, day and night, for 92 hours, the total given being 24 g. At the end of this period the discharge showed no change and still contained both intra- and extra-cellular gonococci. A second course of 12 g. of sulphapyridine given in four-hourly doses of 1 g. produced no clinical or bacteriological improvement. After 2 days' rest a third course of 12 g. was given, and this also produced no change in the condition. White-cell counts during this phase of treatment varied from 7500 to 9000 per c.mm. The level of free sulphapyridine in the blood after the administration of 10 g. was 6.3 mg. per 100 c.cm. Seven weeks of irrigation with potassium permanganate 1/10,000, twice a day, eventually controlled his infection.

It was fortunately possible to enroll the full coöperation of the female host of strain 23 for a comparative clinical and bacteriological investigation.

The woman was unaware of being infected though she did not deny previous risk of infection from other sources. She had received no previous treatment, and the source of her infection could not be traced. Clinical examination showed chronic cervicitis, and massage of the urethra yielded a mucopurulent discharge. Cultures were made from cervix and urethra. The urethral culture grew an abundance of gonococcal colonies but none was obtained from the cervical culture. Forty-eight hours old subcultures of the primary gonococcal growth were suspended in saline and diluted to a count of about 179 million gonococci per c.cm. Several tests with such suspensions of successive subcultures of this strain were carried out on plates which were also inoculated with similar

suspensions of gonococci from case 23. All tests showed a complete resistance to a 1/5000 concentration of sulphapyridine in the inocula from the female host and from case 23. The woman was treated with 49 g. of sulphapyridine, and when urethral cultures were made at the end of a fortnight's treatment gonococci grew in profusion, illustrating the clinical resistance of her infection to this drug.

There were no grounds for doubting the statements of these two patients, and the results of this special investigation support the view that a sulphonamide-resistant strain of gonococcus had been transmitted from one host to another.

DISCUSSION

Many factors can contribute to failure in the sulphonamide treatment of gonorrhoea, but the predominating factor may prove to be an infection with gonococcal strains which are insensitive or relatively insensitive to sulphonamide action. Chemotherapeutic failures in the present series showed a tendency to become more common as time went on. This insidious change, together with the evidence of the correlation between in vitro and in vivo resistance to sulphonamides of some gonococcal strains, suggest a gradual evolution of such strains.

From quantitative experiments with yeast extract Woods (1940) suggested (1) that para-aminobenzoic acid is an essential metabolite with which sulphanilamide competes for the enzyme reaction involved in the further utilisation of para-aminobenzoic acid; (2) that a sufficient excess of sulphanilamide interferes with such utilisation of an essential metabolite; and (3) that the competition depends on the chemical similarity between sulphanilamide and para-aminobenzoic acid. Applying these suggestions to the development of drug fastness, it is possible that some strains of an organism synthesise or learn to synthesise more essential metabolite than can be overcome by the sulphonamides, or rely for their survival on alternative enzymatic processes, unaffected by these drugs, or convert sulphonamides which chemically resemble one or other metabolite into substances conforming to their nutritional requirements. Such organisms would be insensitive or relatively insensitive to the bacteriostatic action of the sulphonamides.

In the light of recent work in bacterial chemistry the development of drug fastness is admirably presented by McIlwain (1942).

"Drug-fast strains are regarded as having been 'trained' so that they differ in their needs or synthesising abilities with respect to the essential metabolites or enzymes with which the drug in question interferes. Their production by growing an organism in the presence of increasing concentrations of a drug is essentially the same as a process of nutritional training, in which organisms are grown in the presence of decreasing concentrations of an essential nutrient. The stability of many nutritionally trained strains on repeated subculture in various media is well attested, as is the stability of many drug-fast strains. Both classes of derived organism can preserve to a large extent the diagnostic characters of their parent strains, but differ from them in a specific manner, which with nutritionally trained organisms is demonstrably their ability to synthesise essential nutrients."

It may be added that with some drug-fast strains there is evidence of alteration in metabolism and in their enzymatic processes (MacLeod 1939).

While the existence of naturally sulphonamide-resistant strains of gonococcus was demonstrated by Schmith and Reymann (1940) in tests on 50 old laboratory strains isolated in the presulphonamide era, the available evidence points to the likely occurrence of strains, previously sensitive, which have acquired a sulphonamide tolerance as a result of repeated exposure to sub-therapeutic quantities of these drugs in some patients' tissues. The probable explanation of the development in vivo of drug-fast strains of gonococci is as follows. Inadequate sulphonamide dosage in the treatment of gonorrhoea is known to produce an acquired clinical resistance to further adequate drug therapy. The organisms, initially susceptible to sulphonamide action, become desensitised to the further action of these drugs either by being "trained" to rely on alternative metabolic processes, not affected by the sulphonamides, or by "learning" to synthesise an excess of metabolite capable of reversing sulphonamide action. This period

of training is represented in vivo by the time during which gonococci are exposed to repeated small amounts of the drug which are carried to the infected tissues by the blood-stream. When such organisms from an uncured case of gonorrhoea infect a fresh host, the resulting gonococcal infection fails to respond to adequate sulphonamide therapy, which only tends to desensitize the organisms still further. In this manner highly resistant strains develop and are passed on from host to host.

The present periodical, and possibly geographical, variation in the incidence of such resistant cases may be explained by the presence or absence, at different periods and in different areas, of persons infected with resistant strains of gonococci. The findings in the male and female hosts of strain 23 furnish a picture of how such resistant infection may spread.

If this interpretation is correct, inadequate dosage, haphazard tests of cure and the premature cessation of treatment in defaulters—some deluded by a mirage of cure—will help in the further creation of sulphonamide-resistant gonococci. This will entail a return to the old and tedious methods of treatment unless new counter measures are discovered.

The treatment of an infection with resistant organisms is so far limited to irrigation or the use of artificial fever. In some cases which are probably relatively resistant a change to a different sulphonamide preparation—e.g., from sulphapyridine to sulphathiazole or sulphadiazine—may occasionally effect a cure. The future control and treatment of this type of infection will depend on (a) the discovery of new compounds, capable of inducing bacteriostasis in strains resistant to present-day sulphonamides, or (b) measures which will resensitize such strains, and these measures should be simpler to apply than artificial fever by means of the hypertherm apparatus and more certain in effect than pyrexia induced by the injection of TAB or Dmelcos vaccine.

#### SUMMARY

Sulphonamide resistance in gonorrhoea may be of three types—acquired, relative and absolute.

Possible factors governing absolute or relative resistance are considered in the light of observations on 956 cases of male gonorrhoea.

An in vivo and in vitro investigation of 44 cases of male gonorrhoea shows that 5 resistant and 1 relatively resistant strains of gonococci were responsible for 6 cases which failed to respond to adequate sulphonamide treatment.

Investigation of the female host of one sulphonamide-resistant strain of gonococci supported the view that such a strain can be transmitted from one host to another.

The development of resistant strains is probably favoured by inadequate dosage, haphazard tests of cure and the premature cessation of treatment in defaulters.

Until new compounds effective against sulphonamide-resistant strains are evolved, or means found for resensitizing these strains, treatment in cases infected with a sulphonamide-resistant organism must be by irrigations or artificial fever.

I am grateful to Surgeon Captain G. V. Hobbs for his interest in this work; Prof. Alexander Fleming for his advice and tuition in bacteriological technique; Dr. P. Fildes, Lord Stamp and Dr. D. D. Woods for their advice on the action of sulphonamides; Surgeon Captain Hitch for his co-operation in the preparation of media; Mr. J. A. Gardner for some of the chemical and biochemical analyses; Dr. D. F. Johnstone, city VD MO, for his co-operation in the clinical investigation and treatment of the female patient; Surgeon Commander C. H. Birt for the laboratory facilities; Mr. A. Hornbrook for the photography of plates; and Chief Sick-berth Petty Officer T. Jones for his assistance in the laboratory.

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## DEFECTS OF SMELL AFTER HEAD INJURY

A. D. LEIGH, M B M A N C, M R O P

CAPTAIN RAMC; MEDICAL OFFICER AT A MILITARY HOSPITAL FOR HEAD INJURIES

Petit, Pott, Larrey, and the older writers on head injuries make no mention of traumatic defects of smell. William Ogle was the first to publish, in 1870, a description of anosmia consequent on injury to the head; he described 3 patients who, after blows on the back of the head, suffered a complete loss of smell; "there can, I think, be little doubt," he wrote, "that the loss was due to the rupture of the olfactory nerves as they pass from the bulb through the holes in the ethmoid bone." One of these patients had also an associated taste defect: "boiled onions, boiled apples, and boiled turnips all appear the same to his palate." The same year Notta (cited by Goland 1937) reported 6 cases of traumatic anosmia, and three years later Legg (1873) described how, in a man of 36 who fell on his right posterior parietal region and had bleeding from the left ear, there was partial loss of the sense of smell and taste, with a residual parosmia (perversion of sense of smell) and no recovery seven months later. Legg suggested that the site of the lesion was the temporal lobe at its tip, which was feasible enough, "as my friend, Dr. Ferrier, during his researches, places smell in the temporosphenoidal region." Gowers (1893) recognised that olfaction was affected by blows or falls on the front or back of the head: "the delicate filaments are torn from the bulb or lacerated in their passage through the ethmoids."

Traumatic impairment of loss of smell has now become more widely recognised. Collet (1933) and Goland (1937) drew special attention to anosmia resulting from violence to the back of the head. Using the method of olfactometry developed by Elsberg and Levy (1935), Goland investigated olfactory function in 66 cases of acute head injury; 3 showed "almost complete anosmia following injury to the occipital region of the skull." Goland refutes the classic view that with occipital injuries there occurs a shearing of the olfactory filaments. He concurs with Legg (1873) in suggesting that the loss of smell results from damage to the lateral olfactory striæ and tips of the temporal lobes by impact against the lesser wing of the sphenoid, and concludes that "injuries about the anterior portions of the head, apart from fractures to the cribriform plate and local damage, played a secondary rôle in producing disturbance of smell."

#### METHODS AND RESULTS

In a series of 1000 consecutive cases admitted to a military hospital for head injuries, there were 72 with impaired sense of smell (7.2%). Refined methods of olfactometry were not employed, as an estimate was needed on the basis of a simple clinical test. The test substances used were coffee, camphor, eucalyptus, peppermint and cloves. An airway clear and free from blood and mucus was considered satisfactory; anterior rhinoscopy was not performed. A single sniff up each nostril to carry the particles to the olfactory mucosa replaced the blast technique of Elsberg and Levy (1935).

Of the 72 cases, 2 were gunshot wounds, the remainder blunt injuries; 2 died, 41 had complete anosmia, and in 31 anosmia was incomplete in that there was a general diminution in olfactory acuity or a unilateral anosmia; 12 complained of parosmia. The sites of injury were

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occipital or frontal in most cases, 18 being occipital (12 showing fracture and 6 showing bruising or laceration of the scalp in the occipital region), and 30 frontal (27 showing fracture); 7 were parietotemporal, and in the remaining 17 the site of violence could not be determined, although 10 of these cases showed fractures of the skull. Of the occipital fractures, there were 5 with fissures running into the foramen magnum, and of the frontal fractures 14 involved the frontal sinus, giving rise to cerebrospinal rhinorrhoea in 5 cases.

That the violence was usually severe is shown by the high incidence of organic neurological signs. The post-traumatic amnesia was long, being reckoned in days in all but 6 cases. The focal signs, either transitory or residual, ranged from extensor plantar responses, dysphasia and post-traumatic epilepsy to bitemporal hemianopia and diabetes insipidus; 43 of the total showed such signs in some stage of their evolution. Later, 2 died from meningitis, both being open injuries with destruction of bone and brain; 26 were so incapacitated that they were discharged from the Army (a rate for the group of 36.4%, whereas the general discharge-rate for the 1000 cases was 29.6%); 12 men were sent back to duty in a lower medical category, fit for light work only; and only 34 returned to full duty.

## RECOVERY

In only 6 of the 72 cases has any recovery of smell been noted, as follows:

Site of violence	Parosmia	Time of recovery
Crush	Yes	20 days
Frontal	Yes	3 months
Occipital	Yes	12 months
Crush	No	4 months
Frontal	No	3 months
Occipital	No	1 month

I saw 2 personally; in both, local nasal causes of anosmia, such as an associated injury of the nose, were excluded.

CASE 1.—A man of 23 received a crush injury of the skull, being unconscious for 2 days with blood in the cerebrospinal fluid and multiple cranial nerve palsies. He had a coronal fracture involving both parietal bones, and 10 days after injury showed a severe right-sided hyposmia, with a parosmia in the left nostril, where coffee smelled like fish-paste, and camphor like floor-polish; 20 days after injury all test smells were recognised. He made a partial recovery from his other cranial nerve injuries, but before returning to duty in the RAF he had a series of operations for diplopia, with satisfactory result.

CASE 2.—An airman of 19 fell about 30 feet down a barrack well. He sustained a fracture involving the frontal sinuses, and X-ray examination some days later showed the ventricular system to be filled with air. This spontaneous aerocele persisted until the rent in the dura behind the fractured frontal sinus was repaired by operation. As soon after the accident as it was possible to test him he showed anosmia on the right side and severe hyposmia on the left. Two months later he still had a right anosmia, but the left-sided hyposmia was replaced by parosmia: the test substances smelled foully, like faeces; there was no spontaneous parosmia. Three months after injury, for the first time, he could recognise all test smells in the left nostril; smell in the right nostril was still impaired.

Of the remaining 4, one was reputed to have had an immediate complete loss of taste and smell which had recovered in twelve months, with parosmia in the recovery phase. One was a crush injury with at first complete anosmia which was so much improved in four months that fine smells could be distinguished; during recovery there was no stage of parosmia. The third man, who had probably suffered frontal violence, had a complete anosmia four weeks after injury, and recovery was complete in three months, again with no interval of parosmia. The last case was completely anosmic on the right side after an occipital injury, and began to recover after a fortnight, with complete recovery in a month.

## PAROSMIA

Perversion of smell perception was found in 12 cases: in 2, unpleasant smells arose spontaneously; in the remainder, the parosmia was associated with olfactory

stimulation. The type of smell was nearly always unpleasant: "foul, like faeces," "like bad fish," "everything smells filthy," "everything has a bad smell—like bad hay or straw," "a continual smell of burning." The onset of post-traumatic parosmia was usually delayed, at periods varying from seven days to three months after the injury. The following is a typical story.

CASE 3.—A man of 29 sustained a severe head injury, with a post-traumatic amnesia of four days. X rays showed two fissured fractures in the left squamous temporal region, and there was clinically a left 7th nerve paresis, slight left-sided deafness, and tinnitus. There was right hyposmia and left anosmia. Six weeks after injury food tasted acid and "everything smelled like manure." Seven months after injury smell was recovering and there was no parosmia.

Of the 6 cases of recovery 3 went through a period of parosmia, and the question arises whether it is part of the recovery cycle. Paskind (1935) reported the case of a woman who had a continuous parosmia during her illness, and at autopsy two small secondary carcinomatous nodules were discovered in the olfactory bulbs. He tentatively proposed that parosmia might be found in cases going on to anosmia. Might not the reverse change occur? It is tempting to assume, too, that parosmia follows damage to the uncus region, because of the olfactory hallucinations associated with tumours of this region; but it has been amply shown that it can result from a lesion interfering with any part of the olfactory pathway (Rollett 1899, Seydell 1932). Rollett applied alcohol to his nasal mucosa and suffered from parosmia. The sites of violence, too, show a wide scatter: 5 were frontal, 4 lateral, 1 occipital and 2 doubtful, and it is difficult to predicate that all 12 sustained uncal damage.

## TASTE

The connexion between taste and smell had long been known before Ogle commented on loss of taste and smell after occipital violence. That a large part of taste is subserved by the olfactory nerves has been a commonplace of physiology. In this series there were 2 cases in which loss of taste and smell and their subsequent recovery went hand in hand.

In case 1, 13 days after his injury the patient complained that his food had no taste. When tested, he said that on the right side salt was "perhaps cane sugar," quinine was "bitter, although not very bitter," sugar was "salt." On the left side sugar was salt and quinine was salt; 20 days after injury there was no taste defect. There was no parageusia.

This case is exceptional; in most cases there was no disturbance of taste: among 41 patients with complete anosmia all but 6 noticed no change in taste; and in the whole group of 72 there were only 14 who complained of disturbance of taste. In 9 of these, primary tastes were preserved, while appreciation of flavours was lacking. In 2 taste was perverted; 6 of the 14 patients with disturbed taste had parosmia.

This group of cases shows that the connexion between taste and smell is not so close as has been popularly supposed. In the main, the group confirms the conclusions of Crosland and his colleagues (1926) that patients suffering from anosmia are not inferior to controls in naming foods placed in their mouths.

The inconstant association of loss of taste and of smell in most cases cannot be fully explained on the clinical findings. It is possible that taste is subserved by olfactory stimuli more in some people than in others. In some cases, in addition to tearing of the olfactory filaments, there might also be damage to the temporo-sphenoidal lobe or to the region of the anterior perforated crater which is probably "especially concerned with the feeding reflexes of the snout and muzzle, including smell, touch, taste, and muscular sensibility" (C. J. Herrick). In other cases there is a possibility that taste fibres might be concomitantly involved in their course through the petrous bones. Of the 14 cases with disturbance of taste, 7 showed a direct fissured fracture running down from the parietal temporo-occipital region towards the base; and others had signs of possible petrous damage in the form of facial weakness, true vertigo, or varying degrees of deafness on one side or the other.

## SUMMARY

Seventy-two cases of impaired sense of smell were encountered in 1000 consecutive cases of head injury. In 41 cases loss of smell was complete; in 31 it was partial.

This impairment may follow violence to any part of the head. Frontal, by direct involvement of the cribriform plate or tearing of olfactory filaments (30 cases), and occipital injuries (18 cases) are the most common.

The post-traumatic amnesia and periods of hospitalisation are long, and the large incidence of organic neurological signs indicates that in most cases a head injury which produces defects of smell is severe.

Recovery is seen in the minority (6 of the 72) and is usually within the first six months after injury.

Parosmia, which affected 12 cases, is usually delayed in onset and may be a stage of recovery; it can occur with damage to any part of the olfactory pathway.

Taste was affected in only 6 cases of 41 with complete anosmia. Taste and smell are probably not so closely related as is at present maintained.

I wish to thank Lieut.-Colonel G. O. Chambers, MC, and the officers of the hospital for providing the data in this paper; and Brigadier Hugh Cairns for his criticisms and encouragement.

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MOTILITY OF THE FASTING STOMACH  
IN HEALTH AND DISEASE

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UNTIL the latter part of the nineteenth century physiologists tacitly assumed that the stomach was quiescent except when active digestion was proceeding. Morat, however, in 1882, showed that contractions occurred in the stomach of the fasting unanaesthetised dog, and later made the same observation in man. Boldireff (1904) noted, in dogs with gastric fistulae, regular rhythmic contractions of the empty stomach and bowel, periods of activity alternating with periods of rest. In 1916, Carlson gave a detailed account of his investigations on the fasting gastric contractions in animals and man, and since then these movements have been investigated by various workers (e.g., Weitz and Vollers 1925, Danielopolu 1930, Barron et al. 1936, Brauch 1937). The aim of the present investigation was to study in man the contractions of the fasting stomach in health and any abnormalities produced by disease.

## TECHNIQUE

The many methods described for recording movements of the empty stomach in man all depend on the changes of pressure in a balloon passed into the stomach. In the present study a modification of Carlson's method was employed (fig. 1).

To the end of a Ryle's duodenal tube (A) a rubber condom of 200 c.cm. capacity was tied with a fine silk thread so that the weighted end of the tube acted as a guide when it was being passed into the stomach. The other end of the tube was connected to a water manometer (B and C) containing a vulcanite float (L) carrying a recording point (E).

The tube with the deflated balloon was swallowed until the mark 60 was between the patient's teeth. Air was then introduced by the side tube (J) until the level of the water had moved down 5 c.cm. in the burette (N). After the balloon had been thus inflated, 15 min. was allowed to elapse so that the patient could become accustomed to the experimental conditions. In this interval X-ray screening was carried out so that the position of the balloon could be accurately deter-

mined, and if necessary the tube could be manipulated. When in a satisfactory position, the tube was fixed by adhesive tape to the patient's cheek.

The tube with the deflated balloon was passed without difficulty after a little practice. The best lubricant was found to be sterile water. Special care was required to ensure equal puckering of the balloon where it was attached to the tube since with a faulty connexion it tended to become folded on itself inside the stomach. No discomfort was experienced by the patient throughout the investigation, which was carried out after a fasting period of at least 5 hours. The recording was always done with the patient sitting upright in a hard chair since a more comfortable seat often induced sleep.

Objections have been raised to the balloon method of recording gastric movement. Moritz (1895) indeed suggested that the balloon inside the stomach merely elicited contractions associated with the presence of a foreign body. Alvarez (1940) believes that the least distension of the balloon increases the amplitude of the little movements which are constantly taking place. Danielopolu (1930) says that any increase in the tension of the balloon is commonly followed by the onset of tetanic contractions. Several observers, however, have demonstrated movements in the fasting stomach when no balloon is present. Templeton and Johnson (1929) succeeded in doing this by recording the changes in pressure in a gas bubble in the stomach, while McSwiney and Spurrell (1933) demonstrated waves of gastric contraction by outlining the wall of the stomach with silver sutures. Gianturco (1934) inserted small shot under the gastric serosa covering the greater and lesser curvatures and by X-ray cinematography demonstrated slight rhythmic movements of the stomach.

My own observations indicate that when the balloon is in position and inflated to its usual size, no movement of the stomach beyond the flat waves of relative quiescence may be seen for periods of 2 hours at a time. It is fair to assume that if the balloon acted as an irritant these long periods of rest would not occur. Occasionally the passage of the tube into the stomach was immediately followed by a very short phase of contraction followed by a long period of rest. This suggests that after the initial disturbance due to inserting the balloon, mechanical stimulation becomes insignificant. The air-pressure in the condom was often increased without producing any change except a rise in the level of the whole tracing. From these observations it seems reasonable to conclude that the balloon itself does not initiate contractions apart from those produced during the actual insertion into the stomach. On the other hand, normal contractions may be magnified by the presence of the balloon. Neidhardt (1935) declares that the activity of the empty stomach is not significantly affected by the condom, and it is feasible that changes in intragastric pressure are much greater than are demonstrated by an X-ray method.

## GASTRIC MOTILITY IN HEALTH

Using the method described I investigated 23 subjects repeatedly. Each had been thoroughly examined clinically and radiologically and in none was there evidence of any abnormality in the gastro-intestinal tract. Care was taken that no subject was suffering from even the slightest febrile disturbance, since, as Carlson showed, this interferes temporarily with gastric motility. In the present investigation, a patient with slight coryza was observed for 2 hours and showed not a single gastric contraction, although on previous occasions normal contractions were present.

Cannon and Washburn (1912) described in the fasting human stomach periods of activity which lasted for 20-30 min. and alternated with phases of relative quiescence. During the period of activity individual contractions lasting 30 sec. were seen at intervals of  $\frac{1}{2}$ -1 min. Weitz and Vollers (1925), Danielopolu (1930), Barron, Curtis and Haverfield (1936) and Brauch (1937) have also described these movements; the fullest account, however, is that given by Carlson (1916) who described periods of powerful rhythmical contractions alternating with phases of relative quiescence and in addition tonus rhythm consisting of waves of small amplitude lasting about 20 sec.

An examination of my records reveals three phases: active contractions; tonus rhythm; and relative quiescence (fig. 2). The active contractions are repre-

sented in the tracing by sharp-topped waves with a duration of 30-40 sec. These waves, usually regular in rhythm and of approximately equal amplitude, occur at intervals of from 10 sec. to 5 min. The rate at which the contractions appear is variable but is as a rule in the region of 14 in 20 min. The number of contractions in one phase is very variable but in most instances at least 20 were observed. These phases, which varied in duration from ½ to 1 hour, usually ceased abruptly and were followed by a period of relative quiescence, but occasionally the stomach passed into tonus rhythm. This was characterised by a series of flat-topped waves, each of which lasted about 90 sec. and was immediately followed by its successor. This phase occasionally persisted for as long as 2 hours, and was followed either by quiescence or by active contractions. In the latter case the tonus waves began to follow one another more rapidly, becoming shorter in duration and greater in amplitude until they gradually merged into active contractions.

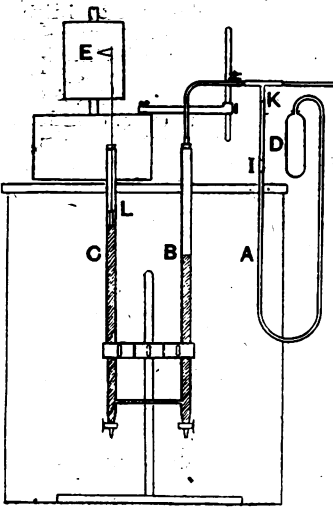


Fig. 1.—Recording apparatus. A Ryle's duodenal tube; B and C water manometer; D rubber condom; E pointer recording on drum; I glass connecting piece; J metal clip; K glass T-piece; L vulcanite float.

In Carlson's work each tonus wave lasted about 20 sec.; the longer duration in the present work is probably due to the fact that the larger balloon which I used filled the stomach more accurately. The phase of relative quiescence is the nearest approach to complete rest which was found in the healthy fasting stomach. It is characterised by flat-topped low amplitude waves of about 2½ min. duration. These waves, which have not been previously described, represent slight but frequent changes in the tone of gastric muscle. Carlson (1916) and Danielopolu (1930) described in the normal stomach a tetanic phase in which the active contractions occur more and more often until a lengthy state of high intragastric pressure develops. I have not observed this in the fasting stomach of the healthy subject.

OCULO-GASTRIC AND CAROTICO-GASTRIC REFLEXES

These reflexes were described in detail by Danielopolu (1930). Moderate compression of the eyeball, insufficient to slow the pulse, produces a short period of inhibition succeeded by a phase of excitation of gastric motility. Compression of the right carotid bulb just below the angle of the jaw leads to a slowing of the gastric contractions, followed, when the pressure is removed, by a state of hypermotility which eventually ends in a phase of relative quiescence. These reflexes were demonstrated in 6 subjects; but if the stomach was quiescent the phase of excitability could not be elicited. No data are available from the present work to throw any light on the physiological mechanisms, and they are mentioned to show how extrinsic stimulation may alter the gastric movements.

SECRETORY ACTIVITY, GASTRIC FASTING CONTRACTIONS

Onodera and his colleagues (1931) stated that no relationship existed between gastric acidity and the motor activity of the stomach. In the present series 23 cases were investigated; a fractional test-meal was performed

and later the gastric motility was studied by the balloon method.

The degree of acidity was assessed on the basis of the greatest concentration of free hydrochloric acid attained during the fractional test-meal and expressed in terms of decinormal acid. The emptying time was judged as the period during which starch remained in the stomach, using the starch-iodide test. The strength of the contractions was measured by the amplitude of the wave (mm.) and the breadth of its base (sec.), and the time between individual contractions was noted (see table).

Despite the variation in the acid content of the stomach from well-marked hyperchlorhydria to complete achlorhydria, the duration of the individual contraction wave is almost constant—a total variation of 10 sec. being noted in the whole range. The degree of the gastric acidity and the amplitude of contractions also

RELATIONSHIP BETWEEN GASTRIC ACIDITY AND MOTILITY

(A) Free HCl (c.cm. of N/10 HCl)  
 (B) Emptying time (hr) (C) Amplitude of contractions (mm.)  
 (D) Duration of contractions (sec.)  
 (E) Interval between contractions (sec.)

Case	(A)	(B)	(C)	(D)	(E)	Case	(A)	(B)	(C)	(D)	(E)
1	100	1	40	30	30-90	13	45	1½	15	30	45
2	90	2½	24	33	90	14	45	1½	20	30	60-90
3	85	1½	24	30	30	15	40	1½	20	30	90-270
4	82	1½	20	33	180	16	40	2½	15	30	90
5	72	2	20	30	30-90	17	30	1½	15	30	30
6	70	2½	10	30	120-480	18	30	1½	16	30	30
7	70	1½	12	30	30	19	30	1½	25	35	45-60
8	55	1½	30	35	30-90	20	30	1	25	30	30-45
9	52	1½	30	35	60	21	30	1	15	30	15-30
10	50	2	16	35	90	22	Ac.	1½	20	30	90
11	50	1½	25	40	30	23	Ac.	1½	20	30	30
12	45	1½	30	35	30						

Ac. = achlorhydria.

do not appear to be associated. The hyperchlorhydria in case 1 was accompanied by very large contractions, but they were only slightly larger than those in case 9, with about half the degree of acidity. Even with achlorhydria (case 23) well-marked gastric contractions were found. The interval between individual contractions varied from 15 sec. to a maximum rest period of about 8 min., but this interval did not appear to be related to the degree of acidity.

PATHOLOGICAL CONDITIONS

A priori it would seem that gastric motility should play an important part in the pathogenesis and symptomatology of lesions of the stomach and duodenum, but no decided changes from normal have hitherto been described. Danielopolu (1930), although he stated that it was difficult to determine the limits of normality, described as typical of gastric atony a wave of small amplitude and contractions which never proceeded to a tetanic phase. In 6 cases of pyloric stenosis he reported increased amplitude of contractions with decided irregularity and fusing of the waves. He also noted in this condition an arrhythmia, the waves varying in amplitude and duration. These phenomena, he added, were not pathognomonic of pyloric stenosis.

In the

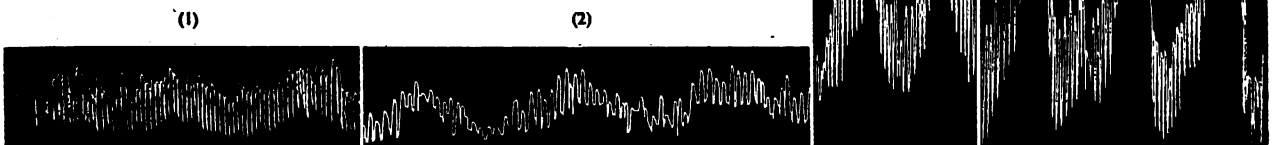


Fig. 2.—(1) Phase of relative quiescence; (2) phase of tonus rhythm; (3) high tonus rhythm changing into next phase; (4) phase of active gastric contractions.

present investigation, an attempt has been made to determine whether any alteration in gastric motility can be distinguished as characteristic of pathological states of the stomach and duodenum. Among the patients studied were 2 with gastro-enterostomy, 12 with peptic ulceration and 2 with gastric carcinoma.

**Gastro-enterostomy.**—The 2 patients, men aged 43 and 37, had had gastro-enterostomy performed 10 and 15 years before the present investigation. In neither case was any abnormality detected in the gastrogram, which supported the view of Cannon that there was no reason for thinking the food was not thoroughly churned in the pyloric end of the stomach in the normal manner.

**Peptic ulceration.**—I examined 12 patients with various types of peptic ulcer. In all cases diagnosis was confirmed by X-ray examination which showed 10 ulcers to be situated in the duodenum and 2 in the prepyloric region of the stomach. An analysis of the records show that in patients with acute duodenal ulcer the gastric tone is increased and the contractions are stronger and more frequent than in the healthy stomach, tend to fuse and often end in a phase of tetanus. This is in accord with the findings of Onodera and his colleagues (1931). Brauch (1937) from his study of 64 patients came to the conclusion that the important findings were irregular peristalsis and a tendency to hyperperistalsis. Of the 10 patients with duodenal ulcer powerful contractions and arrhythmia gastrica were noted in 6. In the patient with acute gastric ulcer the gastric contractions were weak but tended to run into one another. The periods of gastric contraction, though less frequent than in health, lasted longer with longer intervals between the individual contractions. These findings resemble those described by Onodera (1931) for patients with peptic ulceration associated with a slight degree of pyloric stenosis. In the patient with the chronic gastric ulcer the contractions were powerful and regular in rhythm.

In 2 of the patients with duodenal ulcer and in 1 with gastric ulcer pain was felt on several occasions when the records were being made. In the patients with duodenal ulcer the complaint of a spasm of pain coincided with the appearance of a contraction on the tracing. These contractions were stronger than usual and on one occasion when the pain was very severe a phase of tetanic spasm was noted.

These results support Hurst's view of the pathogenesis of pain in duodenal ulcer patients. He holds that the important factor is an increase of muscle tension due to spasm of the pyloric sphincter accompanied by deep peristaltic waves. The pain in gastric ulcer he attributes to an increase of pressure in the proximal portion of the stomach, the obstruction at the site of the ulcer being due to a spasmodic hour-glass constriction. In the present investigation, however, the patient's gastric ulcer was situated in the prepyloric region, and he had long-lasting gnawing pain, not associated with gastric contractions, which indeed were often noticed without any accompanying feeling of pain or discomfort.

**Gastric carcinoma.**—The findings in 2 patients with carcinoma of the stomach resembled those described by Onodera (1931). The gastric contractions were much less frequent and weaker than normal.

#### WATER REVERSAL PHENOMENON

Carlson (1916) showed that cold water, added directly to the stomach by stomach-tube, caused an inhibition of hunger contractions for 3–5 min. In the present investigation, it was found that draughts of cold water (4 oz.) led to cessation of the gastric contractions in healthy subjects for at least 10 minutes. This experiment was done repeatedly on 6 patients with normal stomachs, and the duration of inhibition of gastric motility varied from 10 to 35 min. In addition, 8 patients with peptic ulceration were given 4 oz. of cold water. The normal inhibition of 10–35 minutes duration was not produced in these cases; instead one of four phenomena was seen:

1. Immediately after the patient swallowed the water there was an intense increase in gastric tone, accompanied by the onset of tetanic contraction (1 case).
2. The gastric contractions continued uninterrupted (5 cases).
3. The contractions gave place to tonus rhythm (1 case).

4. A very short period of inhibition (2 min.) was seen in only 1 case in this series of observations on 8 patients, and was followed by powerful contractions.

This change in the behaviour of the stomach after a draught of water may be an indication of increased sensitivity of the neuromuscular mechanism to intra-gastric or intraduodenal stimuli when an ulcer is present. Even gentle stimulation of the ulcerated area is sufficient to cause reflexly either increased contractions of the stomach or the onset of tonus changes instead of the normal period of inhibition. Carlson (1917) indeed postulated an increased sensitivity of the nerve-endings in ulcer patients, and Hardt (1918), and later Palmer and Heinz (1934), also considered that irritability of the nerves due to inflammation played an essential part in the production of pain in peptic ulceration. In the 2 patients in whom pain was associated with gastric contractions pain was produced by the swallowing of water, a finding which demonstrates the heightened sensibility of the ulcerated area to intragastric or intraduodenal stimuli. The relation of gastric contraction to the onset of pain is difficult to explain, but it is possible, as Ivy and others (1925) suggested, that duodenal contraction occurs synchronously with gastric contraction.

#### SUMMARY

Gastric motility was recorded by a balloon method in 23 healthy subjects, 12 patients with peptic ulcer, 2 with gastric carcinoma and 2 with gastro-enterostomy.

The findings in health indicate that there are three phases: active contractions; tonus rhythm; relative quiescence. No relationship between the acid-secreting power and the motility of the fasting stomach was demonstrated.

In 10 patients with acute duodenal ulcer gastric tone was increased and contractions were stronger than in the healthy stomach and liable to end in tetanus. In a patient with acute gastric ulcer contractions were weak and tended to run into one another; in a patient with chronic gastric ulcer the contractions were powerful and regular. In 2 patients with gastric carcinoma contractions were less frequent and weaker than normal.

In 8 patients with peptic ulceration the ingestion of cold water, which inhibited gastric contractions in health, had no inhibitory action and in some cases actually had an excitatory effect.

I wish to thank Prof. Noah Morris for his help, Dr. William Martin, medical superintendent of Stobhill Hospital, for permission to conduct the investigation, and the Medical Research Council for a grant.

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**MEDALS FOR GLASGOW NURSES.**—To commemorate the work of Sir William Macewen and Mrs. Strong in raising nursing to the status of a profession, and to mark the jubilee of the opening of the Glasgow Royal Infirmary school for nurses two medals—a Macewen to be awarded to the best practical surgical nurse, and a Mrs. Strong to be awarded to the best practical medical nurse—have been presented to the infirmary by one of the managers.

## CARCINOMA OF TESTIS PRESENTING AS AN ACUTE ABDOMEN

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A MAN, aged 26, was admitted to hospital on April 14, 1942, with a tentative diagnosis of perforated peptic ulcer.

He had had severe abdominal pain in the umbilical region for 18 hours; it had remained localised. Temperature 97° F., pulse-rate 94, respirations 38. There was generalised rigidity and tenderness over the upper half of the abdomen; the main sign however was dyspnoea, and he showed a preference for sitting up rather than lying flat. His breasts were enlarged and showed signs of chronic mastitis. He had a few crepitations at the base of his right lung. Heart normal. Next morning an X ray of chest showed multiple rounded opacities throughout both lung fields. He had been at work up to the time of onset of abdominal pain. His breasts had started to enlarge five months before and had become tender and rather red about two months before. Recently he had developed "lumbago," and had also had pain in the right shoulder and right side of the chest on one occasion. He had noticed his upper abdomen becoming large for a fortnight, and had had to let his belt out. The morning after admission the upper abdomen was still somewhat rigid but the liver was palpable and tender in the upper epigastrium and right hypochondrium. He had a hard, heavy, painless swelling of the right testicle with an overlying hydrocele. The left pupil was larger than the right. The blood-count was within normal limits. Sedimentation-rate, 27 mm. in 1 hour; blood-urea 28 mg. per 100 c.cm.; Wassermann and Kahn reactions negative. Urine normal; X ray of renal tract after injection of iodoxylin normal. X ray of pelvis and lumbar vertebrae normal. Aschheim-Zondek test positive.

He lost weight and became cachectic. There were pyrexial periods up to 100° F., and the dyspnoea remained. The liver rapidly enlarged until at death its lower edge was 2 in. above the symphysis pubis; there was a corresponding enlargement upwards. A hard gland appeared under the lower part of the left sternomastoid. He developed an intractable cough relieved by an opium preparation. He went steadily downhill and died on May 5, 21 days after admission.

**Autopsy.**—There were small blood-stained effusions in both pleural cavities. A much enlarged hæmorrhagic necrotic gland was found among the left supraclavicular group. Both breasts were slightly enlarged.

The lungs contained large numbers of secondary malignant deposits of all sizes, mostly hæmorrhagic and necrotic. The hilar and mediastinal glands contained similar deposits and were grossly enlarged. Heart, large vessels, trachea and œsophagus normal. In the abdomen there was a small blood-stained peritoneal effusion, and peritoneal metastases growing through from underlying malignant glands were seen on the right brim of the pelvis.

The liver weighed at least 10 lb., and was adherent to the diaphragm, abdominal wall and surrounding structures. It was a mass of large multiple necrotic and hæmorrhagic metastases, one of which had bled into the mesocolon. Spleen, kidneys and adrenals normal. The lumbar, iliac, and deep and superficial inguinal glands on both sides were grossly enlarged. The right testis felt firm but was not grossly enlarged. A small hydrocele was present containing clear yellow fluid. The body of the testis was entirely replaced by a hæmorrhagic growth limited by the tunica vaginalis except in one small area. Extension of the growth was evident along the cord to the seminal vesicles; a small papillomatous mass was present in the bladder just to the right of the internal urinary meatus.

The malignancy of the tumour was clear, microscopically, and there were many mitoses. The appearance was not typical of chorion carcinoma, since the syncytial layer was almost absent. The growth consisted of cubical or polyhedral cells of poor differentiation with large hyperchromatic or vesicular nuclei, giving at first sight the impression of an atypical seminoma. In the pulmonary metastases the discohesiveness of growth was more pronounced, and the

syncytial layer was definitely present, though never greatly developed. The case was one of chorion carcinoma of the testis with extensive metastases.

### DISCUSSION

Malignant disease of the testis is an unusual cause of an acute abdominal condition, and chorion carcinoma is itself rare. The case shows how rapidly this growth can metastasise despite the fact that the primary may remain the same size throughout the illness. The patient himself had never realised that his testicle was enlarged, and in spite of multiple secondary deposits in the lungs and elsewhere was able to continue normal life up to the time of his admission to hospital.

The acute onset of the symptoms was due to a hæmorrhage from one of the superficial metastases in the liver into the mesocolon, which irritated the peritoneum. The enlarged left pupil was due to irritation of the left cervical sympathetic within the thorax by an enlarged mediastinal gland, although the classical picture of Horner's syndrome did not develop. The iodoxylin examination was done to see whether the ureters were dilated. The ureters may be dilated during pregnancy—a condition observed as early as the sixth week, when obstruction can be eliminated. It has been suggested that such dilatation may be hormonal in origin; if so, the ureters might be dilated in growths causing large amounts of female sex hormones to circulate in the body, as shown by a positive Aschheim-Zondek test. X rays showed no dilatation, and at autopsy the ureters were normal.

We have to thank Dr. J. Ross Garson for allowing us to publish this case, and Dr. H. W. C. Vines for performing the autopsy and permitting us to use his notes.

## DEFICIENCY ANÆMIAS OF MALNUTRITION

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THE deficiency anæmias of malnutrition have received little attention in Great Britain, Europe and America because in times of peace such cases are uncommon. The common malnutrition anæmia of temperate regions is that of iron deficiency, but that of the tropics is nutritional macrocytic anæmia; iron-deficiency has not been separately studied, except in India, and it is often part of the picture of hookworm infestation. Recent papers have suggested that one of the commonest anæmias of the tropics is a mixture of both these elements. The iron-deficiency problem is familiar to hæmatologists in Europe but the element of nutritional macrocytic anæmia is less clearly understood. The war is leading to a reduction of substances rich in extrinsic factor, and cases of nutritional macrocytic anæmia (with perhaps varying degrees of iron deficiency) will probably be seen in Great Britain, and certainly on the continent. In Greece even before the war cases were common. No review has been written on this anæmia and standard works on hæmatology contain but brief and often inaccurate accounts of the disease, written by those who have seldom seen a case.

Opinions set forth here reflect the trend of medical opinion in the tropics. These ideas have been tested in the treatment of over 500 inpatient cases of severe anæmia, chiefly Africans together with a few Indians and Europeans, at Mulago Hospital, Kampala, Uganda.

### NUTRITIONAL MACROCYTIC ANÆMIA

Deficiency of extrinsic factor in the diet produces a macrocytic (high mean cell volume) orthochromic (normal mean cell hæmoglobin concentration) anæmia. In many parts of the world the deficiency becomes manifest in pregnancy (pernicious anæmia of pregnancy and tropical macrocytic anæmia), but cases may be seen in both sexes, at all ages, in all climates and among all races.

Mitra (1931) has summarised the early history of nutritional macrocytic anæmia, and Abramson (1938) has given the history of the pernicious anæmia of pregnancy. Earlier work by Alder (1924) and Schneider (1927) in Europe favoured a toxic or hæmolytic cause of the anæmia, views held also by Mitra (1931) but discarded in favour of a deficiency anæmia

since Lucy Wills (1931) showed that the addition of 'Marmite' to the diet cured the anæmia. Pernicious anæmia of pregnancy has been reported from almost all European and American countries; representative papers are those by Esch (1921, 1926, 1927) in Germany, Ungley (1938) in Great Britain, Larrabee (1925) and Smith (1925) in America. The numbers were small, however, and Bardy (1924) could find records of only 68 cases in Europe and America. Cases of macrocytic anæmia in pregnancy have been most commonly reported in the tropics, especially from India where McSwiney (1927) found it in 1.7% of all pregnancies and Mitra (1931) in 4.6%. Cases have been reported from Greece by Hamilton Fairley and his colleagues (1938), and a few cases in many parts of Africa. Napier (1940) has recently reviewed the position in India.

Ungley (1938) has reported 2 cases of nutritional macrocytic anæmia (complicated by iron deficiency) in non-pregnant women, Groen and Snapper (1937) 2 cases, and Benhamou and Noney (1938) 1 case in a woman. On the whole very few cases have been reported even in the tropics. Nutritional macrocytic anæmia in the male has been reported in 9 men by Napier and his colleagues (1938), in an unspecified number by Foy and Kondi (1939), in 1 man by Fairley (1940), in 13 by Trowell (1940), and in 24 by Taylor and Manchanda (1940). Cases in infancy have been reported by Anderson and Roberts (1940). In fact if nutritional macrocytic anæmia is due to a deficiency of extrinsic factor in the diet there is no reason why the disease should be almost restricted to pregnant Indian women, an impression widely held.

#### ÆTIOLOGY

Marmite alone can cure nutritional macrocytic anæmia, whereas few cases of true pernicious anæmia can be completely cured only by marmite. In terms of Castle's hypothesis the dietary deficiency in nutritional macrocytic anæmia is of extrinsic factor. This is the best hypothesis at present, but it lacks clear proof. No case has been reported in which cure was effected by giving a balanced diet (for the taking of large amounts of liver and marmite is not normal); nor has the presence of intrinsic factor been demonstrated in the gastric juice of any particular case, though hydrochloric acid is almost always present. Little is known about the composition of extrinsic factor except that it is present in beef muscle and probably all forms of animal protein, as well as being closely related to the vitamin-B complex in yeast and marmite; some consider that green vegetables, notably spinach, are rich in extrinsic factor but this lacks confirmation; milk and dairy products and all carbohydrates and fats are thought to contain little extrinsic factor, and the disease is probably more common in vegetarians. No known element in the vitamin-B complex has been found to be identical with extrinsic factor.

According to Castle's theory, whether the diet is deficient in extrinsic factor, as in nutritional anæmia, or the alimentary tract is unable to secrete intrinsic factor, as in pernicious anæmia, the final deficiency of the liver substance is identical. This has been vigorously denied by Wills (1937a and b, 1938) who considers that the deficiencies in the two anæmias are not identical. This she bases on three main distinctions: first, that nutritional macrocytic anæmia does not show signs of hæmolytic (but it is generally conceded now that many cases show such signs); secondly, that subacute combined degeneration has never been found in nutritional anæmia (and this is upheld on all sides); and thirdly, that this anæmia does not respond to doses of refined liver fractions that are efficacious in pernicious anæmia. Her experiments (1937a and b and 1938) on the nutritional macrocytic anæmia of rhesus monkeys gave further support though results in this disease cannot be taken as proof of points which arise in the disease in man.

Pregnancy is the only other clear factor in its ætiology, and in the better-fed parts of the world the anæmia is seldom seen apart from pregnancy. It seems that the extra demands of the fœtus, with perhaps some dietetic restrictions dictated by the appetite or prejudices of the mother, are important factors. Many report that much larger doses of liver extracts are needed during the treatment of this anæmia in pregnancy.

#### PATHOLOGY

Balfour (1927) has recorded the pathological findings in 2 cases, and Hamilton Fairley and his colleagues (1938) in 2 cases. My experience in some 24 autopsies and some

8 spleens removed at operation is that apart from the changes which might be expected in any severe anæmia, the liver is enlarged, hæmosiderosis is found in the liver cells (especially at their periphery and especially in those cells which are near the portal tracts); much less pigment is present in the Kupffer's cells. An iron-free pigment is found in some cells. The spleen is enlarged, malpighian bodies are reduced, and reticular cells are active and numerous and may be finely stippled with hæmosiderin, large masses of which may be present in the siderotic nodules in the walls of some of the larger vessels. Hæmosiderosis is found in the usual sites, but is far less common or even absent in cases complicated by iron deficiency. Not much of my material has been adequately examined, however. The bone-marrow is hyperplastic and red marrow occupies the entire length of the limb bones; no sections have been cut and examined but smears taken before death indicate megaloblastic change. Myeloid metaplasia and erythropoiesis are present in the spleen (Gupta 1932).

#### SIGNS AND SYMPTOMS

Mild cases complain of nothing, and indeed it seems possible that most of the inhabitants of some parts of the tropics pass the whole of their lives in a condition of mild nutritional macrocytic anæmia, complicated in many cases by iron deficiency. In many surveys three-quarters of them fall distinctly below even the lowest normal level given for that of any group of normal Europeans. In addition a mild macrocytosis has been demonstrated (Vint 1939, Hennessey 1937). In this state millions of persons spend their lives; they get slight attacks of fever which are due to the hæmolytic, and they have a slight splenomegaly, which may be painful or painless and is incorrectly attributed, like the fever, to malaria. They hardly recognise that they are ill.

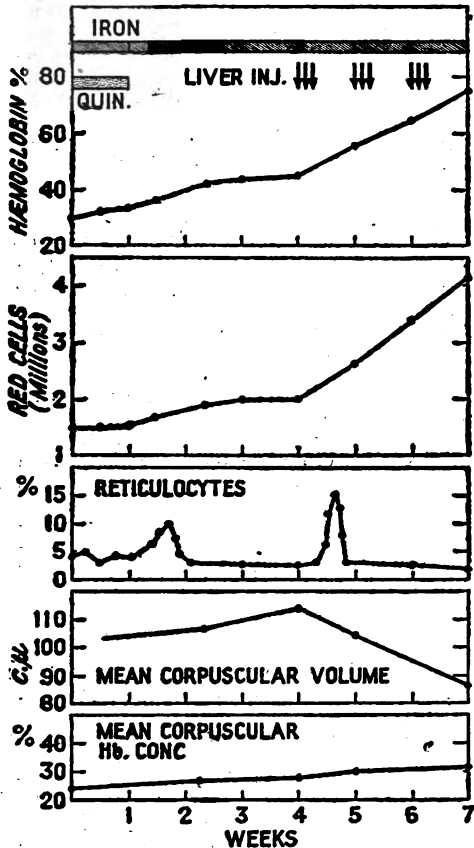
Breakdown and frank anæmic signs usually only follow some added strain such as pregnancy, malaria or hook-worms. In pregnancy signs usually appear in the third trimester, and in addition to the usual signs of anæmia attacks of diarrhoea are present in many cases; a small number complain of sore tongue and dysphagia and about a third show fever and splenomegaly. Fever may be ascribed incorrectly to urinary infection, or in the tropics to malaria. Oedema of the legs may be attributed to toxæmia, and a trace of albumin may be present in the urine, but the blood-pressure tends to be low and the pulse-pressure is increased; congestive heart-failure is often present and may be fatal; purpura may develop and uterine hæmorrhage is common.

The signs of the frank case are varying degrees of fever, usually low, but at times high and even causing rigors; it may last long enough to suggest typhoid. The nails and hair are normal unless iron-deficiency is also present; the tongue never shows loss of papillæ. Jaundice may be absent or slight. The van den Bergh test gives a weak or negative indirect reaction but a quantitative estimation indicates an increase of serum bilirubin in some cases. The spleen, not usually palpable in cases with a short history, is palpable in most chronic cases and often grossly enlarged, even projecting into the right iliac fossa; it may be painless or extremely painful. The liver is often slightly enlarged and tender. The urine contains urobilinogen. Paræsthesiæ are common; slight neurological changes in the tendon jerks and even extensor plantar responses may be seen in a few cases but paralysis and loss of any form of sensation have not been demonstrated. Neutropenia is often severe, but necrotic ulceration of the throat is seldom seen; respiratory infections are common and often fatal. In childbirth the maternal mortality was about 30%, stillbirths 30% and the infant mortality about 50% (Mitra 1931) in untreated cases before the employment of liver.

#### BLOOD FINDINGS

*Peripheral blood.*—In a severe case the red-cell count may often be below a million per c.mm. In most cases the colour-index is over unity and reduction below unity suggests an associated iron deficiency. The mean diameter of red cells is usually towards the upper limits of the normal range but not macrocytic. The MCV is always increased, Hamilton Fairley (1938) found it ranged from 113 to 163 c. $\mu$ ; the average mean cell thickness also tends to be above normal. The cells stain well and look spheroidal, resembling the spheroidal cells of

acholuric jaundice. Nucleated red cells are seen after a long search in almost all severely anæmic cases, most being late normoblasts, but some definitely megaloblasts of Ehrlich. A total leucopenia due largely to a neutropenia and a reduced platelet count, with a tendency to bleed easily, are features of most cases; the senile pernicious anæmia neutrophil leucocyte is seen also in this anæmia. Cases in which iron deficiency is severe but nutritional macrocytic anæmia deficiency is slight will have a low colour-index, and though iron alone will produce much improvement, and may slowly restore the hæmoglobin to a normal level, liver will give a second reticulocyte response and an increased rate of red-cell



Dimorphic anæmia: response to Iron and liver. Conc = Concentration

production. Cases where the reverse applies—that is, where macrocytic nutritional anæmia deficiency is severe and iron deficiency slight—may similarly have the minor deficiency overlooked. Two pointer guides, used by hæmatologists, will not detect this anæmia: the colour-index takes up an equivocal position of about unity in most cases, but may vary from high to low figures (1.2-0.4) according to the relative preponderance of the two deficiencies; and the mean cell diameter, which is usually about normal, may vary widely for the same reason. The CI and the MD are used as pointers by hæmatologists because they separate easily the two well-known deficiency anæmias; but they fail when macrocytosis mixes with microcytosis and hyperchromia with hypochromia.

**Bone-marrow.**—Turnbull's nomenclature and definitions have been adopted (Vaughan 1936). The bone-marrow is hyperplastic, red marrow being present in all the long bones. Sternal-puncture films reveal a cellular marrow, hæmocyto blasts are plentiful and large islands of erythropoiesis and many mitotic figures are seen. All stages of megaloblastic development are present, but the fully matured eosinophil megaloblast is uncommon; Hamilton Fairley (1938) found similar changes. White-cell development also shows the pathological giant metamyelocytes, stab forms and senile neutrophils found in pernicious anæmia. Hamilton Fairley (1938) has described changes in the megakaryocytes.

The serum bilirubin is raised in many cases and the van den Bergh reaction is indirect. Free hydrochloric acid is almost always present in the test-meal, and can usually be produced by histamine.

**DIFFERENTIAL DIAGNOSIS**

Nutritional macrocytic anæmia may be missed if the CI is about or below unity, and if the MD is normal. In these cases only an estimation of the MCV will prove the presence of the macrocytic anæmia, though a well spread

blood-smear reveals circular and oval cells with a solid thickened appearance and increased anisocytosis. If the CI is high nutritional anæmia has to be distinguished chiefly from pernicious anæmia; free hydrochloric acid in the test-meal is then of cardinal importance, and the age and association with pregnancy may be suggestive. Those gastro-intestinal and liver diseases occasionally associated with a macrocytic anæmia must be excluded by the usual clinical, radiological and biochemical tests; most of them are incapable of much improvement.

Like pernicious anæmia, nutritional anæmia has been confused with hæmolytic anæmias. The so-called acquired acholuric jaundice (Israëls and Wilkinson 1933, Ordway et al. 1937) has points of resemblance, and differentiation might be difficult. The refractory megaloblastic achrestic anæmia of Israëls and Wilkinson (1936, 1940) has many points of resemblance to the tropical cases, especially when it affects non-pregnant young women; but there is no evidence that their patients were undernourished, and Witts has insisted that the deficiencies in pernicious and nutritional anæmias are different.

**TREATMENT**

Mild cases of nutritional macrocytic anæmia—at any rate those not associated with pregnancy—should improve if the diet is altered to contain sufficient extrinsic factor. Meat is the only rich source of extrinsic factor; rice polishings and possibly green vegetables and fruits are said to contain fair amounts. Severe cases must be treated with some form of liver or a suitable preparation of yeast.

I have found liver extract for intramuscular injection (BDH) 5-10 c.c.m. weekly (Trowell 1941), or 'Campolon' (Bayer) 8-15 c.c.m. weekly, uniformly successful in non-pregnant cases. Cases showing severe signs of hæmolysis and pregnant women demand a larger dosage, such as 42-56 c.c.m. of campolon a week for a maximum reticulocytosis (Fairley et al. 1938); 'Neo-Hepatex' (Evans) is favourably reported on by Lucy Wills and her colleagues (1938); in my hands it has usually succeeded in a dosage of 28 c.c.m. weekly, but in 4 cases no response was obtained. The response of 8 cases to 'Hepatex T.' (Evans) was unsatisfactory except in a dosage of 16 c.c.m. daily. Dried liver extracts are usually not favoured; the equivalent of 600 g. (1 lb. 4 oz.) of liver is needed. Lucy Wills (1937a and b 1938) finds 'Anahæmin' (BDH) to be inactive in nutritional macrocytic anæmia of rhesus monkeys in a dosage of 14 c.c.m. weekly, whereas 4 c.c.m. weekly is adequate in pernicious anæmia. Foy and Kondi (1939) however reported that anahæmin was always successful in hæmolytic cases of the pregnancy anæmia if 14 c.c.m. was given a week, and Fairley (1940) also found it effective. I found anahæmin successful in a dosage of 12 c.c.m. weekly (6 cases); there was a moderate response to 6-8 c.c.m. weekly (2 cases) and no response to 4 c.c.m. weekly (4 cases). All were non-pregnant women or men. A variable response to small dosage of anahæmin was found by Napier and his colleagues (1938). Marmite is effective in this anæmia; 30-60 g. (1-2 oz.) daily is required, but since most patients find it difficult to take these large amounts it has been largely replaced by liver injections. In my opinion liver by the mouth, ¼ lb. daily, is the method of choice among the underfed patients of Africa since it is much cheaper than any liver injection, is almost always effective and supplies other deficiencies in the diet. Liver injections are the method of choice in European patients; they are more certain and more swift in their action.

**NOMENCLATURE**

Bomford and Rhoads (1941) have stated a case for a new grouping of the anæmias refractory to all treatment, not due to any deficiency, or associated with serious infections or debilitating diseases which might inhibit the cure of almost any anæmia. They favour the elimination of such terms as aplastic anæmia, achrestic anæmia and the like in favour of refractory anæmia, which is divided into different classes according to the appearance of the marrow sections. It is unfortunate that in their descriptions of the marrow sections so little mention is made of whether any megaloblastic change was found or was definitely excluded, and that the morphology of the cells seen in sternal-puncture smears receives little attention, for these differ in some respects from those seen in sections. As it is, though many cases are clearly not nutritional macrocytic anæmia, yet in a fair number of those with cellular marrow it was noticed that the

diet had been defective, that the anæmia was macrocytic, and that fever, splenomegaly, slight jaundice and reticulocytosis were sometimes all present. A few cases improved on large doses of baker's yeast; this suggests that some may have had a deficiency anæmia allied to or identical with nutritional macrocytic anæmia, in which yeast has proved curative.

I have suggested elsewhere that the term dimorphic anæmia should be applied to this variety of anæmia, for two deficiencies play a part in its aetiology, the blood smear shows dimorphism between the central and the peripheral parts of the smear, the sternal puncture reveals two deficiency types of erythropoiesis, and two factors are necessary in its treatment. The figure shows the response of a typical case of dimorphic anæmia, having no tropical disease, to iron and to liver. The case-history was as follows:

A male immigrant-labour African, aged 18, had had for 2 years attacks of fever, splenic pain and anæmic symptoms. Diet largely cassava and sweet potatoes, a few beans, little green vegetables, meat about once a month. Poor nutrition, weight 7 st. 3 lb. Temperature 100° F. on admission, irregular until liver was given. Spleen just below umbilicus, liver 2 finger-breadths below costal margin. Slight jaundice, indirect van den Bergh reaction positive to 2.5 mg. per 100 c.cm. Urine: trace of albumin, urobilinogen present. Test-meal: free HCl. Blood (4 examinations): no malarial parasites. Stool (3 examinations): no ova, occult blood negative. Blood count: red cells 1,560,000 per c.mm.; Hb. 30% (Sahli); CI 1.0; reticulocytes 4%; MCV 114 c.μ; MCHC 23.8%; MD (Price-Jones) 7.623 μ; MCA 2.591 μ; white cells 2800; (neutrophils 1600, lymphocytes 2000, monocytes 200, eosinophils 40). Normoblasts 3 per 100 white cells; no sickle cells, normal fragility. Sternal puncture: mostly normoblastic erythropoiesis, some showed iron-deficiency development and some showed megaloblastic change. No response to quinine 2 g. daily. Slight response to ferrous sulphate 4 g. daily, but feeble rise in reticulocytes and red-cell blood-count; increase of MCV and MCHC. Better reticulocyte response to three weekly courses of 15 c.cm. Liver extract for injection (BDH) given, with further rise of blood-count. MCV fell and MCHC rose to normal. Spleen shrank and was 3 finger-breadths below costal margin on discharge.

Elsewhere I have tried to set forth the evidence that this may well be the commonest deficiency anæmia of the very poor; and the very poor are not confined to the tropics.

#### SUMMARY

Our knowledge of nutritional macrocytic anæmia, a common anæmia in both sexes when the diet is deficient in extrinsic factor, is reviewed.

The failure to recognise this anæmia, and its refractoriness to many forms of liver in the form and dosage found potent in pernicious anæmia, might cause confusion with achrestic anæmia, achloric jaundice of the acquired variety, refractory and aplastic anæmia.

When iron-deficiency anæmia and nutritional macrocytic anæmia are both present the resulting anæmia presents a confused picture difficult to recognise. I suggest that the term dimorphic anæmia should be given to this combination.

I wish to thank the Director of Medical Services, Uganda, for permission to publish this article.

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## DANGERS OF PENTOTHAL SODIUM ANÆSTHESIA

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 FALKIRK

It is now seven years since 'Pentothal Sodium' (Abbott) was introduced into this country by Jarman and Abel (1936). Like most new anæsthetics it has had to struggle long for a place in the sun, but now general recognition of its merits has been gained. It has still however to attain that final hallmark of respectability, an official pharmacopœial name and dose. Its widespread popularity indicates its safety and reliability, but no agent capable of producing complete unconsciousness and profound muscular relaxation can ever be regarded as entirely innocuous. According to Hewer (1939) the main risks associated with the use of this drug are to the liver, while the common sequelæ of barbiturate narcosis—pallor, respiratory depression and postoperative restlessness—are also liable to develop. Ruth and his colleagues (1939) have demonstrated that such disturbances are few. As far as could be discovered from a search of published work dermatitis has not been recorded as a result of the administration of pentothal sodium. I encountered this unpleasant sequela recently and in recording it take the opportunity to review other risks of this form of anæsthesia.

The depressant effect of pentothal sodium on the dog's heart has been clearly demonstrated by Grueber and his colleagues (1937, 1938a and b). They state that the injection of a large dose is followed at once by a sharp fall of blood-pressure. I have repeatedly observed something of the same kind during the induction period. The onset of anæsthesia is often marked by some pallor and a diminution in the volume and tension of the radial pulse. When the initial respiratory depression passes off there is a coincident improvement in colour and pulse suggesting that it is perhaps feeble action of the thoraco-respiratory pump which has been the cause. I have also noted that obstruction of the airway under this form of narcosis, which is liable to arise when an assistant is left to hold up the lower jaw while the anæsthetist injects the drug, is associated with tachycardia and lowering of the blood-pressure. The depressant action of pentothal sodium on the blood-pressure, however, is mainly the result of the parasympathomimetic action common to all barbiturates; and Allen and his colleagues (1936) have used this phenomenon as a measure of the probable improvement in a case of hypertension resulting from denervation of the suprarenal glands.

Grueber and his colleagues have also shown that pulsus bigeminus, in which normal beats alternate with ventricular extrasystoles, is readily produced in dogs under pentothal sodium. Mallinson (1937) and Ruth (1939) on the other hand say that such disturbances of the human cardiac rhythm are rare. I have not encountered any such irregularities, but the fact that they appear in animals suggests the necessity for caution. Further, the observation of Reynolds and his colleagues (1938) that cardiac arrest uninfluenced by artificial respiration or analeptics can be produced by repeated injections of 5% pentothal sodium into dogs, is yet another reason for care.

The cardiac disturbances noted by Grueber and his colleagues and by Reynolds (1939) in dogs are probably related to the great susceptibility of these animals to vagal stimulation. It is well-known, for example, that when poisoned with chloroform dogs die of vagal arrest

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of the heart while other species, including man, more often suffer from the effects of ventricular fibrillation. This view is supported by two facts elicited by Kohn and Lederer (1938): first, the alterations in cardiac rhythm described are found in monkeys only after the preliminary administration of morphine; secondly, these changes are in no way aggravated by poisoning the heart muscle with chloroform, strophanthus or thyroxin. The practical application of this conclusion is that all patients about to be anaesthetised with pentothal sodium should receive an adequate preoperative dose of atropine or hyoscine.

In a series of 2000 administrations Ruth and his colleagues (1939) saw pallor as a postoperative complication twice; they do not indicate how or whence it arose. After one of my own earlier attempts at pentothal sodium anaesthesia, I overheard a conservative ward sister commenting on the colour of the patient in unfavourable terms. As a result I observed the next cases closely during the immediate postoperative period, and found that pallor, tachycardia and an extremely poor radial pulse were by no means uncommon and sometimes there was a real indication for an analeptic. While this disturbance responded readily to nikethamide I felt that for patients less robust than those whom one naturally selects as subjects for testing the action of a new anaesthetic, serious consequences might have ensued. In view of this danger I abandoned the use of pentothal sodium alone for any but short minor surgical procedures. Where longer anaesthesia was required the combination of pentothal sodium with nitrous oxide and oxygen described by Organe and Broad (1938) was employed. For the same purpose Carraway (1939) recommends the routine administration of oxygen by nasal catheter.

The depressing effect of pentothal sodium upon the respiratory centre is well known, but it is not generally recognised that asphyxia of mechanical origin in the course of this form of anaesthesia is not associated with the forcible attempts to overcome the obstruction which result under ether or nitrous oxide; thus a beginner may fail to observe the accident. In such circumstances a vicious cycle develops in which anoxæmia further depresses the respiratory centre to such an extent that clearing of the airway is not followed by the return of spontaneous breathing. If this cycle is to be broken and a fatal outcome avoided it is necessary to inflate the lungs with oxygen without delay.

Burstein and Rovenstine (1938) have shown that in animals the laryngeal reflexes are extremely active during anaesthesia with the short-acting barbiturates. In man a similar state of affairs undoubtedly obtains. I have often become anxious about the patency of a patient's air-passages and inserted a Phillip's airway; instead of improving matters this has evoked a spasm of severe and persistent coughing which materially worsened the pre-existing anoxæmia. The obvious remedy might seem to be to inject more anaesthetic, but if this is done a considerable overdose can be administered before the coughing ceases. It is much more satisfactory in every way to change over to combined gas and oxygen and intravenous anaesthesia with, if necessary, the addition of a little ether or, better still, a minute trace of chloroform.

An important point must be borne in mind about the hyperactivity of the laryngeal reflexes. Intravenous narcosis affords excellent relaxation of the lower jaw and for this reason might seem ideal as preliminary to intubation under direct vision. If the larynx is first thoroughly anaesthetised with 2% 'Nupercaine' (Ciba) or a similar drug all will be well, but if this is not done one must be prepared for severe coughing as soon as the laryngoscope or tube come into contact with sensitive areas of laryngeal or tracheal mucosa. If the intubation is rapidly successful this is of little moment, but if it fails the consequences to the anaesthesia or even to the larynx may be disastrous.

It is unwise to employ pentothal as the sole anaesthetic for operations involving opening the pleura, for the vagal inhibition of respiration which results from collapse of the lung may give rise to a prolonged apnoea with development of the vicious cycle of anoxæmia and respiratory depression. In animals such apnoeas may even prove to be irreversible (Moyer and McKittrick 1942). The vagal reflexes arising from interference with

the hilar area of the lung can also be extremely troublesome as they may give rise to cardiac arrest (Mantz 1941). It therefore follows that to use pentothal as the sole anaesthetic for intrathoracic procedures is to court disaster. This agent may, however, be used for induction if followed by ether, since Moyer and McKittrick have shown that ether abolishes the respiratory inhibitory reflexes which are active under pentothal alone. It must be remembered, too, that all the troubles which arise under this form of anaesthesia are accountable in the long run to anoxæmia, and that provided the oxygen supply is maintained by adequate artificial respiration the most refractory respiratory centre will recover if time is allowed for the offending drug to be destroyed or for the offending stimulus to become ineffective.

The unfortunate results which may follow the use of general anaesthesia in the presence of Ludwig's angina have long been recognised and the researches of Weese (1939) have indicated that a possible cause of such tragedies is undue irritability of the carotid sinus produced by the proximity of an acute inflammatory focus. Grueber and his colleagues (1938b) have repeated Weese's work for pentothal sodium and shown that the same dangers attend its use too. Other workers, however, believe that the primary risk in such cases is that of anoxæmia from partial obstruction of the airway; as has been mentioned, that state of affairs greatly increases the cardiac depression produced by pentothal sodium. Whatever the explanation there is a clear-cut contra-indication to the use of this and probably of all other general anaesthetics in the presence of cervical cellulitis.

Reynolds and his colleagues (1938) have shown that repeated doses of pentothal sodium will produce degeneration of the liver in mice. So far only one case of jaundice has been reported in the human subject after a single anaesthetic; on the other hand numerous repeated administrations of the drug without ill effect have been recorded. In addition, Carraway (1939) carried out Quick's hippuric acid test of liver function on the first and tenth days after operation on 100 consecutive patients to whom pentothal sodium had been administered. No diminution in liver function was found in spite of the fact that most of his patients were already jaundiced or suffering from other forms of hepatic insufficiency. The significance of these results becomes much greater if it is realised that 24 hours after operation the detoxicating function of the liver is diminished after the use of ethylene by 21%, after ether by 25%, and after spinal block by 49% (Boyce and McFetridge, 1938).

Hewer (1939) has drawn attention to the possibility of precipitating sulphæmoglobinæmia by injecting pentothal sodium into patients who are receiving sulph-anilamide. Smith (1940) has shown that no such ill effects are seen in patients receiving sulphapyridine and a search of the published work has failed to bring to light any record of dangerous symptoms thus produced. On the other hand Maher (1941) has indicated clearly that preliminary treatment of rats with sulph-anilamide and sulphapyridine greatly diminishes the hypnotic and lethal doses of all barbiturates, especially of those containing sulphur. He did not, however, obtain any evidence of any tendency to liver damage after the simultaneous administration of these drugs.

Cutaneous manifestations of idiosyncrasy to phenobarbitone are not unknown while the related drug phenylethylhydantoin ('Nirvanol') will produce a rash in most normal people. Hewer has recorded a case of angioneurotic oedema as the result of the injection of hexobarbitone and I have had a similar experience after its rectal administration. No such disturbances have hitherto been noted after pentothal sodium anaesthesia. Some time ago one of our patients who received this form of anaesthesia for incision of a septic finger, developed urticaria 24 hours after operation; this eruption lasted 2 days and disappeared without giving rise to further trouble. The following case-history shows however that much more serious disturbances can occur.

An officer of the RAF who had previously been given several inhalation anaesthetics with indifferent results received pentothal sodium, nitrous oxide and oxygen for the exploration of an anorectal sinus. After operation he developed erythema multiforme on his limbs and trunk. This rash disappeared

in 5 days and was not regarded as of any significance. A second administration of the same drug, however, made clear that the patient had a real intolerance to it; 24 hours after the second anaesthetic he began to complain of pain in the back and in the suboccipital region; 12 hours later confluent papular erythema of the face appeared; vesication, pustule formation and crusting were seen in the next 2 days. There was an associated pyrexial reaction and considerable discomfort. On the hands a few papules appeared at the same time and there was also a circumscribed area of eruption around the place where the injection had been made, indicating that some of the drug had escaped outside the vein.

This case-history indicates that cutaneous allergy may follow the use of pentothal sodium. If the full significance of the first rash had been appreciated little harm would have ensued. It seems that pentothal sodium should not be given to patients who say that they are sensitive to barbiturates of any kind.

The effects of injecting pentothal sodium into the tissues around a vein have been regarded as more serious than those which follow a similar accident with hexobarbitone. Dixon (1937) has shown that a 10% solution can cause definite irritative manifestations, but Jarman (1937) suggests that the 5% solution in common use is almost innocuous. In my experience it is unusual for patients to complain even of a sore arm, though in the absence of a special drip apparatus some of the drug escapes outside the vein in almost every case. On the other hand several cases of thrombosis of the basilic vein extending to the axilla have been recorded after the use of pentothal sodium, and though no cases of embolism were reported the possibility must be borne in mind (Payne 1939, Evans 1939).

#### CONCLUSIONS

From the patient's point of view pentothal sodium is an ideal anaesthetic; induction and recovery are much pleasanter than with inhalation methods and it is generally held that vomiting and chest complications are less common, though Rivett and Quaille (1940) failed to confirm this. All the common pitfalls in its administration are readily enough avoided by the experienced anaesthetist. The drug is easily portable and requires only the simplest of apparatus for its use. The makers recommend that it be used only by an expert anaesthetist who has at hand the means of inflating his patient's lungs with carbon dioxide and oxygen.

The indications and contra-indications for pentothal sodium anaesthesia are as follows.

1. It should be used for short operations where nitrous oxide is unsuitable or not available. It is almost ideal for reduction of fractures; the initial relaxation is good and the period of sleep which follows allows of the application of a plaster without discomfort to the patient.

2. Combined with nitrous oxide and oxygen it is a good second best to cyclopropane for extra-abdominal operations generally.

3. Its value for intra-abdominal operations is doubtful, since relaxation may be incomplete. The combination of spinal anaesthesia and light pentothal sodium narcosis is well spoken of however.

4. It must not be used as the anaesthetic for incision of cervical cellulitis.

5. It must not be used as the sole anaesthetic where there is any possibility of entry of foreign material into the larynx.

6. It is probably unwise to prolong pentothal sodium anaesthesia without taking special precautions to prevent the anoxaemia.

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## Medical Societies

### ROYAL SOCIETY OF MEDICINE

At a meeting of the section of neurology on Dec. 17, Dr. R. M. STEWART, the president, in the chair, a discussion on

#### Neurological Complications of Malnutrition

was opened by Prof. V. P. Sydenstricker (Augusta, Ga.), who read a paper on psychic manifestations of nicotinic acid deficiency. He comes from Georgia, where pellagra is endemic, and has had first-hand experience of these encephalopathic states. In this country such states are uncommon, and are apt to be seen only in the alcoholic, the aged poor, and in individuals depleted by illness and certain therapeutic procedures. Like almost every manifestation of illness due to deprivation of vitamins of the B group, he said, the neuropsychiatric symptoms are not specific: they can simulate neuroses and most of the well-known functional, toxic and organic psychoses; diagnosis can often only be made by a therapeutic test. Partial deficiency of nicotinic acid, lasting for months or years, probably produces relatively mild functional or biochemical disturbances which in the course of time lead to anatomical changes that may be irreversible. On the other hand, complete or almost complete deprivation causes some, even fatal, functional disturbances, often with no gross anatomical lesions. In pellagra the psychic manifestations may precede any other manifestations by weeks or months, and often the complaints are so typically neurotic that the patient gets little sympathy. Lassitude, slight mental retardation, loss of memory for recent events, apprehension, and a tendency to confabulation are common. There may be depression and mild delusional states without much loss of insight; also insomnia, headache, vertigo and paræsthesiæ of various types. As the disease progresses the characteristic glossitis and dermatitis make their appearance. After several relapses the mild psychoses are replaced by marked disorientation and sometimes by actively maniacal states. Of much more importance than the pellagrous psychoses are those due to an acute avitaminosis. Such are often labelled "toxic psychosis," and are commonly seen in general hospitals, particularly after surgical operations or after delivery. The onset of delirium, hallucinations, or mania is abrupt or follows a short period of confusion; and the response to nicotinic acid therapy is rapid and often complete within twenty-four hours. Severe, but possibly less acute, deficiency of nicotinic acid produces a condition identical with Wernicke's syndrome: stupor, cogwheel rigidities, uncontrollable grasping and sucking reflexes, and perhaps peripheral neuropathy. Administration of nicotinic acid rapidly cures the encephalopathic state; the peripheral neuropathy is probably due to deficiency of thiamin. Diagnosis of the encephalopathic conditions due to malnutrition is not satisfactory, since therapeutic administration of vitamins remains the only certain and convenient test. Positive tests for vitamin deficiency in the absence of gross physical signs are few and specialised; but the recent methods of determining trigonelline and nicotinic acid in urine may prove very useful. The management of these psychoses is relatively simple; large amounts of nicotinic acid are required during the first few days. Dr. Sydenstricker recommends 100 mg. nicotinic acid every hour for 10 hours during the first 2 days, continuing this dosage longer if necessary; the vitamin can be added to intravenously or subcutaneous infusions or given intramuscularly. Usually the condition improves within 48 hours, and once improvement is definite the daily

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dose of nicotinic acid can be reduced to 500 mg. given in divided doses. Later the oral administration of 25 mg. thrice daily should suffice for maintenance. If there are signs of peripheral neuropathy, and perhaps if there are not, thiamin should be given as well; an amount equal to one-tenth the nicotinic acid is a convenient dose.

Dr. H. M. SINCLAIR (Oxford) discussed those peripheral neuropathies which are believed to be caused by nutritional deficiency, and said that at least four vitamins had been incriminated: A, E, B<sub>1</sub> and riboflavin. Mellanby first showed 16 years ago that degeneration of nerves in the central and peripheral systems was caused by deficiency of vitamin A in animals. Later it was suggested that such deficiency in man might produce nerve degeneration, and therefore such conditions as xerosis conjunctivæ, night blindness, retrobulbar neuritis, neuritis of beriberi, and subacute combined degeneration of the cord. The belief that the epithelial metaplasia of vitamin-A deficiency is due to nerve degeneration has now been disproved by Sauer. Hart showed that bony overgrowth in animals in vitamin-A deficiency could cause blindness, and Mellanby that it could also produce deafness. This bony overgrowth has recently been studied by Wolbach and Bessey, who have concluded that vitamin-A deficiency causes skeletal growth to stop but that the central nervous system and other soft tissue continue to grow; they believe therefore that the nervous lesions of vitamin-A deficiency are wholly mechanical in origin. Evans and others showed that deficiency of vitamin E in animals caused degeneration in muscle and later other authors suggested that nerve degeneration was also produced. This led Bicknell and Wechsler independently to test, upon various neuromuscular disorders, vitamin E with or without the vitamin-B complex. Encouraging or disappointing results have been obtained by many clinicians in the last two years, and the weight of evidence is now strongly against vitamin E having any beneficial effect on such disorders; in fact the four papers in which estimations of creatine or creatinine in urine have been done have all shown no effect of such therapy on this biochemical disorder. The most important vitamin from the point of view of peripheral neuritis is vitamin B<sub>1</sub>. Much of the early work on deficiency of this vitamin in animals is untrustworthy because the effects of inanition or deficiencies of other vitamins were not properly controlled. Recently several groups of workers in America have studied the histological changes in vitamin-B<sub>1</sub> deficiency with great care. For instance, Swank has shown that in pigeons acute deficiency produces opisthotonos with only a few or no degenerating fibres in peripheral nerves or the central nervous system; on the other hand, chronic deficiency produces first locomotor ataxia due to proprioceptive loss, and then leg weakness with degeneration of peripheral nerves. The axon is first involved at its most distant point, degeneration progresses centrally and the myelin sheath degenerates later; the largest fibres are affected first, and the smallest are usually untouched. Swank believes that the hæmorrhages found in the lower parts of the brain are secondary to degenerative changes in the neurones surrounding blood-vessels and are caused by accumulation of acid metabolites. Since, according to Walshe and to Vedder, polyneuritis gallinarum is analogous to human beriberi, it is legitimate to apply these results obtained on animals cautiously to man. Unfortunately there is little clear-cut evidence of the rôle of vitamin B<sub>1</sub> in human multiple symmetrical neuritis, partly because a diet is unlikely to be deficient only in vitamin B<sub>1</sub>, and partly because vitamin B<sub>1</sub> stimulates appetite and therefore it is difficult to be sure that therapy has been confined to that one vitamin alone. In recent experiments in which human volunteers have been placed upon diets deficient in vitamin B<sub>1</sub>, neurasthenia but not neuritis has been produced; it is probable from animal work that such experiments have not been sufficiently chronic. One of the most satisfactory methods of assessing deficiency is to estimate vitamin B<sub>1</sub> or its phosphorylated form (cocarboxylase) in blood, and results of these estimations obtained in Oxford were communicated to the Neurological Congress just before war broke out. It seems likely that nutritional, alcoholic and gastrogenous polyneuritis are

accompanied by deficiency of vitamin B<sub>1</sub>, and that the same is true of some cases of diabetic and of gestational polyneuritis. The neuritis that may accompany dosage with some sulphanilamide derivatives seems to be closely associated with conditioned deficiency of vitamin B<sub>1</sub>; but diphtheritic, arsenical and other toxic forms have no direct relation. However, just as deficiency of vitamin B<sub>1</sub> produces neuritis by interfering with the utilisation of pyruvate in neurones, so many of the toxic forms may be produced by a similar biochemical lesion; arsenic, for instance, is known to interfere with the oxidation of carbohydrate in a similar way to deficiency of vitamin B<sub>1</sub>. But other important factors may come into the picture: for instance, arsenic and alcohol interfere with the conversion in the liver of vitamin B<sub>1</sub> to its coenzyme form. During the siege of Madrid some neuromuscular conditions arose from malnutrition, and Grande classified these in five groups: paræsthesiæ; paræsthesiæ with causalgia; retrobulbar optic neuritis; funicular myelopathy; and cochlear neuritis. These syndromes were often accompanied by the skin manifestations of pellagra. The diet however was not especially low in vitamin-B<sub>1</sub>, and biochemical evidence from the utilisation of lactate indicated that there was no particular vitamin B<sub>1</sub> deficiency. In fact Grande doubts whether vitamin B<sub>1</sub> played a part in any of these conditions, which however could be cured by giving yeast. There is no doubt that other as yet unidentified members of the B complex play a part in causing nerve degeneration; the work of Moore, of Landor and Pallister, and of Wilkinson has shown the importance of this complex in the aetiology of retrobulbar neuritis. The most likely cause of this is deficiency of riboflavin.

In the discussion the CHAIRMAN mentioned his observations on scurvy in the last war amongst Bulgar prisoners, and also suggested that attention should be paid to trace elements.—Dr. FRANKLIN BICKNELL was unwilling to accept the biochemical evidence against the rôle of vitamin E in neuromuscular disorders, and Prof. E. J. BIGWOOD stressed the importance of multiple vitamin deficiencies.—Dr. HUGH STANNUS thought the encephalopathic states described by Dr. Sydenstricker were probably not uncommon in this country, and he again emphasised the variability of symptoms.

## Reviews of Books

### Post-Natal Development of the Human Cerebral Cortex

Vol. II. *Cortex of the one-month infant.* J. LEROY CONEL, professor of anatomy, Boston University School of Medicine. London: Humphrey Milford, Oxford University Press. Pp. 144. 46s. 6d.

THIS is the second monograph of a series designed to trace the postnatal development of the architecture and morphology of the neurones in the human cerebral cortex. The first volume, published in 1939, dealt with the cortex of the newborn infant. The present study is based on an examination of five normal brains obtained at the first month, using the same technical methods as before. Comparison with the newborn shows a slight gain in the total depth of the cortex in most parts of the cerebrum, affecting the deeper laminae rather than the superficial. Definitely formed Nissl bodies and neurofibrils are restricted to the giant pyramidal cells of the precentral gyrus at this time, being best seen in the hand region. There is little gain in development in the occipital lobe. Among the primary receptive areas the somæsthetic is by all criteria more advanced than the visual, acoustic or hippocampal areas. Such observations have an evident bearing on changes in behaviour of the growing infant, and it will be interesting to see how neuronal development shapes towards the twelfth and eighteenth months. Histological criteria leave open the question of function, but the observation of J. R. Smith that the electroencephalogram records the first appearance of waves at the age of one month seems to agree with the present evidence on the initiation of mature stages in the neurones at this age. The work is superbly illustrated with 108 plates of camera-lucida drawings of Cox-Golgi preparations as well as macrophotographs and low-power microphotographs.

**British Encyclopædia of Medical Practice**

Surveys and Abstracts 1941-42; cumulative supplement 1941-42. Editor: Sir Humphry Rolleston, Bt., MD Camb., FRCP. London: Butterworth and Co. Pp. 432 and 289. 32s. 6d. together.

Of these two supplements one contains critical reviews of medical progress and abstracts of current, medical periodicals all over the world; the other brings the original volumes up to date with a cumulative selection of new material. In this way each annual supplement replaces the one before it; the latest supplement, read alongside original articles just published, is intended to provide a complete description of each disease as understood today. This intention is excellent and on the whole well fulfilled. Subjects receive notice in proportion to the advances made in their study so that it is not surprising to find much about tropical diseases, malaria, leprosy, amebiasis and cholera, and never a word on migraine, constipation or sciatica; and little new knowledge has been found worthy of note under the heading of cancer, compared with the facts lately accumulated about poison gases, drug addiction and blood transfusion. The critical survey of general medicine has been written by Prof. W. E. Hume, that of general surgery by Prof. G. Grey Turner. Effort syndrome receives special attention and Dr. William Evans in a chapter on cardiovascular disease again stresses the importance of X-ray examination; he is convinced that cardioscopy is the surest means of discovering or confirming the presence of an early mitral lesion. Sir Arthur Hurst describes giardial infections, colovesical fistula in diverticulitis and the pathogenesis of the sprue syndrome. In surgery, shock and compression and blast injuries receive the most attention. Dr. F. A. Knott admits that shock is not a readily recognisable clinical entity, but gives a stimulating review of blood transfusion in its treatment. Sir Harold Whittingham surveys aviation medicine and Dr. W. Gunn summarises acute infection. Col. L. W. Harrison's account of venereal diseases is particularly full and instructive. But the surveys in part I do not offer anything of such outstanding importance as the account in part II of the sulphonamides and recent developments in drug therapy by Prof. W. J. Dilling. In the next edition penicillin will presumably occupy more than the single page allotted to it here, though even this brief résumé will whet the appetite. In part III abstracts of published work fill over 300 pages of close print; they are arranged in alphabetical order and well indexed.

**Food and Beverage Analyses**

(2nd ed.) M. A. BRIDGES, MD, FACP; M. R. MATTICE, MS. London: Henry Kimpton. Pp. 344. 20s.

The authors of this book have set themselves "to provide analytical data on the largest possible number of food factors" but no figures seem to have been included for characteristically Chinese, Indian, Malayan or African foods, many of which are available. Actually the authors have limited themselves to European and particularly American foodstuffs. Even this, however, was a Herculean task and published work has been closely scrutinised, full weight being accorded to British and Continental authorities. For many of the proprietary foods the authors have relied upon the makers' data, though they have analysed a few themselves; nevertheless the book is essentially a compilation and its scope may be gauged from the fact that the protein, fat, carbohydrate and calories of 97 cheeses are given in table 17, and the same table opens with: abalone, abalone canned, acidophilus-milk com., agar-agar, ale yeast, dried, alewives, alfalfa bread, algæ, Hawaiian (Limu eleele, Limu lipoa), alimentary pastes, and so on. Data for available carbohydrate, fibre, purines, minerals (including bromine, iodine and sulphur), acidity in terms of pH, organic acids and metabolic reaction have all received full consideration and the vitamins are strongly represented. From the English point of view, the arrangement of the main table of protein, fat and carbohydrate values is unfortunate for the figures are not given per oz. or even per 100 g., but per portion and this portion is of

course a variable quantity. The authors give the arguments for this method of presentation, but it is difficult to see why they were swayed by them. The opening chapters on the proteins, fats and carbohydrates are general, elementary and rather misleading. Thus the chapter on the carbohydrates closes with the statement that "Bananas, chestnuts, and potatoes are particularly rich in starch." But what about biscuits, bread and rice? The wealth of data contained in the book is really extraordinary, however, and no doubt it will have its uses.

**Dermatologic Therapy in General Practice**

(2nd ed.) MARION B. SULZBERGER, MD; JACK WOLF, MD. Chicago: Year Book Publishers; London: H. K. Lewis. Pp. 632. 30s.

If the title of this work implies that it deals entirely with the treatment of skin diseases, it is misleading, for most of the diseases are described in full and one of the best features of the book is the space given to differential diagnosis. Even if, as the authors insist, diagnosis is of first importance in skin disease, treatment based on the form of the lesion may be tried, and often helps to alleviate symptoms pending a definite diagnosis. Minute details of therapeutic procedure have been given and the work is crammed with useful hints and tips. The practitioner is advised to use few local remedies—say eight—and to understand their proper application thoroughly: this is golden advice. It should be a rule never to change a remedy if the case is progressing favourably, and to tell a patient how to apply local therapy is not enough—he must be shown. If the library of the family doctor were to be restricted to one book on skins, this volume would be a safe choice.

**Antenatal and Postnatal Care**

(4th ed.) FRANCIS J. BROWNE, MD, DSc Aberd, FRCSE, FRCOG. London: J. and A. Churchill. Pp. 592. 24s.

THIS comprehensive work on antenatal care has become a popular standard textbook for MB, MD and MRCOG examinations, as well as a stand-by for registrars and first assistants. Every general practitioner who does obstetrics will find it useful. The fourth edition has been completely revised, and obsolete or unnecessary matter eliminated. Most of the new work in it relates to recent advances in the physiology and pathology of the toxæmias and hyperemesis, the treatment of habitual abortion by endocrine therapy and the use of radiology in obstetric diagnosis and prognosis, with special reference to pelvimetry and cephalometry. The chapters on the diseases and disorders of the various systems in pregnancy are comprehensive and lucid. No-one has done more than Professor Browne to preach the gospel of improved antenatal care or its effect on reducing maternal mortality, and foetal and neonatal morbidity.

**Myself, My Thinking, My Thoughts**

K. W. MONSARRAT, FRCSE. Liverpool and London: University Press of Liverpool. Pp. 140. 7s. 6d.

PSYCHOLOGY, says Mr. Monsarrat, is the title that is given to what is said about "thinking" and "knowing." It is because psychology could be thus defined until a hundred years ago that it came so much closer to metaphysics and to an arid epistemology than to the study of human beings as we know them in their daily lives. Mr. Monsarrat's thoughtful treatise is written in a great scholarly tradition, but it has little value for the psychologist and the physician, impatient of psychological studies that do not help them directly to understand human conduct. There is a fundamental issue dividing Mr. Monsarrat's approach from that of current psychological schools. Taking the Cartesian affirmation as his starting-point he examines his habits of thought minutely, chiefly by the methods of introspection and analogy. His style is fine and candid, as all good philosophical writing should be. In the first part dealing with "thinking," chapters are devoted to ideas, remembering and reasoning, images, and the problem of the relationship of energy to mind. In the second part Mr. Monsarrat aims at a general and consistent conception of the world and its troublesome affairs.

# THE LANCET

LONDON: SATURDAY, JANUARY 9, 1943

## SOCIAL MEDICINE

THE Beveridge report is a fitting celebration of the centenary of the birth of social medicine. A number of prenatal investigations had been made by individuals, notably the painstaking survey of prison conditions undertaken by John Howard and reported to the House of Commons in 1774, and the establishment of the famous "Retreat" at York by William Tuke, who showed the world how much could be done for the insane by humane methods of treatment. The report of the Poor Law Commissioners of 1842, however, was the first scientifically planned coöperative investigation into environmental conditions in relation to sickness. This *Enquiry into the Sanitary Conditions of the Labouring Population of Great Britain* was inspired and largely written by Edwin Chadwick. It is a fine example of team work in which practically the whole material contributed is the result of personal study on the spot by medical and lay experts. The most significant feature of the report is not the disclosure of the appalling sanitary conditions which prevailed in our towns at that time, but rather the evidence of a new outlook on ill health in relation to environment and a just emphasis on the preventive aspect. In his introductory remarks Chadwick expresses this view with his characteristic force:

"Abandoning any enquiries as to remedies, strictly so called, or the treatment of diseases after their appearance, I have directed the examinations of witnesses and the reports of medical officers chiefly to collect information of the best means available as preventives of the evils in question."

The whole tenour of the 1842 report closely corresponds with Professor Ryle's recent definition of social medicine as "medicine activated in its ætiological inquiries by social conscience as well as scientific intention, and having as its main purpose the education of scientific and lay thought and the direction of legislation on behalf of national health and efficiency." Chadwick's report certainly bore fruit in legislation—the Public Health Act of 1848—but the education of professional and lay thought was a slow business for which that reformer's carborundum mind was quite unsuited. Fortunately there were others better fitted for the task. Dr. Southwood Smith, one of the principal contributors to the 1842 report, was untiring in his efforts to promote health legislation, and he was ably supported by men of vision like Bishop Blomfield and R. A. Slaney, who fought the battle in Parliament. The burden of leadership fell upon Lord Normanby, the Home Secretary, who had taken the trouble to go and see the sanitary conditions of the people for himself. Delane became editor of the *Times* in 1841, and from then onwards this paper was a steadfast friend of social medicine; it was the *Times* which gave life and strength to the report of 1842.

A hundred years have gone by, and when we look back over the great period of sanitary reform, certain figures stand out because of their special contribution to social welfare.<sup>1</sup> The names of Shaftesbury and

1. But, as Sir Thomas Browne said, the iniquity of oblivion blindly scattereth her poppy.

Dickens are household words in their respective spheres, and Florence Nightingale's brilliant *Notes on Nursing* served the same cause. James Silk Buckingham, who did much to secure public walks, gardens and pleasure grounds for the people, should also not be forgotten. The great towns themselves took an active part in social welfare in the middle of the century, and the reduction of hours of work was largely the result of widespread popular agitation. A more direct advance in social medicine was made by Octavia Hill, the granddaughter of Dr. Southwood Smith. In the spring of 1865 Ruskin handed over to her care three dilapidated houses in Marylebone and a year later bought for her four other slum dwellings. These miserable homes with their wretched tenants were the foundation of a remarkable experiment, the success of which has inspired much of our housing progress today. By skilful, businesslike management of the homes and patient education of the families under her care Octavia Hill demonstrated the truth of the principle that "you cannot deal with people and their houses separately." A few years later the Charity Organisation Society was formed, and Sir Charles Loch, its secretary, became concerned over the abuse of the voluntary hospitals; in 1885 he suggested the appointment of a "charitable assessor" to supplement the work of the medical officer by obtaining the general assistance without which medical relief will often fail in its purpose. Ten years later the Royal Free Hospital appointed the first "hospital almoner" to carry out these duties. As time went on it became clear to the authorities that the trained almoner could serve the hospital better in her own province, and today she is recognised primarily as a social worker. The next development came from the United States. In 1905 Dr. Richard Cabot of Boston, Mass., began to use the medical social service in clinical teaching. His object was to impress upon students the importance of the social factors that might contribute to the patient's illness. More recently the students themselves, under the supervision of social workers, undertake home visiting and so learn to think of the patient as a person rather than a "case." In Britain the outlook on public health underwent a revolution at the beginning of the present century. The sanitary reformers of the nineteenth century regarded health and sanitation as practically synonymous, but their successors laid more stress on personal hygiene and health education. The progress of schemes for maternity and infant welfare, the evolution of the school medical service and the expansion of social legislation were the practical expression of this change. The dispensary system for the prevention and treatment of tuberculosis organised in 1887 by Sir Robert Philip became a model for the national service; and when Agnes Hunt opened the doors of an old and derelict farmhouse in Shropshire in 1900 and found that her home exerted a magnetic attraction for cripples she had the wit to see in this the germ of an orthopædic service which was to spread its benefits over the world.

At the end of the last war the effects of strain and sacrifice caused a sharp increase in mental ill health, and functional disorders of the nervous system began to be studied in their proper setting—the family and social background. Psychiatrists, looking into the "dark backward and abysm of time," found that

many mental and physical ailments had their origin in early childhood. Two momentous results flowed from this: the discovery that intelligent coöperation between medical and social workers lights up many of the dark places where illness is born; and the growing appreciation of the need for a positive attitude towards health, regarding it as something more than the mere absence of sickness. Restrictions on food imposed by the present war provided incidentally a unique opportunity for research in nutrition; the forward policy of the Ministry of Food enabled scientists to use these very limitations in securing a balanced, wholesome diet for the people and in shaping a nutritional programme for the future. And lastly, the enormous expansion of industry to meet war needs raises once more the sharp issue of health among industrial workers; the challenge is being met by the appointment of medical officers and nursing staff to deal with everyday problems of industrial welfare. These advances in thought and practice have led to a deeper understanding of clinical medicine as the study of man in his environment: his family, his house, his food and his work. These are the foundations on which social medicine must be built. A good start has already been made; the basic research has been generously supported by such bodies as the Rockefeller Foundation and the Carnegie Trust, and there is reason to hope that industry itself will give increasing assistance to the scientific study of health problems within its organisation, especially in relation to the restoration of the partially disabled worker. The whole subject offers unparalleled opportunities for field research, for its boundaries are undefined and much of its territory is unexplored. The creation of a chair of social medicine at Oxford through the far-sighted interest of the Nuffield Trust offers a fresh stimulus to united effort.

### HUNDRED PER CENT. HÆMOGLOBIN

DURING 1942 estimation of the hæmoglobin levels in different groups of people suggested an increase in anæmia, especially among women and children, and its correlation with war-time dietary. This work has been criticised from different angles—e.g., the normal or optimal hæmoglobin, methods of estimating hæmoglobin, and the relationship of iron-deficiency anæmia to diet. Unfortunately much recent work of this kind has been deprived of value by the use of unstandardised hæmoglobinometers, whether called by the name of Haldane, Sahli or Dare. Airmen have been known to become anæmic in a day and have been cured as rapidly by moving from one aerodrome (and one hæmoglobinometer) to another. Doubt has even been thrown on the oxygen-capacity method of standardising these instruments. Despite all this, it is generally agreed that for field work a Haldane hæmoglobinometer, checked and rechecked by the oxygen-capacity method, will give results that can be compared with those of the hæmatin or pyridine-hæmochromogen methods, if the observations are made on freely flowing blood and are expressed either as grammes per cent. or on the same scale. There is of course no single standard of normal hæmoglobin level that can be applied to men, women and children alike. In infants the mean level falls from birth to about the third month, rises to the sixth month, falls again slowly in the following months to rise to adult figures

at puberty, when the sex difference begins to appear, the mean hæmoglobin of adult women being about 10% lower than that of adult men. For British adults the accepted standards are those of PRICE-JONES,<sup>1</sup> 105% (Haldane scale) for men and 98.3% for women. These values derive from groups of middle-class individuals and may be taken as average, if not optimal, values. But for children we have scarcely any hæmoglobin estimations except among classes which could not be regarded as having optimal health or an adequate diet. The values generally accepted as normal for pregnant women were obtained<sup>2</sup> from similar "under privileged" classes. This surprising lack of a sound base line is of great importance in any discussion of "normal" values and also in assessing treatment. Often with the cessation of treatment the hæmoglobin returns to its previous low level; the average patient also returns to her inadequate diet and poor surroundings. Let us not claim that as the "average" infant or pregnant woman has a hæmoglobin of 70% this value is the appointed "normal" and that it is a bold act to interfere with it. What we need are standards obtained from individuals living under optimal hygienic and dietetic conditions and born of parents who have had the same good fortune.

But though we lack adequate normal standards, we have certain base lines which can be used for comparison. What evidence, then, is there of an increased incidence of anæmia in the fourth year of war? MACKAY and her co-workers were fortunate in obtaining figures<sup>3</sup> for a group of 353 women, nurses and students, strictly comparable with Price-Jones's group of middle-class women. These figures showed a significant drop in the mean hæmoglobin value from Price-Jones's standard, and this drop was greater in a group of nurses at a base hospital in the country than in a similar hospital in London, a difference correlated with a diet at the country hospital much poorer in animal protein than that at the town hospital. Now, twelve months after the first survey, the mean value of the London nurses is significantly lower than it was; during these twelve months meat and offal have been further restricted. DAVIDSON and others in Edinburgh have estimated the hæmoglobin of 600 pregnant women during the last few months and found it on the average 7% lower than that of a similar group<sup>4</sup> of women in Aberdeen in 1935, though the family income of the women in the present series was two and three times greater than that of the Aberdeen women. Other workers<sup>5</sup> have the same story to tell. Children too are showing a significant lowering of their hæmoglobin levels. DAVIDSON and his co-workers<sup>6</sup> have shown a drop of 10% in the mean hæmoglobin level of school-children in comparison with their 1935 series, and this in spite of the fact that their earlier survey was done at the height of the depression. MACKAY and her co-workers have shown a similar drop for school-children. Neither DAVIDSON nor MACKAY has, however, shown any lowering of the mean hæmoglobin levels of infants in comparison with

1. Price-Jones, C. J. *Path. Bact.* 1931, **34**, 779.

2. Boycott, J. A. *Lancet*, 1936, **i**, 1165.

3. Mackay, H. M. M., Dobbs, R. H., Wills, L. and Bingham, K. *Ibid.*, 1942, **ii**, 32.

4. Davidson, L. S. P., Fullerton, H. W. and Campbell, R. M. *Brit. med. J.* 1935, **ii**, 195.

5. Hamilton, H. A. and Payling Wright, H. *Lancet*, 1942, **ii**, 184.

6. Davidson, L. S. P., Donaldson, G. M. M., Dyar, M. J., Lindsay, S. T. and McSorley, J. G. *Brit. med. J.* 1942, **ii**, 506.

their series<sup>7, 8</sup> of 8 to 15 years ago. There is, however, no ground for complacency on this score, as it is generally agreed that working-class infants, such as these studied, suffer from an iron-deficiency anæmia, if the hæmoglobin levels in more fortunate nurseries, as shown in a few small series,<sup>7, 9</sup> are taken as normal. The adult male, who generally has the lion's share of the rations though his physiological need for iron is less than that of the female, is also beginning to show signs of a lack of iron, as indicated by MURRAY SCOTT'S figure<sup>10</sup> for medical students in Leeds, and MARSHALL'S figures<sup>11</sup> for male blood donors.

In fact there is no doubt that in the random samples of the population studied there is at the present time a significant lowering of the mean hæmoglobin levels of many groups. But does ill health or a lowering of efficiency result from a fall in the hæmoglobin level of 10 to 15%? Direct evidence that such a fall is injurious is difficult to bring, but there is a wealth of clinical evidence to show the improvement that follows treatment of mild degrees of anæmia, and in a population whose prewar hæmoglobin level left much to be desired such a drop must be deleterious. In infants there is direct evidence<sup>7</sup> of increased resistance to infection following the prophylactic administration of iron, and similar improvement would probably follow its administration to other subnormal groups. The prevention and cure of this anæmia should be along the line of increasing iron intake, for an iron deficiency is known to be an important ætiological factor in its production. At the same time other factors, dietetic and hygienic, which may play a part in its production should be investigated. Iron intake could be increased by fortifying bread with iron, a measure of which the USA has had some experience,<sup>12</sup> and by the provision of iron-fortified milk for infants. Particular attention should be directed to the feeding of all school-children<sup>13</sup> and children in war-time nurseries and camps, and to the diets in institutions. Propaganda should play its part by urging the routine administration of iron to infants, and to all pregnant and suckling women, and by stressing the need, and the reason, for fair sharing of rations within the family.

### TRADITION AND ESTEEM

THREE elder statesmen of the medical profession are now eligible to sit in the upper house of the British Legislature. Lord MOYNIHAN, who became a peer while he was president of the Royal College of Surgeons of England, lived but a few years to exert his influence. Two of the present peers are fellows of the Royal College of Physicians of London, one of them has already passed the chair; Sir CHARLES WILSON'S elevation to the peerage now brings the president of that college again into the debating chamber. Some may think this is a break with tradition; that is not so, it is a happy realisation of the traditional

outlook on public policy of the great medical corporations, an outlook which may have been darkened for a time by the individualism and self-seeking that overtook our national life during a great wave of material prosperity, now happily ended. The lower house has not lacked for medical exponents of altruistic ideals, and the upper house has learned to value Lord DAWSON'S vigilance in briefing public-health issues and Lord HORDER'S flair for diagnosing a national malady and epitomising it in a clinical note. Sir CHARLES WILSON is still as vigorous as when he won the Military Cross in 1916, during the battle of the Somme, for digging out wounded men under fire. During those years in the trenches he watched the soldier's conduct under stress and learned the natural history of morale. On his return he was elected to the staff of St. Mary's Hospital and six months later became dean of the medical school. He found the finances, the buildings and the student entry all at a low ebb; the transformation brought about by his administrative gifts was recognised when the buildings of a first-rate school were opened by HM King GEORGE V in December, 1933. Before most of his contemporaries he saw that the clinical unit system provided an academic career in medicine, and defended it when it had few friends; and his *Student in Irons* was a protest against the glorification of facts in the curriculum. The fruit of this unconventional career is that Sir CHARLES brings an acute mind to bear on what is likely to happen and what ought to happen. Then, whether he seeks to convince us by the written or by the spoken word, he depends always on the clarity of his reasoning and the good sense of those to whom his words are addressed. He is an ardent believer in working closely in touch with the sister colleges and in his own college he has at the moment a body of detached thinkers, with the humility of scholarship, who have observed the signs of the times and have had a vision of what medical education might become if released from its swaddling bands. In his first presidential address Sir CHARLES said that the primary purpose of the college, and one which dwarfs all others, is to explain to the Government the considered views of those who lead the medical profession; and he foresaw, what has indeed happened, that a Government department might ask the meaning of medical education. The answer is now in process of being given, and the responsibility is the greater because the growing esteem in which the college is held may cause its advice to be taken—which is a sobering thought even for a corporation which dates back to the second Tudor king.

The CENTRAL COUNCIL FOR HEALTH EDUCATION is appealing to medical men and women who have a flair for teaching to give an occasional public lecture in their own locality. The council, it should be remembered, took over the educational work of the British Social Hygiene Council and the Ministry of Health has enlarged its terms of reference to include health education in the widest sense. Some of the best lecturers are unaware of their latent talent and it should be possible to organise a Monday Night at Eight to discover the stars. We commend this to the consideration of the new chair of social medicine at Oxford, for it is a primary object of that new, but really very old, discipline to get the principles of healthy living translated into the currency of everyday life. A peripatetic correspondent has something apposite to say about this on p. 59.

7. Mackay, H. M. M. and Goodfellow, L. *Spec. Rep. Ser. med. Res. Coun., Lond.* 1931, No. 157.
8. Mackay, H. M. M. *Arch. Dis. Childh.* 1935, 8, 221.
9. Spence, J. C. Investigation into the health and nutrition of certain of the children of Newcastle-upon-Tyne, Newcastle Corporation health department, 1934.
10. Murray Scott, R. A. *Proc. R. Soc. Med.* 1942, 35, 615.
11. Marshall, T. S. *Brit. med. J.* 1942, II, 586.
12. See Wright, Helen P. *Lancet*, 1942, II, 441.
13. Widdowson, E. M. and McCance, R. A., *Ibid*, 1942, II, 689.

## Annotations

### THE GENESIS OF PAIN

Sir Thomas Lewis has now placed the results of his researches on pain within easy reach of everyone by collecting them into a monograph.<sup>1</sup> Its chief interest lies in the contributions he and his colleagues have made to direct experiment in this difficult field. Obstacles arising from the subjectivity of pain have been diminished by two important steps—the reduction to two in the number of recognised qualities of pain, and the demonstration by Kellgren that referred pain may follow insult to somatic as well as visceral structures. When divorced from tributary sensations, pain from the superficies is of the same kind however elicited, as is shown by characteristically simple experiments. The same is probably true of all deep pain, but here it is more difficult to determine just how far apparent variations in “quality” are in reality due to duration, intermittency, fluctuation, or mental association with a type of stimulus which cannot be established. The demonstration that a little hypertonic saline injected into appropriate interspinous ligaments may simulate acute abdominal lesions is striking. Not only is the reference of pain indistinguishable, but there is also rigidity of the appropriate abdominal quadrant accompanied by deep and followed by cutaneous tenderness. This suggests a revision of our conception of “referred pain”: since pain does not reside in the affected organ, all pain is in a sense “referred.” When the skin is injured, reference is accurately to the point of injury, but damage to deep structures leads to a more segmental response. If irritation of the ligament between the twelfth dorsal and first lumbar spines gives many of the same signs and symptoms as a stone in the ureter, it becomes more correct to speak of imperfect localisation of deep pain within the first lumbar segment than of pain referred from the ureter to the testicle; certainly it is more satisfying intellectually. In accordance with modern trends, no essential difference is recognised between visceral and somatic afferents, but of the many possible neuro-anatomical frameworks into which the general conception will fit none can be regarded as established. There is a similar deficiency of background to the consummate series of experiments on the tenderness of damaged areas of skin (erythralgic tenderness) and that surrounding a localised injury (nocifensor tenderness). Not only do chemical stimulants seem inevitable and widespread—they appear also as an integral part of the theory of muscular pain—but they must often be produced by the agency of the afferent nerves themselves. This implies a process passing peripherally—in effect, nerve impulses in the branches of afferent fibres passing in an outward direction and having efferent effects. It has long been taken for granted that the impulses of “axon reflexes” pass up one branch of a fibre and down another without leaving the periphery, but Lewis’s experiments on the nocifensor system establish the existence of a similar process acting over much longer distances than hitherto envisaged. Important questions arise: how far centrally, for example, does the branching of afferent fibres take place? Pain fibres may be small and unmyelinated; then is actual branching (i.e., continuity) necessary or is contiguity sufficient for the transmission of impulses? That vasodilator fibres emerge via the dorsal roots is now recognised; can antidromic impulses in afferent fibres also be centrally initiated, assuming that the vasodilator and afferent fibres are different? If not, is there any way in which the mechanism of segmental hyperæsthesia can be brought into line with that of local hyperæsthesia? In addition to solid contributions to knowledge, and a great clarification of

our ideas on pain, Lewis has provided a simplified and therefore useful scaffolding for future experiment.

### DEATH FROM VAGAL INHIBITION

PERHAPS the only functional disturbance which really deserves the name of “shock” is that of sudden vagal—or vasovagal—inhibition. Into its meteoric course it packs all the essential features of shock which have received so much attention. Vagal inhibition has been much studied by physiologists for nearly 20 years<sup>1</sup> but has excited little interest in other circles, and its medicolegal aspects have been neglected except for an isolated paper by Spilsbury.<sup>2</sup> Every habitual abortionist is familiar with the danger of a death on the premises, but the doctor who dilates and curettes sees it not; his anaesthetist however could tell of many a sudden flicker in the pulse and transient falling away of the blood-pressure during dilatation. We are gradually coming to realise that every incautious instrumentation of a viscus, every stretching of a sphincter or a serous membrane, even the manipulation of a joint, every sudden emptying of a sac which causes alterations of shape, form and relationship, every needling, even outside the pleura, carries with it the risk of sudden arrest of the heart or respiration or both, and of sudden death which might have been avoided. This hairspring trigger, it is becoming clear, is released partly by the apprehension of the subject. The excessively fearful are likely to react violently, even fatally; the plethoric unimpressively; and the fully anaesthetised hardly at all. In 1942, at a Hackney inquest, it was reported that a young man assured his father in terror that he “would die if ever they needled the chest again”; and so he did. Gardner<sup>3</sup> has recently drawn attention to the forensic importance of such fatalities in a study of 24 deaths from shock: from water entering the glottis (8 cases); from choking (7); from sudden general injury (5); and from hanging (3). He has an engaging eye for the significance of trivial detail and his alert mind seized the single common factor enabling them to be grouped as a whole: sudden stimulation of one of the many outstretched vagal tentacles. It behoves us then to keep ears, eyes and memories at concert pitch in cases of sudden death, or we shall be talking of status lymphaticus or more honestly, perhaps, admitting we have found no cause.

### EHRlich AND INTERNATIONAL STANDARDS

SUPPOSE a diabetic travelling through a world at peace found that the unit of insulin rose suddenly to many times its former value or fell to a fraction of it every time he crossed a national frontier. The journey would certainly be inconvenient, and if he was bad at arithmetic possibly fatal. Sir Henry Dale, broadcasting on standards for some modern medicines on Dec. 30, discussed this diabetic’s dilemma; and traced his security from danger to the wisdom and foresight of Paul Ehrlich. So many opportunities come the way of man to deplore the confusion created by his fellows that it is heartening to recall one story where difficulties were recognised in advance and met by capable plans. In the days when diphtheria antitoxin was a novelty different workers used different units, and no-one knew how to measure his own unit accurately. Ehrlich took a sample of antitoxin, dried it in a vacuum, sealed it in tubes and kept it in a refrigerator. Its activity was found to remain constant, and he proposed that the activity of an exact weight of this dried sample should be called one unit. This proposal was accepted in most countries, and he established regular distribution of small samples of his standard to any maker of antitoxin and any research worker, anywhere in the world. Thus

1. Pain. Sir Thomas Lewis, FRS. London: Macmillan. Pp. 192. 12s. 6d.

1. Hering, H. E. Die Karotissinusreflexe, Dresden, 1927.  
2. Spilsbury, B. S. *Med.-leg. Rev.* 1934, 2, 1.  
3. Gardner, E. *Ibid.*, 1942, 10, 120.



his preparation became not only the fixed standard but a currency in which the value of the unit could be transmitted abroad. During the last war distribution of the standard was interrupted, and before the end of it he died; but he had established the principle. In 1921 the League of Nations started an inquiry to see what had happened to the value of Ehrlich's unit in different countries; and it turned out that nowhere had there been a serious departure from his original value. His unit was therefore adopted by formal international agreement as the only standard of diphtheria antitoxin for the world. A new dry standard sample was prepared and placed for safety in the State Serum Institute at Copenhagen. Those were the days when it seemed that Denmark would be permanently a neutral country. In the years that followed the principle was adopted with other antitoxins and serums, and the Copenhagen institute took charge of them all. At an early stage similar international standards were discussed for the hormones and vitamins. Insulin was an urgent case; it only began to be generally available in different countries in 1922, but by August, 1923, several different units had already become current. Establishment of an international unit based on a dried sample preserved our hypothetical diabetic from disaster when on foreign travel. Pituitary hormone was giving similar trouble; one of the preparations on the market was 80 times as active as another offered in dosage of the same volume, which added to the hazards of its use in midwifery. Since 1925, however, a doctor can order, say, 20 units of insulin or 5 units of pituitary extract in the knowledge that his prescription has the same meaning anywhere in the world. Other hormones and the vitamins have been standardised on the same plan, many of them as soon as they were discovered. These later standards were placed by the League of Nations in the custody of the National Institute for Medical Research, and duplicate sets have been put in various centres, so that they may be expected to survive this war.

Besides this, in his systematic search for an artificial remedy for syphilis and the discovery of salvarsan Ehrlich may be said to be the founder of chemotherapy. Since he was Jewish, the street in Frankfurt which bore his name is now called something else. We may wish with Sir Henry Dale to see that memorial to him restored; but whatever nonsense they perpetrate in Germany the rest of the world knows Ehrlich for what he was—one of the international standards for the medical profession through the ages.

#### ANOSMIA

WHEN loss of the sense of smell is not due to local inflammation of the nasal mucosa or to blockage of the nasal passages, it usually indicates disease or injury of the olfactory nerve. Chronic meningitis and neurosyphilis can cause anosmia, and so may increase of intracranial pressure over a long period. In tumours of the frontal lobe loss of smell on the same side may be a useful localising sign, and if associated with optic atrophy on the same side is suggestive of a meningeal tumour. Destruction of one temporal lobe does not produce anosmia, and though bilateral destruction of the olfactory cortex will presumably cause it, cortical anosmia has not been described in man. In closed head injuries the olfactory nerve is injured more often than any of the other cranial nerves, and on another page Leigh analyses some of the features of 72 instances of this injury found in 1000 cases of head injury. Traumatic anosmia is usually permanent, but Leigh reports 6 cases in which there was some recovery several weeks after the injury. The prognosis in traumatic anosmia is thus not quite so hopeless as in traumatic optic atrophy. It is also noteworthy that, while optic and oculomotor nerve injuries are usually caused by frontal injuries, a high proportion of cases of traumatic anosmia are caused by falls on the

occipital region; this suggests a contrecoup mechanism in which the movement of the brain inside the skull probably tears the olfactory filaments. These contrecoup lesions in occipital injuries do not harm the optic nerves. The relationship of the sense of smell to that of taste is puzzling and variable; in traumatic cases, as Leigh points out, anosmia may be associated with no disturbance of taste, with complete loss of taste or with loss of the sense of flavours only. This anomaly remains unexplained, and Leigh suggests that in some cases there may be an injury to the higher levels of the olfactory and taste pathway.

The clinical method of testing the sense of smell is necessarily somewhat inaccurate. Usually the subject is asked to sniff common volatile oils such as peppermint and to name the substance presented—each nostril being tested separately. Many people however are unable to recognise and name common substances even when they have no anatomical disorder of the olfactory pathway. In these one has to be content with demonstrating that the patient can say whether or not the substance presented has any odour when compared with control phials containing water. Elsberg in 1935 described a quantitative olfactory test, and recently he and Spotnitz<sup>1</sup> have summarised the results of testing 1000 cases by his method. They have studied what they term the minimal identifiable odour of the odorous substance, and also the rate of recovery after olfactory fatigue, and have formed the opinion that the method detects slight disorders of olfactory function on one side compared to the other, and is of value in localising and lateralising tumours of the frontal or temporal lobe. Spillane<sup>2</sup> has pointed out that the value of this method in its clinical application is not so clear. Its chief clinical value probably lies in the possible detection of slight relative hyposmia on one side in early cases of frontal tumour. Apart from these cases Elsberg's figures for the successful localisation of tumours by this method are not impressive if one deducts those cases in which crude tests for anosmia would give equally valuable information.

#### NEW YEAR HONOURS

THE list of honours on p. 58 is a reminder, if reminder were needed, of the variety of service to the common weal rendered by medical men and women of British nationality in many parts of the world. The list is not yet complete, for a curious reason. There was not enough news-print available in the country to recite the names in a worthy setting. The recipients of medical decorations will count themselves happy to have their work honoured at a moment when hope is beginning to dawn that stopping the wounds of war may give place to refashioning the fabric of peaceful life. The elevation of Sir Charles Wilson, PRCP, to the peerage has been made the theme of a leading article. The honours which fall so justly to Sir Henry Dale, Sir Wilson Jameson and Dr. H. L. Tidy are symbolic of the recognition of the national importance of well-directed research, of enlightened administration, and of the consultant's experience in the fighting services. Dr. Saravanamuttu's knighthood for his wise handling of health resources in Ceylon is only one example of how our key islands have been blessed with key officers, witness the many names associated with Malta, Mauritius, Trinidad, and the outposts in Asia and Africa which are almost as isolated as islands. At home civil defence has again received distinction, and Dr. McDougall's great work for tubercle at Preston Hall. It is good to be able to say "I have done the state some service, and they know it"; and we other servants are glad with them.

1. Elsberg, C. A. and Spotnitz, H. *Arch. Neurol. Psychiat.* 1942, 48, 1.
2. Spillane, J. D. *Brain*, 1939, 62, 213.

## Special Articles

## THE BEVERIDGE REPORT AND THE MEDICAL PROFESSION\*

T. B. LAYTON, D.S.O., M.S.LOND., F.R.C.S.

SENIOR SURGEON TO THE THROAT AND EAR DEPARTMENT OF GUY'S HOSPITAL; OTOLOGIST TO THE FEVER SERVICE OF THE LONDON COUNTY COUNCIL; MEMBER (EX-CHAIRMAN) OF THE LONDON INSURANCE COMMITTEE

THOSE who have been following "the schemes of social insurance and allied services" that are "the product of the last 45 years" (§ 2) † will find that there is not much new in Sir William Beveridge's report. It is rather a scheme of unification "from which the anomalies and overlapping . . . which mark the British social services today have been replaced by coördination, simplicity and economy" (§ 29). But "In one respect only of first importance, namely limitation of medical service, both in range of treatment which is provided as of right and in respect of the classes of persons for whom it is provided, does Britain's achievement fall seriously short of what has been accomplished elsewhere" (§ 3).

"Fall seriously short."—This is a grave national indictment, but one which every medical man and woman will welcome from one of Beveridge's standing after "a comprehensive survey of the whole field of social insurance and allied services" (§ 3). We have spent our lives trying to do the best for our patients under the conditions in which we have worked and they have lived, and neither have been as good as we have wished. We stand now at the dawn of an age when both may be vastly improved if we but strive aright. Beveridge lays down the principle of a health service that "will ensure that for every citizen there is available whatever medical treatment he requires, domiciliary or institutional, general, specialist or consultant" (§ 427). "Most of the problems of organisation . . . fall outside the scope of the report" (§ 428), nor do I propose to deal with them today, but to consider changes likely to occur in the lives of the profession from the adoption of that principle. Two axioms arise: there will be many more of us, and we must recruit the profession on a national not on a commercial basis. On the commercial basis we compete for money available for illness when food, shelter and clothing have been paid for. On a national basis we must enlist students for the needs of the people.

These needs will demand many more men and women than there are in our profession today. The Children's Act of 1906 laid down the principle of the medical examination of individuals without waiting for them to report sick; this principle must be extended to the entry into industry and for some time after. This will mean more doctors. We have long known that all persons within the panel income limit must have the benefit of an insurance for their health; this includes 90% of the population. The Beveridge plan allows the rest to have it too. For the first time every one will have a family doctor. This will mean many more general practitioners. Hospital treatment has been removed from the Poor Law but much remains to be done before "suitable hospital treatment is available for every citizen and that recourse to it, at the earliest moment when it becomes desirable, is not delayed by any financial considerations" (§ 433). This will mean more hospital staffs. A corollary to this axiom is a relative increase in women doctors. In their opposition to teaching women students men claim that it is a waste of time to teach persons who cannot earn a living or who will not continue owing to marriage. The latter is common to all education of women above the kitchen standard. The former is due to the idea that it is members of the profession who make appointments. They may select the candidates; it is the people, through their accredited representatives, that lay down establishments.

## INSTITUTIONAL TREATMENT

On these axioms certain postulates follow, and the first is to recognise that the voluntary hospital system has passed. This arose on the ashes of the old monastic system when Nicolas Ridley, Bishop of London, preached

to the Court, and convinced the young king of the necessity to do something for those who were not so fortunate or successful as others. It was based upon charity, and in spite of the beginning of the poor law system in 1601 (app. B.2) charity remained the chief form of relief until the middle of the nineteenth century; since when, though there is still room for charity both of the Pauline and cheque-book varieties, there has been criticism of the economic order which includes the voluntary hospital system. This is well expressed by the Archbishop of Canterbury:

The charge against our social system is one of injustice. The banner so familiar in earlier unemployed or socialist processions—"Damn your charity; we want justice"—vividly expresses the situation as it was seen by its critics. If the present order is taken for granted or assumed to be sacrosanct, charity from the more to the less fortunate would seem to be virtuous and commendable; to those for whom the order itself is suspect or worse, such charity is blood-money.—*Christianity and Social Order* (Penguin Special, p. 14).

The voluntary system was one in which the patient entered the hospital without any right or privilege whatever, where those who gave their time as governors or their money as subscribers, did so without reward. How much of that remains today, and is there any of it that you want to retain? The Beveridge report does not get rid of the voluntary hospital system, but it impels us to recognise that it has already passed. This is all to the good. We can now apply ourselves to the continuation of independent hospitals working with, and no longer in opposition to, the municipal ones. In all human activity there is need for struggle, and one means of ensuring this is by competition. I fear that a unified municipal system would fall back into the bumbledom from which it is rising unless there are also independent institutions with whose work their own must be compared. A second reason is that institutions have souls that remain like smouldering fires in their existing forms when they have served the purpose for which they were founded.

But reasons such as these cannot influence any body of men and women responsible for the expenditure of public funds to loosen the purse strings; and therefore every voluntary hospital must show cause why it should remain in the service of "the people and their needs" (§ 310). It appears that the hospitals to which undergraduate medical schools are attached have been recognised for this purpose, but only for the moment. It throws the responsibility for the continued existence of these hospitals on to the medical schools; if any school is unworthy of the trust the associate hospital will go.

With the passing of the voluntary hospital system, Harleystreetism must disappear. Consulting and specialist practice will remain, but the system has had its day under which we spend a third of our lives working for nothing, recouping ourselves during the remaining two thirds out of the pockets of the wealthy through the agency of the general practitioner. It worked well in the nineteenth century when consultants were few and the well-to-do were many, but it has steadily been breaking down as an increased number of us have been trying to get larger incomes out of a diminishing proportion of the population. This has had a bad effect upon the practice, teaching, and conduct of medicine, and to it has been grafted a fungoid growth for which we cannot entirely repudiate responsibility. A few will continue to earn an honourable living by this means, spending their whole lives between Harley Street and a hospital and being ignorant of the lives of the people and of their needs. No further persons leading such a life should be put upon the staff of a teaching hospital.

What next? You are at the dawn of an era of hospital construction that will last through the lives of you and your children. The Chamberlain Act showed us how deficient we were in hospital accommodation; the Beveridge report emphasises it. Except for those in hospitals built by the old Metropolitan Asylums Board, there is hardly a ward in London that combines a proper bed-space with efficient ventilation. You should all study hospital construction, not from books, but with your eyes and thoughts wherever you go. Somewhere in England each one of you will be concerned with it. Take care that want of money no longer compels you to

\* Two lectures delivered at Guy's Hospital.

† The paragraph numbers refer to the Beveridge report.

wage the eternal war against disease "too little and too late" any more than it is now allowed to interfere with the way we fight our fellow-men. Be reasonable in your demands, but having made them beware the economy committee. I know of one new hospital where the wards are beautiful, but where two persons of my bulk cannot meet upon the stairs without having to turn sideways as we pass; I know a small new block in another, the designs of which were beautiful until the economy committee pressed the doctors and the architects to give way inch by inch so that in the kitchen as the nurse cuts the bread-and-butter for tea and the ward-maid washes up the dinner plates, their bodies bump as each bends down to do her work.

Most of this construction will be done under the municipal hospital system. But buildings and equipment are not enough. Just as a spirit for good may last long, so may a spirit for the bad, and the municipal hospital system has a bad ancestry. The infirmaries arose when Mr. Bumble became a doctor. In that "strong movement against the form and spirit of the old poor law" (app. B.2) the Chamberlain Act removed their form, but you cannot exorcise a demon by an act of parliament.

Great changes have been made by men and women how have gone into this service in the last fifty years with the definite intention of doing good work on a salary instead of aiming at what one of my senior colleagues used to call "the Eldorado up west," but much change of spirit is still needed. Interference in the details of clinical treatment by an administrator must cease. He must be a medical man that he may think clinically, but his job is to make straight the way of the clinician that he may do his work well, not to order him how to do it. The young man needs guidance, the senior often needs help; but guidance or help must come from a clinician in the same or other subject, not from a Dr. Knowall. The right of the medical superintendent to interfere in his position as an administrator with the treatment of any patient is wrong. Whether he has such a right in law is doubtful. It is the hypothesis on which the municipal hospital system is run; but it has never been thrashed out in the courts. It has got to go; and it should be unnecessary to stage a great test case and take it to the Lords in order to attain this.

#### DOMICILIARY TREATMENT

Of domiciliary treatment I speak not as the intimate worker, but as the responsible observer. I am not going into the questions whether there is still any room for private practice, whether the panel system should continue, or whether a state service should arise, whatever that may mean; I want to lay down certain principles that I believe are essential. The first is the personal relation between doctor and patient. We must retain this for those that have it, and develop it for those that never have had a family doctor. The personal touch is the greatest therapeutic influence in all methods of treatment. Upon it is based the whole of professional etiquette, as well as the principle of free choice of doctor. When, as happens so often today, numerous specialists are called in to help in a case their treatment fails unless there is one to correlate or control in the form of the general practitioner, or as a temporary measure the general physician. Unless you secure this I believe that whatever system you set up you will do less good work than your fathers and grandfathers before you.

As with the institutional work, you will have to bargain with some committee or minister as to rates and conditions. The labourer is worthy of his hire; but having admitted that principle there is room for considerable difference of opinion as to what that hire should be. Within a wide range the conditions of work are of greater importance than the rates of pay; there has in the past been too great a tendency to assume that the only matter to be discussed is money. Settle the conditions first and deal with the pay after, you will then be much happier.

I think the present system fails in three ways: accommodation; inter-communication; and security for old age. Insurance committees inspect doctors' surgeries, and waiting-rooms, but no-one considers that the minimum to which we have to agree is adequate. In the poorer districts the accommodation is not to be had

without building specially, and it is doubtful whether a practice limited to panel patients can carry the overhead charges of decent accommodation with the necessary care of them and the attention to the practice. Why is it that in the wealthier districts you always find the doctor in the big house at the corner of the street? Not because he is the wealthiest man in the road; but because in our profession our business and domestic affairs have never been separated. The banker and the lawyer have both given this up. It is time for us to do this as well. We shall then be able to make up income-tax returns that really distinguish between business charges and personal expenditure; and I believe it will then be found that where the business side of practice has been efficient in waiting-room, consulting-room, and treatment-room (called the surgery) the money for this has come from the doctor's private practice. In taking over the administration of practice to serve 90% of the population, the state will have to provide the accommodation and leave the doctor to live as he can afford and where he likes providing he is accessible. You will notice that doctors tend to congregate next to one another in one road. This means that many practices can efficiently be conducted from the same spot. It should therefore be a reasonable thing for the state to provide doctors with accommodation at some such central place in each district or town, and to staff them. These would not be health centres; the accommodation would be special to each doctor except for the waiting-room. He would thus give his own rooms his own personality and retain the human touch. They might be in the same building as the health centre or at the local hospital but would not be a part of either. At such a place the staff would know where to find him. He would be responsible for letting them know his whereabouts.

The legal doctrine that a principal is responsible for his agent's torts has been wrongly applied to doctors. He has been made responsible for the torts of one who is not his agent—namely, his wife's servant—who is not trained to take and transmit messages and who often is not capable of being so trained. In an industrial area the doctor's wife has to depend for her servant upon those who are either physically or mentally unfit to work in the neighbouring factories or offices; and upon these has been put the onus of work such as is done by the manager's private secretary in the factory. Under commercial medicine the doctor loses practice if he cannot be found; under contract terms it becomes neglect if he cannot be got at every moment of his life. If the new general, aged 15, who took service under his wife 24 hours ago, does not transmit to him a message which a patient's relative says a friend left at his house while the doctor was going his round, he may be fined a sum of money far in excess of what he might lose in private practice and in addition receive a severe censure by a committee devoid of legal training and unable to understand the difficulties he has to surmount. In the change over from ad hoc to annual payments, this onus has been left on the doctor without anybody realising the altered conditions under which he is working.

The medical profession of London has always advocated the inclusion of doctors' pensions as a part of the payment under the national health insurance scheme. It is not necessary to consider why their proposals have been turned down by the rest of the country, nor to go into distressing stories of old men hanging on to a small panel as the only way of keeping themselves from starvation; they make a pension a necessity in the interest of the people. In starting any pension scheme there is always the difficulty of those over 40 who want to come into it, realise the value of its benefits, but cannot possibly pay the premiums for them in the time still left. It is wrong that they should get the benefits out of the premiums their juniors will pay. This difficulty might be surmounted. The state has never recognised the right to sell a panel practice. When the dependants are brought into the national health system the same rule will apply to them, and capital values will disappear. But it is a form of capital that has been allowed to be built up; when the state takes this away should it compensate the owners. Probably not in hard cash, but in the form of back payments to a pension scheme; it should be possible in this way to bring in all doctors already so old that the time before them is not enough for

them to subscribe to a pension worth having. Other points arising out of this matter are a pension scheme for the profession instead of for individual jobs in it, and the prohibition of the sale of practices. The time is ripe for this. There are those that think it wrong directly or indirectly to sell a human being; but such a moral principle has never moved a committee, though it may move those that compose it; and this is the present position in regard to the sale of practices. Unhealthy transactions, hard to prevent and within the law, have arisen within the profession and without; conversion of the capital value of practices to pensions for the practitioners would overcome this difficulty.

Another thing that must go is the last relic of the apothecary's shop. It is not that I think it beneath the dignity of the profession to perform or to supervise the dispensing of drugs, but because the cessation of this was the first step in general practice becoming a speciality. The family doctor should no more today make up his patients' prescriptions than he should cut their corns, give them massage, or apply to their skins ultraviolet light. All these things have become the business of the ancillary professions and the doctor should no longer perform them. When it is realised that general practice is as much a speciality as any other, the family doctor will no longer attempt to invade those other ones, and will settle down to think what are his functions, what he can do better than anyone else, and what he had better drop because he no longer can do it as well as they.

#### CERTIFICATION

The records of the medical service subcommittees show that, with one grave exception, there would not be much room for complaint against our profession if we were given the opportunity of doing our best work under adequate conditions, rather than conditions which "fall seriously short" of what the people should give us for their needs. The exception is the way in which we abuse the privilege and duty imposed upon us in the use of our signatures. When one hears of a practitioner who has been inveigled into signing a certificate that states "I have this day seen and examined" a certain patient when in fact he has not done so, we cannot defend him. We may sympathise with him when he has given way to the pleadings of a daughter who says she cannot get the money to keep them in food for the next week unless she takes the certificate to the society's office before 4 PM, when he knows the father has pneumonia that will keep him off duty for many weeks, when he saw him yesterday, and is arranging to do so again tomorrow. We may think that the way in which the approved society issues sickness benefit needs inquiry as much as the conduct of the doctor; but we cannot defend him. He has knowingly made a false statement on a document which is, in effect, a cheque upon the public funds. The whole profession is involved.

As a student he has got used to a distinguished physician of the highest honour signing in blank a form for an X ray or a special drug that can only be got under the signature of a member of the staff. He becomes a house-surgeon under the voluntary hospital system, and finds it the custom for the sister to get him to sign a number of certificates in blank so that she has them ready to hand; and the surgeon who is supposed to be guiding him in the conduct of practice raises no protest. He becomes an AMO under the municipal hospital system and sees lying about books of certificates signed in blank in a room to which dozens of persons have access and hears a story of how when a young AMO protested against the signing of such certificates without seeing the patient, including those which contain the words "I have this day seen and examined," she had been threatened with dismissal by the superintendent if she did not comply.

Such customs make the doctors in practice careless even when they are not kind-hearted. Even the GMC is not above criticism; it has issued warning notices from time to time, but the general opinion of those that administer the health insurance is that it has not given them sufficient support in insisting on the observance of these notices.

Each profession has its ideals. Those of the law of finance, of insurance, and of banking, place first a meticulous care in regard to all matters concerned with other persons' monies. We place above that the care and kindness that we give to their bodies, but those in other professions are entitled to be heard. In the Beveridge report

there is a sentence that seems to me to be ominous on this matter. "The primary interest of the Ministry of Social Security is not in the details of the national health service or its financial arrangements. It is in finding a health service which will diminish disease by prevention and cure, and will ensure the careful certification needed to control payment of benefit" (¶ 437).

#### NEW YEAR HONOURS

THE honours list issued on Jan. 1 contains the following names of members of the medical profession:—

##### Baron

Sir CHARLES WILSON, MD LOND.  
President of the Royal College of Physicians of London.

##### G.B.E.

Sir HENRY DALE, MD CAMB., FRCP, FRCS.  
Lately director of the National Institute for Medical Research.

##### K.C.B.

Sir WILSON JAMESON, MD ABERD., LL.D.  
Chief medical officer of the Ministry of Health and Board of Education.

##### K.B.E. (Military)

Hon. Major-General HENRY L. TIDY, DM OKFD, FRCP, late RAMC.

##### Knight Bachelor

RATNAJOTI SARAVANAMUTTU, MB.  
For public services in Ceylon.

##### G.B. (Military)

Major-General JOHN A. MANIFOLD, DSO, MB EDIN., KHP, late RAMC.

##### C.S.I.

Major-General HEERAJI J. M. CURSETJEE, DSO, MRCS, KHS, IMS.  
DDMS, Headquarters, North-Western Army.

##### G.M.G.

E. LAURENT, MD.  
For public services in Mauritius.

##### C.I.E.

Lieut.-Colonel EDWARD COTTEE, MB NUI, IMS.  
Public-health Commissioner, India.

##### C.V.O.

CHARLES S. MORRIS, MRCS, LDS.

##### C.B.E. (Military)

Brigadier GEORGE B. CHISHOLM, MC, MD TORONTO.  
DG, Canadian Medical Services.

##### C.B.E. (Civilian)

WALLACE R. AYKROYD, MD, SCd DUBL.  
Director, Nutritional Research Laboratories, Coonoor.

FREDERICK HALL, MD MANG.

MO, Lanes County Council—for civil defence.

Hon. Captain MAHARAJ K. KAPUR, LMS, DPH, DTM & H.  
Medical practitioner, Lahore.

WILLIAM P. H. LIGHTBODY, LRCP.

DMS, Sierra Leone.

JOHN B. McDUGALL, MD GLASG., FRCP.

Medical director, Preston Hall, Maidstone.

##### M.V.O. (4th Class)

JOHN R. KENNEDY, MB ABERD. (dated Oct. 20, 1942).

##### O.B.E. (Military)

Lieut.-Colonel JUSTIN W. F. ALBUQUERQUE, MB MADRAS, DPH, DTM & H, IMS.

Lieut.-Colonel MILTON H. BROWN, MD TORONTO, RCAMO.

T/A/Surgeon Lieut.-Commander EVERETT F. CRUTCHLOW, MD MCGILL.

Lieut.-Colonel (T/Colonel) FREDERICK McKIBBIN, MB BELF., RAMC.  
A/Wing-Commander DAVID M. WALLACE, MB LOND., FRCS, RAFFR.  
Surgeon Commander EDWARD R. P. WILLIAMS, MB LOND., RN.

##### O.B.E. (Civil)

Lieut.-Colonel ALFRED I. COX, MRCS, IMS.  
District MO and Superintendent, Government Headquarters Hospital, Ootacamund, Madras.

DAVID N. DE SILVA, MRCS.  
ARP controller, Ceylon.

WILLIAM M. HOWELLS, MB GLASG.  
DDMS, Gold Coast.

MOHAMMAD HUSNAIN, MB CALCUTTA, FRCS, DLO, DOMS.  
Professor of ophthalmology and otorhinolaryngology, Prince of Wales Medical College Hospital, Patna.

Lieut.-Colonel MADHAR K. KELAVKAR, MBE, MB BOMBAY, MRCP.  
Assist. DG, IMS (Stores).

BERNARD MOISER, MB LOND.

Leprologist to the Government of Southern Rhodesia and MO at Leper Settlement, near Fort Victoria, S. Rhodesia.

CHARLES R. PHILIP, MBE, MD ABERD.  
MO, Kenya.

HENRY SACCO, MD.

For public services in Malta.

Prof. VITTORIO VASSALLO, MD.

Superintendent of the Hospital for Mental Diseases, Malta.

## M.B.E. (Military)

Captain (A/Major) HAROLD E. FOEK, MD TORONTO, ROAMC.

Captain HUGH C. HAIR, MD TORONTO, ROAMC.

Captain NARAYAN V. KARVE, MB BOMBAY, IMS, IA.

Captain (T/Major) JAMES L. MACCALLUM, MRCS, IMS, IA.

Captain DESMOND A. D. MONTGOMERY, MB BELF., RAMC.

Captain RAM L. SOOTA, MB PUNJAB, IMS, IA.

Captain JOHN A. STRONG, MB DUBL., RAMC.

## M.B.E. (Civil)

PIERRE A. ROSTANT, MB EDIN.

MO, Trinidad.

Dr. MOSHE WALLACH (hon.).

Principal of Shaarei Zedek Hospital, Palestine.

## D.S.C.

T/Surgeon Lieutenant JAMES C. GRAY, MRCS, RGNVR.

T/Surgeon Lieutenant JAMES I. A. JAMIESON, MB MANC., RNVR.

T/Surgeon Lieutenant GEORGE C. MCKINLAY, MB GLASG., RNVR.

T/Surgeon Lieutenant IAN MISKELLY, LRCP, RNVR.

## Mentioned in Despatches

T/Surgeon Lieutenant ERNEST O. DAVIES, MRCS, RGNVR.

(Squadron-Leader) AGNES C. GILLAN, MB EDIN.

A/Squadron-Leader GEORGE B. GRAYLING, MRCS, RAFVR.

Surgeon Lieutenant G. A. HENDRY, MD TORONTO, RGNVR (posth.).

A/Squadron-Leader H. G. MAGILL, MB BELF., RAFVR.

## Commended for Brave Conduct

Flying-Officer JAMES DOUGALL, MB BELF., RAFVR.

## MEDICINE AND THE LAW

## Employer and Employee's Doctor

THE Court of Appeal lately discussed (in *Phelps v. Kemsley*) a question of the privilege possibly occurring where a third person communicates with a patient's doctor. This situation often arises, especially where an employer takes a sympathetic interest in the health of a sick employee; it is perhaps surprising that there are so few decisions about it. The legal problem is in a sense wider than the ordinary case of medical privilege (mentioned in Parliament over the defence regulation dealing with venereal disease) where the patient's interest is deemed to demand non-disclosure of confidential information by the doctor who attends him.

Mr. Phelps was employed for several years as personal secretary to Lord Kemsley. Some 18 months ago he had a nervous breakdown and was ordered to rest; he then sent Lord Kemsley a medical certificate. A few weeks later, during an interview with his employer, he announced that he was going away into the wilderness; Lord Kemsley undertook to pay him three months' salary. After the interview Lord Kemsley, impressed by his poor state of health and wanting to do the best for him, telephoned to Mr. Phelps's doctor. The substance of his statement was that he thought his secretary was mentally deranged; that the doctor ought to see him as he needed medical attention; that his appointment had been terminated; that three months' salary would be paid and that Lord Kemsley would be grateful for advice as to how this money should be divided between Mr. and Mrs. Phelps. On this statement Mr. Phelps brought an action for slander. In the trial court Mr. Justice Macnaghten ruled that the occasion was privileged; he directed the jury to find a verdict for Lord Kemsley. The Court of Appeal confirms his ruling.

The recent judgment emphasises the reciprocal element in privilege. A privileged occasion is one where the person making the communication has an interest or duty—legal, social or moral—to make it to the person who hears it, and the hearer has a corresponding interest to receive it. A right-minded person in the position of Lord Kemsley, says the Court of Appeal, ought to have communicated his fears about Mr. Phelps's health to someone who was the proper person to look after him. The doctor had an interest in receiving the information. The occasion was therefore privileged. It was an additional consideration that Lord Kemsley was about to pay Mr. Phelps a substantial sum and had an interest in knowing whether he was fit to receive the money. For a statement to be privileged it is, of course, necessary not only that the defendant makes it under a sense of duty but also that there must be a duty to make it.

## In England Now

## A Running Commentary by Peripatetic Correspondents

THE young American nurse accepted a cigarette with an air which seemed to say "Thanks, I am getting used to English cigarettes now," and settled back in her chair. "Oh Yes! I like the English people. I think you are all just swell, and not nearly so reserved as I expected. Once I have made friends I find you English just like the folks back home." She looked up quizzically, "There is one thing though, that does strike me—and I hope you won't be offended—when walking along the streets, or in buses and the like, so many people seem ugly; but ugly." This rather took my breath away, and the remark was made so apologetically that I was fumbling for an answer when she continued, "Of course people in American streets are ugly too, but it is a different sort of ugliness, just as there is a different sort of American profile generally, and of course one is accustomed to it I suppose it is not being used to the English face that makes me notice it."

At once my mind flashed back to a clinical lecture in my third year when Dr. Chalmers Watson prescribed us an exercise in clinical observation. "Do not read in tramcars," he said, "it is bad for the eyes. You will find greater profit in studying the other passengers. Look at them carefully, and decide what diseases and abnormalities they have, or are likely to suffer from. You will be surprised how seldom you fail to spot something which can be termed abnormal." I often followed his advice (being careful not to stare too hard) and agree with the truth of his last remark. The memory seemed to link up logically with the nurse's observation. In fact, she is right. Far more people are ugly than beautiful—the attention that a beautiful girl attracts in the street is in itself proof of this. But I suddenly realised, as never before, that most of this ugliness is preventable since it derives from bad habits of feeding and posture, unhygienic ways of living, preventable disease and the like. Any physician could produce a long list of preventable factors which produce ugliness of face and form; such things as ill-fitting shoes, the habit of worrying, wrong carriage, and the misuse of cosmetics. Surely no-one could refute the premise that healthy and hygienic communities are physically more beautiful than those whose health standards are lower. I would be the last to make comparisons which might be thought invidious, but I would like to pay tribute to the delightful prevalence of beauty in girls of British Columbia and South Africa which are both countries with high standards of living.

I found a key to the situation in Prof. J. M. Mackintosh's striking address at the congress of the Royal Sanitary Association of Scotland in September. He was talking of the medical aspect of domestic hygiene in war-time, and his peroration on health education should be read by every doctor, and one might add by the lay staffs of the Ministry of Health and the Board of Education. His succinct and emphatic call for health education could not be bettered. Ignorance is just as great a foe to the life of the nation as is the present enemy against whom we are in arms; and ignorance can only be dispelled by education. This not only implies a knowledge of the facts but also the inculcation of the will to employ them. So one notes with pleasure signs of ever-increasing vitality in that useful body—of which insufficient use is made—the Central Council for Health Education. They have done much. Let us hope they will do much more. In a humble way I would suggest that to their aim of a healthy Britain they might add the slogan of "Build a Beautiful Britain." Everyone is interested in health, but I should not be surprised to find they were even a bit more interested in beauty, or at least in being beautiful. If the contention that beauty and health are inseparably connected is correct then health education propaganda might well gain added force by working simultaneously for beauty.

Mr. Gladstone was born in our street—from where I sit I can see the tablet on the house across the way—and Arthur Hugh Clough and his sister Anne who tried her hand at pedagogy here before she became first principal of Newnham. The street is officially called

and best known by the name of a famous British admiral, but depending largely upon point of view it has other designations such as "The Valley of the Shadow of Death" or "The Harley Street of the North." In the days of peace, any invasion of the street by non-professional tenants would be registered as a sign of decay, while the acquisition by purchase of a whole house for himself and his family on the part of a medical man would be hailed with satisfaction and tacitly counted unto him for righteousness' sake. But mostly these sombre three-story Georgian dwellings would represent ant-hills between which, and the cars densely packed along the curb, consultants, specialists and their patients would constantly scurry. That was before the war. To some extent it is the same today, but the war has brought many changes in the street: notable figures are absent and bombed-out and fugitive businesses have invaded it. There is one change, however, that can never be regretted and that was the furling of the swastika flag at No. — where it had flaunted through two darkening years; like many another German consulate this one left under a cloud about the time when sandbags and blackout material made their appearance and paper strips began to be pasted on windows. No account of the street in war-time would be complete without mention of the dog attached to the military police who have their HQ here. He is not an Army dog in any official sense but he regards himself as having complete charge of this unit of the corps. How he obtained this post remains obscure: clearly it was not on grounds of family or breeding. He is rough-haired, vaguely yellow, something larger than a terrier, and has a vigorously up-curved tail. But war as we know is a great leveller, giving opportunity for the individual of parts to get to the top; perhaps he was seconded for special duties. These apparently comprise liaison work between police in the two separate houses, some distance apart, which they occupy, together with a general supervisory function over the activities of the OMP at the main-line termini; for, in this neighbourhood, where the Red Caps stalk, there will the dog be also. He evidently has the entrée to the most guarded of arrival and departure platforms, and from his contempt for barriers and his cavalier manner with inspectors and ticket collectors it is difficult to imagine that he bows to any authority short of that exercised by the Provost-Marshal himself. At any time during waking hours—and it has to be admitted that he has been known to snatch a nap upon a sunny doorstep around noon—this dog may be seen in active prosecution of what he conceives to be his important duties, proceeding at a fast pace between HQ and stations, keeping vigil or acting as solemn escort. His responsibilities appear to allow him small opportunity for canine society. Of his family life nothing is known, but such intimates as he has must see little of him. As I rolled up for firewatching at about dusk the other evening I heard the quick tap of paws behind me, and up the hill round the corner flashed a pale streak just back from meeting the London train.

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A busy friend of mine always has three books going—a serious one for ordinary reading, a light one for bedtime, and one which lends itself to five minute snatches which he keeps in the lavatory. The serious one is, of course, about what one is interested in or has got to know, but the bed book should have certain qualities. The great Asquith read the *National Dictionary of Biography*; personally I like Gilbert White and the Wayside and Woodland series. When I was a student I used to go with others and help with a lot of children who were sent down to the seaside by the Country Holiday Fund. We used to take it in turns to tell them stories in the dormitories at night, and one of us, the present Director of the Industrial Welfare Soc., displayed great artistry. His story would be quite exciting or troublous at the start, then it passed through a comic stage, and tailed off into a tranquil, happy, repetitive, interminableness—something like the alcoholic sequence. He'd yawn, speak more softly and slowly, take a deep breath, yawn again—"so Derek stayed down in the country and got heaps of lovely brown eggs from his chickens, and every morning. . . ." Finally he'd tiptoe from the room; all the boys were asleep. In essence the story was always

the same, for children of that age are stout conservatives: Derek, with whom they could all identify themselves, escaped from brigands, pirates or general all-round murderers with no small credit to himself, and settled down to a well-fed and pleasantly undulant life in the country. It was the gently undulant part that induced sleep. This quality should be sedulously avoided in the lavatory book. Here one wants the climax element, energy with a bang, stories that end with a shriek or a shot rings out in the night; like the tale of the doctor who is doing a PM in the tropics and looks up to see that his big black assistant has not only got the big knife and is staging a manic burst but is edging round the table. The doctor edges the other way and they go round and round, gradually faster and faster, clutching the table and corpse, a vortex. That ought to stimulate peristalsis in anyone. Once I thought I'd got the ideal lavatory book on a second-hand bookstall in the Farringdon Road. Its title was *Bowels Opened*, and I think it was by one Smiles, but it was theological not alimentary; not worth 4d.

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The Surgeon looked up from his paper. "Do you see our old class-mate, Mac, has been put on another committee? I wonder how many that makes. He has so many fingers in so many pies that I think he must be polydactylous!" "And I wonder," said the Gynaecologist, "how he does it. Mac was certainly not one of our most brilliant students, and he has completely lived up to the lack of promise of his undergraduate career. A thoroughly nice fellow, of course, and I like him, but somehow I have never sent him a case for consultation."

The Physician interjected thoughtfully, "Mac is a good example of a long-established general principle. Look at his record. He had about £200 a year when he qualified, and so was able to do three house-jobs when the rest of us could only afford one. Then he helped his chief for six months with a little desultory research, which, combined with a good book memory, enabled him to pick up both the MD and his Membership, on account of which he then got a university assistantship, though everyone knew at the time that there were a couple of better men in for the job, who just had their MB's. That £200 a year gave him a little more leisure than the rest of us, so he was put on that committee on case-statistics and follow-ups, and for the same reason he was made secretary of the Therapeutic Society. His Fellowship followed as a matter of course, and he was a natural choice for the library committee. With all that behind him an application for a what's-its-name research fellowship was of course successful, and his pedestrian investigations gave him three or four papers, and so it went on. Mac dabbled mildly in medical politics, joined the right lodge, and managed to be appointed to a temporary and obscure committee on some Government work, and as he never said very much but produced a turgid set of minutes he got the MBE. From there on progress continued in the same way. I agree that Mac is a very pleasant chap, but every single thing he has done has been completely undistinguished. As I said, his case is a beautiful example of the Biblical aphorism 'To him that hath shall be given.'"

"Well, I'm not jealous," said the Surgeon. "No, I don't think any of us are," replied the Physician. "But the trouble is that this type of thing seems to be inseparable from our method of selecting men for jobs, committees and the like, and it has obvious drawbacks. These are all the more apparent in war-time, and they certainly don't help the war effort." "I never looked at it like that before," said the Gynaecologist, "but there is something in what you say. I suppose it is difficult to choose a clever youngster with a simple qualification over the head of an older man with enough letters after his name to start an alphabet, though he has arteriosclerosis added to a record of unblemished dullness." The Physician sighed. "I don't see how this can be avoided. Since the war I have been reading the Bible, and I have been tremendously impressed by the colossal truth of some of these texts which we accept without thinking about them because they are so familiar—such as the one I quoted. I would like to be a parson; I could preach a sermon on that text." "You very nearly have," murmure the Gynaecologist.

## Letters to the Editor

## MEDICAL PLANNING

SIR,—The future medical service of this country is of great importance to many young practitioners who, like myself, have joined the Forces within one or two years of qualification. In that short period few if any of us had time to prepare for our postwar career, some had ideas of specialisation, others had thought of a future in general practice, but many have no postwar plans at all. A planned medical scheme is the only hope that the profession has of avoiding a wild scramble when the war is over. Any medical scheme in which the paramount concern of the doctor is his own existence is basically wrong. I believe that most of the profession has sufficient interest and enthusiasm for that alone to be a stimulus to highest efficiency once the problem of financial insecurity is solved. In the evolution of our social conscience we have realised at last that the welfare of the community as a whole is of greater importance than the convenience of any one individual or group of individuals. This development has made the idea of a state medical service the natural outcome of our health legislation.

The form that this service is to take has been largely determined by the increasing complexity of modern medicine, and the growing realisation that it is unfair both to patient and doctor for one man with grossly inadequate facilities to be responsible for the health of large sections of the community. With the steady growth of local government schemes of preventive medicine has come the demand for a coherent scheme, which will combine potentially antagonistic forces together. The EMS has shown that the regional basis, ignoring local political boundaries, is apt; and common sense suggests that each region should be associated with a medical school. Co-operation of the whole profession, especially of general practitioners, is essential if the scheme is to work smoothly. The price is some loss of individuality, the reward membership of a team.

J. M. S.

TOTAL *versus* SUBTOTAL HYSTERECTOMY

SIR,—A letter by Dr. Scott Russell in your issue of July 25 (p. 113) referred to the statistics of mortality in an article by McKinnon and Counsellor of the Mayo Clinic on total *versus* subtotal hysterectomy for benign lesions. Since the statistical work of this article was done with assistance of the division of statistics of the Mayo Clinic when I was acting chief, I feel called upon to make some reply to his comments. Contingencies connected with my leaving for service with the Armed Forces prevented my seeing this article before it was published, and I regret certain slight arithmetic errors in carrying out of decimals that however do not bear on the points of controversy raised by Dr. Russell.

In regard to his first general point that even so large a group as 2674 hysterectomies does not entirely remove possible error in making a comparison between subtotal and total hysterectomy, but only reduces it to a minimum, because there may be bias, one can only comment that in this world, especially in the world of medical data, to reduce errors to a minimum is about all one can attempt to do. It can always be said that there *may* be bias. The article by McKinnon and Counsellor is clear enough in the objective basis upon which the analysis was made and the general conclusion as respects mortality is also easily discerned. It is that, for a group of cases in which surgical risk is comparatively small, subtotal hysterectomy is followed by a considerably greater hospital mortality than is total hysterectomy.

This conclusion of the authors is based on the observation of hospital mortality-rates for total and subtotal hysterectomy in the entire series examined, and in a group categorised as of lesser surgical risk according to objective criteria. The statement by your correspondent that the criteria are not given is incorrect; they are given on page 957, though perhaps not as completely as he should like to have them. In the series of 1497 cases with lesser risk, the mortality in the group with subtotal hysterectomy is over four and a half times that for the group with total hysterectomy (0.86 as against

0.19%). Your correspondent has chosen to calculate the statistical significance not of this difference in mortality, from which the conclusion of the original authors was derived, but for the table of the entire series which is heterogeneous as to risk, and for this he calculates a 50% probability for occurrence by chance. If the appropriate statistical calculation is made for the difference between the mortalities, in this group with least risk, one obtains 0.3—that is, a 3% and not a 50% probability for the chance error. This would generally be considered statistically significant.

From another table of the remaining cases, not given by the original authors but produced by your correspondent from their data, he obtains figures from which he reaches the conclusion that "by using the same methods as the authors", there is in nearly half the total cases a higher mortality associated with the total operation than with the lesser procedure. The original figures, therefore, might almost as well have been used to show that the total operation was more dangerous than the subtotal operation." I suppose the word "almost" can cover almost anything, but in this table that your correspondent has produced the mortality for total hysterectomy is only one-tenth again larger than in the subtotal (1.47 as against 1.33%), whereas, in the definitive group with less risk, the rate for subtotal is increased more than threefold over that for total hysterectomy. Actually the difference in the mortalities for total and subtotal hysterectomy for this group of remaining cases in the table produced by your correspondent is nowhere near statistically significant. The conclusion of the original authors—namely, that for cases of least risk there is appreciable and significant difference in mortality in favour of total hysterectomy—seems well warranted in the figures produced.

Therefore, we must not join Dr. Russell in his conclusion that "It seems a pity that the blessing of THE LANCET should have been given to statistics of such questionable value." On the contrary, THE LANCET is to be congratulated on observing their noteworthy merit.

Office of the Air Surgeon,  
US Army.JOSEPH BERKSON,  
Chief, Statistical Division.

## METALS IN FOODS

SIR,—The case quoted in your issue of Dec. 12 (p. 714), in which a purveyor of food-products was charged with selling a table cream containing injurious metals, is most disturbing and suggests that it is time that the Government employed analysts who are not permitted to give expert evidence in the law courts except in cases in which the Crown is involved. It is surely most undesirable that the senior official analyst to the Home Office should be permitted to give evidence on behalf of a private firm accused of poisoning the public by selling an article containing appreciable amounts of metals. This same Home Office official gave evidence recently in a case heard in West Bromwich to the effect that arsenic in amounts up to one-tenth of a grain per pound (ten times the amount of the standard of the Royal Commission) should not be regarded as unsafe. Any man may hold whatever views he likes in England today, but for an analyst in an official position to a Government department to be in a position to make statements so markedly in conflict with the legislature under the Food and Drugs Act, and against the spirit of modern public health teaching, is deplorable.

Warwick.

C. FRASER BROCKINGTON.

## LONG INCUBATION PERIOD OF SYPHILIS

SIR,—In THE LANCET of Dec. 26 Dr. Michael-Shaw related the case of a married woman, aged 24, who showed on May 20 two small sores on the labia, which might be described (as no direct smears were taken) as early secondary condylomata. The positive Wassermann and Kahn tests would confirm this view, taking Jan. 29 as the primary date of infection. We may assume that the primary infection passed unnoticed and that the positive serological test appeared three months after the date of infection—taking for granted, of course, that the patient's statements were true.

Pinner.

J. UNGAR

## Obituary

## EDMUND HENRY COLBECK

O B E, M D C A M B., F R C P, D P H

Dr. E. H. Colbeck, emeritus physician to the London Chest Hospital, who died on Dec. 16, belonged to the old school of cardiologists. He held that a good ear and experience are worth more than all instruments. Meticulous in his study of the pulse and in the timing and assessment of bruits he believed that they were the basis of all that was best in cardiology.



Elliott and Fry.

He was born in 1865 at Batley, where his family owned woollen mills, and he had all the forthright qualities of a Yorkshireman. His father, William Henry Colbeck, migrated to New Zealand and Edmund's childhood was spent between his home there and his Yorkshire relatives. These early ties held firm and during the last war he served with the rank of major in the NZMC as consulting physician to the New Zealand Military Hospital at Walton-on-Thames. He was

educated at Tonbridge School, Nelson and Wellington Colleges and at Caius College, Cambridge, where he obtained a first class in the natural sciences tripos. He went to St. Mary's Hospital with a scholarship and graduated MB in 1889. After holding a house-appointment under Sir William Broadbent at St. Mary's and a clinical assistantship in Vienna he began his long association with the great chest hospital at Victoria Park. He was physician there for over forty years and chairman of the house committee, which he ruled with absolute fairness but with a rod of iron, for about half that time. He was a forceful personality and inflexible of purpose but his housemen knew his great kindness and were grateful for his keen understanding of their problems. At Allbutt's invitation he became an additional examiner in medicine at Cambridge University. His *Diseases of the Heart* was published in 1901 and his *Science and Art of Prescribing* in the following year. When he retired from the hospital in 1937 his colleagues presented him with a fine crayon drawing of himself by Rothenstein.

Outside the hospital Colbeck's chief interest was golf, and under the pseudonym of The Burnham Hare he published *The Golfer's Swing*, a subject on which he was qualified to speak, for after an injury to his knee which would have incapacitated most people he taught himself to play left-handed until he regained his scratch handicap. He married Miss Susanna Mary Winearis and had a son and a daughter.

## HAROLD MEREDITH RICHARDS

M D LOND

Dr. Meredith Richards, who died at Oxford on Christmas Day in his seventy-ninth year, ranks as one of the leaders of the new public-health movements of this century and as an early advocate of medical inspection in schools. A man of wide culture he had unexpected reserves of learning and interests, and though his modesty led him to make light of his gifts they were recognised and appreciated by his colleagues at the Ministry of Health.

Richards was born at Cardiff and had joined the coal export business of one of his kinsmen when the opening of the University College of South Wales led him to play truant from commerce. Soon he went on to University College, London, and qualified from UCH in 1891. He took his MD the following year and the MD in state medicine with the rare distinction of the gold medal in 1893. After some house appointments he entered the public-health service and became MOH for Chesterfield and later for Croydon where the new borough gave him scope for enterprise. His administrative abilities—he was always kind and considerate in his dealing with others—and his writings and reports soon won recognition and it was a popular appointment when in 1911 he

returned to Cardiff as deputy chairman of the Welsh Insurance Commissioners. This association of a public-health authority with clinical medicine expressed the purport of insurance work and he did much to develop the medical side of the Welsh insurance scheme and to place it on secure foundations. In 1920 he was called to Whitehall to place his wisdom and experience at the disposal of the new Ministry of Health. As a trusted adviser on the medical and hospital aspects of the Local Government Act of 1929 his retirement was postponed at the request of Mr. Neville Chamberlain till the transfer of the poor-law hospitals to the county councils should be under way. But he had always overworked and now a temporary illness warned him that exacting official work on his high standard should be relinquished. He retired in 1930 to spend many happy years among his books, and though he was not physically robust he could outlast many younger men at his hobbies of walking and gardening. He married Mary Cecilia Todd and they had four sons, one of whom, Dr. A. Meredith Richards, is in practice in Oxford.

## A NOTE ON THE ESTIMATION OF SERUM BILIRUBIN &amp; SULPHANILAMIDE

WITHOUT PRECIPITATION OF PROTEINS  
F. RAPPAPORT F. EICHHORN

Beilinson Hospital, Petah Tikva, Palestine

Most procedures in current use for the estimation of bilirubin and sulphanilamide require preliminary removal of the proteins from the diluted serum or cerebrospinal fluid, followed by the measurement of a diazo colour in the filtrates. Deproteinisation has two disadvantages—it is tedious and, at least in the case of bilirubin, may lead to loss in the precipitate of some of the constituent being determined. Jendrasik and Cleghorn<sup>1</sup> found that the use of caffeine sodium benzoate made the precipitation of proteins unnecessary, but the occasional clouding of the coloured solution with precipitated benzoic acid may make colorimetry difficult. Evelyn and Malloy<sup>2</sup> overcame the difficulty by diluting the serum with aqueous methyl (instead of the usual ethyl) alcohol before diazotisation. This procedure is highly successful, but the colours are pale, due to the high dilution, and require a photoelectric colorimeter. In the present procedures a citric-acid buffer, with added caffeine and urea, is used to keep the proteins in solution, and to render the "indirect" bilirubin reactive. This mixture has the added advantage that the colours are developed at a constant pH, thus eliminating any variations in the colours which may arise because of the indicator nature of the dye substances formed by the diazo reaction.

## I. Bilirubin

The reagents required are as follows:

I. *Diazo mixture*.—Diazo 1: 1 g. sulphanilic acid is suspended in a little water and dissolved by the addition of 15 c.cm. fuming hydrochloric acid; water is added to 1000 c.cm. Diazo 2: A 0.5% solution of sodium nitrite; this solution must be kept on ice; it keeps only a limited time and must be renewed when the diazo dye obtained with bilirubin has a violet tinge. To prepare the fresh reagent mix 10 c.cm. of diazo 1 with 2 c.cm. of diazo 2.

IIa. *Buffer solution for total bilirubin*.—15 g. citric acid; 5 g. sodium citrate tribasic; 5 g. pure caffeine; 24 g. pure urea. On a warm-water bath dissolve all these reagents in 60 c.cm. of water, cool and dilute to 100 c.cm.; this solution keeps well.

IIb. *Buffer solution for direct bilirubin*.—24 g. pure urea; 0.9 g.  $\text{KH}_2\text{PO}_4$ ; 18 c.cm.  $\text{N}/15 \text{H}_3\text{PO}_4$ . Dissolve and make up to 100 c.cm. with distilled water.

III. *Standard solutions*.—2.16 g. purest anhydrous cobalt sulphate is dissolved in water and made up to 100 c.cm. in a measuring flask.

IV. Normal bilirubin-free serum is diluted 1:5 with diazo 1.

## TOTAL BILIRUBIN

Place 0.5 c.cm. of serum in a test-tube. Add 0.25 c.cm. of freshly prepared diazo 1. Observe if within a few minutes a colour change develops. Finally add 1.75 c.cm. of the bilirubin buffer mixture (IIa). Depend-

1. Jendrasik, L. and Cleghorn, R. A. *Biochem. Z.* 1936, 289, 1.  
2. Evelyn, K. and Malloy, H. T. *J. biol. Chem.* 1937, 119, 481.



ing on the bilirubin concentration, a red colour develops either at once or at the latest after 15 minutes.

In the direct reaction ("direct" bilirubin) the colour change occurs after diazotising only. In the indirect reaction ("indirect" bilirubin) the red colour appears only after the addition of the bilirubin buffer mixture. When the intensity of the colour has reached its maximum, which, as stated, takes place at the latest after 15 minutes, the material examined is poured into the cup of a micro-colorimeter and compared with the standard.

Serum especially rich in bilirubin whose colour intensity surpasses that of the standard solution must be diluted either before diazotising with physiological salt solution, or after diazotising with buffer solution IIa. The degree of dilution must be considered in the calculation. When the bilirubin content of the serum is low (below 2.5 mg. per 100 c.cm.), there is a difference in the shade of the colour in the colorimeter, so that at times a comparison of the solutions becomes impossible. This, however, may be remedied by using the serum diluted as in reagent IV, as a blank in a compensating visual micro-colorimeter or in a photoelectric instrument. This solution serves to neutralise the difference in colour between the standard and the unknown.

#### Calculation.—

$$\text{Mg. bilirubin per 100 c.cm.} = \frac{\text{Reading of standard} \times 2.5}{\text{Reading of test}}$$

#### DIRECT BILIRUBIN

It may be of interest to determine the direct bilirubin quantitatively in cases where both "direct" and "indirect" bilirubin are present in one serum. Usually on finding a positive direct reaction the amount of indirect bilirubin which may be present as well is neglected, and the mg. of bilirubin per 100 c.cm. given as the result includes both kinds of bilirubin.

To measure the direct bilirubin only, we add instead of buffer solution IIa after diazotising the serum the same amount (1.75 c.cm.) of buffer solution IIb, which does not contain any compound with alcoholic groups, thus preventing the development of indirect bilirubin.

This buffer solution IIb fulfils the same task of keeping the proteins in solution and the diazo dye at a constant pH. In cases of a direct positive reaction we do two tests, one with buffer IIa and one with buffer IIb. The result obtained after subtracting "direct" from total bilirubin gives the amount of indirect bilirubin present. For example: 5.7 mg. total bilirubin per 100 c.cm. minus 3.2 mg. direct bilirubin per 100 c.cm. gives indirect bilirubin of 2.5 mg. per 100 c.cm.

#### II. Sulphanilamide

The reagents required are as follows:

1. N. hydrochloric acid.
2. 0.5% aqueous sodium nitrite solution.
3. Buffer solution: as for bilirubin—buffer solution IIa.
4. 0.4 g. dimethyl- $\alpha$ -naphthylamine is dissolved in 100 c.cm. of 98% alcohol. The solution lasts a very long time if kept on ice.
5. Aqueous sulphanilamide solution containing 100 mg. per 100 c.cm. If determination of a sulphanilamide derivative is wanted, a similar solution of that substance is used.

#### DETERMINATION OF SULPHANILAMIDE IN SERUM

**Unknown solution.**—0.25 c.cm. of serum is put in a test-tube; 0.05 c.cm. of solution 1 and 0.05 c.cm. of solution 2 are added. The mixture is allowed to stand for three minutes, then 2 c.cm. of the buffer solution 3 and 0.1 c.cm. of solution 4 are added.

**Standard solution.**—0.75 c.cm. of serum, free of sulphanilamide, is added to 0.15 c.cm. of solution 1, 0.15 c.cm. of solution 2 and 0.06 c.cm. of solution 5 and are left standing for three minutes; 6 c.cm. of the buffer solution 3 and 0.3 c.cm. of solution 4 are added.

All easily comparable red-violet colours develop immediately. Should the colour of the unknown solution be too intense, it may be diluted with water.

If the content of sulphanilamide is determined in icteric or hæmolytic sera, a difference of colour appears between the unknown and the standard solution. This can be eliminated by putting a colorimetric cup of the diluted serum under examination behind the standard solution in a compensating colorimeter.

#### Calculation.—

$$\text{Mg. sulphanilamide per 100 c.cm.} = \frac{\text{Reading of standard} \times 8}{\text{Reading of test}}$$

The factor 8 results from the following calculation: 0.25 c.cm. of serum corresponds to 0.02 c.cm. of the 100 mg. per 100 c.cm. sulphanilamide solution. Therefore 1 c.cm. corresponds to 0.08 mg. and 100 c.cm. to 8 mg.

#### DETERMINATION OF SULPHANILAMIDE IN URINE

Besides the free sulphanilamide acetylated sulphanilamide often appears in urine. This does not take part in the reaction, and can be determined only after hydrolysis with HCl.

**Determination of free sulphanilamide.**—Use 0.25 c.cm. urine, diluted ten times; 0.2 c.cm. N/HCl; and 0.05 c.cm. of the nitrite solution. The further procedure and the calculation are the same as in the determination in serum. For the standard solution water is used instead of serum.

**Determination of total sulphanilamide.**—0.25 c.cm. urine, diluted ten times, is boiled with 0.2 c.cm. of N/HCl for thirty minutes in the water bath or in the steam steriliser. After cooling, 0.05 c.cm. of the sodium nitrite solution is added, and the sulphanilamide is determined as above.

The difference between the total and the free sulphanilamide gives the quantity of acetylsulphanilamide in the urine.

#### DETERMINATION OF SULPHANILAMIDE IN CEREBROSPINAL FLUID

In cerebrospinal fluid sulphanilamide may also be found in the acetylated form. The determination should therefore be done as in urine, 0.2 c.cm. N/HCl being added to every 0.25 c.cm. of CSF. One of the test-tubes is first boiled for 30 minutes in the water bath or steam steriliser. After cooling, 0.05 c.cm. of nitrite solution 2 is added to both tubes, and the sulphanilamide content is determined. The difference between total and free sulphanilamide gives the quantity of acetylsulphanilamide.

#### SUMMARY

Methods for determining bilirubin in serum and sulphanilamide in serum, urine and cerebrospinal fluid are described. Precipitation of protein is avoided by choosing suitable reagents. The pH is kept constant by the use of a buffer solution. Thus the colours of the solutions under examination can always be reproduced true to tone.

We are grateful to Miss E. Setter for her assistance in performing these experiments.

#### Infectious Disease in England and Wales

WEEK ENDED DEC. 26

**Notifications.**—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2054; whooping-cough, 837; diphtheria, 731; paratyphoid, 3; typhoid, 6; measles (excluding rubella), 10,888; pneumonia (primary or influenzal), 671; puerperal pyrexia, 111; cerebrospinal fever, 64; poliomyelitis, 7; polio-encephalitis, 0; encephalitis lethargica, 3; dysentery, 103; ophthalmia neonatorum, 60; No case of cholera, plague or typhus fever was notified during the week.

**Deaths.**—In 126 towns there were 1 (0) deaths from enteric fevers, 16 (0) from measles, 4 (1) from scarlet fever, 8 (1) from whooping-cough, 14 (1) from diphtheria, 23 (3) from diarrhoea and enteritis under two years, and 38 (5) from influenza. The figures in parentheses are those for London itself.

Bradford reported the fatal case of an enteric fever. There were 3 deaths from diphtheria at Liverpool. Birmingham had 5 deaths from influenza and Manchester 4.

The number of stillbirths notified during the week was 185 (corresponding to a rate of 41 per thousand total births), including 24 in London.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

## Notes and News

## ENDOMETRIOSIS OF THE VAGINA

ENDOMETRIOSIS of the rectovaginal septum perforating into the vagina is rare, and presents special problems in treatment. J. C. Ahumada, J. A. Salaber and A. E. Nogués<sup>1</sup> have recently observed 4 cases. The patients' ages ranged from 32 to 43 years; 2 complained of metrorrhagia, one of painful menorrhagia with rectal tenesmus and the fourth of continuous lower abdominal pain with frequency and rectal tenesmus. In 3 of the patients a hard, granular mass projected into the vagina from the posterior wall; in the fourth a thickened band was present in the posterior fornix, dragging the upper part of the cervix backward, but the mucosa over it was not perforated. In 3 cases a Wertheim operation was successfully performed; in the fourth case the tumour mass was first freed per vaginam and then removed through an abdominal incision, and the vagina sutured. Pathological examination of the tumour in each case showed typical endometriosis—that is to say, neoplastic formation, partly solid and partly cystic, and containing numerous areas of hæmorrhagic extravasation. The tumour is believed to be derived from ectopic endometrial tissue, and the microscopic structure resembles endometrium, consisting of glandular spaces embedded in a stroma composed of fibrous tissue and smooth muscle. In one instance a primary focus was found in the uterus, from which the disease had extended to the rectovaginal septum. In the three other cases the condition appeared to be primary, and no lesion was found elsewhere in the genital tract. The authors emphasise the diagnostic value of preliminary biopsy in doubtful cases; it was practised once in their series. Radical operation is the treatment of choice. If for reasons of age or infirmity surgery is contra-indicated, or if the disease is too extensive for complete removal, radiotherapy may be tried.

## Queen's University, Belfast

At a recent graduation the following degrees were conferred: MD—D. P. Gurd (with high commendation); \*J. C. Bowe, \*W. S. Empey.

MB, BCh, BAO—Mary I. Allen, Moira Armstrong, Robert Calwell, Joan S. Deans, Elisabeth Elliott, W. L. Esler, Leslie Goldring, Joan I. M. Macauley, W. F. McAuley, F. H. McMullan, J. W. Mathews, William Pitt, M. E. Quiry, J. G. Quigley, R. H. Ramsay, F. J. Rath, J. H. Scott, Benzion Shein, V. J. Sterling, W. M. Sweeney, Adelaide M. W. Walker, D. A. Weir, Martha N. A. Wilson, K. W. Wolfe. \* In absentia.

## Royal Faculty of Physicians and Surgeons of Glasgow

Mr. R. W. Watson-Jones will deliver a John Burns lecture in the hall of the faculty, 242, St. Vincent Street, Glasgow, on Wednesday, Jan. 13, at 4 PM. His subject will be surgical and rehabilitation treatment of bone and joint injuries.

## Pharmaceutical Society of Great Britain

Mr. F. H. Cotton, AIC, will deliver a lecture on synthetic rubbers at the house of this society, 17, Bloomsbury Square, London, W.C.1, on Thursday, Jan. 14, at 7 PM.

## Faculty of Radiologists

A meeting of the therapy section of the faculty will be held on Saturday, Jan. 16, at 10.15 AM, at 32, Welbeck Street, London, W.1, when Mr. E. W. Riches, Mr. I. G. Williams and Dr. Alexander Haddow will open a discussion on the treatment of carcinoma of the prostate.

## Royal Society of Medicine

The section of pathology of this society will meet at St. Mary's Hospital, Paddington, on Tuesday, Jan. 12, at 2.30 PM. At a meeting of the section of physical medicine to be held at the house of the society on Jan. 13, at 2.30 PM, Prof. H. A. Harris will read a paper on the anatomical basis of physical medicine. On Jan. 15, at 3.30 PM, the section of obstetrics and gynaecology is to discuss the radiological diagnosis of disproportion. The openers will be Prof. Chassar Moir and Dr. E. Rohan Williams. At 4.45 PM, on the same day, at the section of radiology Air-Commodore Stanford Cade, Dr. Robert McWhirter and Mr. J. Jackson Richmond will open a discussion on the value of irradiation in association with surgery in the treatment of carcinoma of the breast.

1. Ahumada, J. C., Salaber, J. A. and Nogués, A. E. *Rev. Cirug. B. Aires*, 1942, 21, 121.

## Control of Rubber Gloves

Circular 2740 of the Ministry of Health announces that the following maximum purchases of rubber gloves will be allowed during 1943: for doctors 6 pairs; midwives 6 pairs; district nurses not practising as midwives 4 pairs; nurses in private practice 2 pairs. Doctors may obtain their booklets of six certificates from the Central Medical War Committee, but applications for supplementary rations should be made to the regional offices of the Ministry.

## Charles L. Mayer Awards

The National Science Fund of America has created two \$2000 prizes to be known as the Mayer awards which will be presented for outstanding contributions during last year and this year to our knowledge of factors affecting the growth of animal cells, with particular reference to human cancer. Contributions may have been published or may be submitted direct to the fund at 515, Madison Avenue, New York City.

## Medical Casualties

The following medical men who were reported missing at Singapore are now known to be prisoners of war:

Captain A. Y. Adam, MB Edin., RAMC; Major P. R. Graves, MD Lond., RAMC; Captain W. J. Street, MRCS, RAMC; Captain K. W. Todd, MRCS, RAMC; and Dr. H. R. Morrison.

Captain C. W. Peck, MRCS, RAMC, is also reported missing at sea in October.

## British Institute of Philosophy

On Friday, Jan. 22, at 4 PM, Prof. Herbert Dingle, DSc, will deliver a lecture at 14, Gordon Square, London, W.C.1, under the auspices of the institute. He will speak on space and time in modern physics.

## Appointments

MILLER, MABEL G., MB EDIN., DROOG: temp. asst. MOH for Twickenham.

\*SMITH, D. H., MB ST. AND.: deputy superintendent for Abergele Sanatorium.

\* Subject to confirmation by the Manchester City Council.

## Births, Marriages and Deaths

## BIRTHS

HARRIS.—On Dec. 26, in London, the wife of Dr. J. R. G. Harris—a daughter.  
 HAVARD.—On Dec. 29, in Oxford, the wife of Dr. R. Emlyn Havard, of Headington, Oxford—a son.  
 HOLLINS.—On Dec. 25, at Melling, near Carnforth, the wife of Dr. Charles Hollins—a daughter.  
 IRWIN.—On Dec. 31, in London, the wife of Captain S. T. Irwin, RAMC—a daughter.  
 MADDEN.—On Dec. 27, at Colchester, the wife of Dr. J. G. Madden, of Tollesbury, Essex—a daughter.  
 MASON.—On Dec. 31, at Minster-in-Sheppey, the wife of Mr. J. I. C. Mason, FRCS—a daughter.  
 PROPERT.—On Dec. 25, at Colchester, the wife of Dr. Sydney ProPERT—a son.  
 ROBERTSON.—On Dec. 26, at Wimbledon, the wife of Captain J. A. Robertson, RAMC—a daughter.  
 ROBINSON.—On Dec. 25, at Aylesbury, the wife of Captain Philip Robinson, RAMC, of Wendover—a son.  
 WATERS.—On Dec. 26, to Dr. Cicely Waters (née Weatherall), and Dr. E. T. Waters, RCAF—a son.  
 WENYON.—On Dec. 25, at Herne Bay, the wife of Captain E. J. M. Wenyon, RAMC—a daughter.

## MARRIAGES

COSIN—STEBBINGS.—On Dec. 24, C. Frank Cosin, MRCP, of Langland Gardens, NW3, to Pamela Stebbings, only daughter of Mr. and Mrs. H. V. Stebbings.  
 COSIN—STEBBINGS.—On Dec. 19, Lionel Cosin, FRCS, of Orsett Hospital, to Mrs. Pamela Stebbings, daughter of Mrs. Keenlyside.  
 HELE—DAVIS.—On Dec. 31, at Cambridge, Thomas Shirley Hele, FRCP, to Audrey Louise.  
 KIRKMAN—McCABE.—On Dec. 27, at Staplehurst, Albert Henry Beaumont Kirkman, FRCS, to G. Evelyn McCabe, MD.  
 LEIPER—THOMAS.—On Dec. 31, at Tottenham, Edwin James Reid Leiper, MRCP, to Margaret Dilys Thomas, MB, both of Haymeads Hospital, Bishop's Stortford.  
 MCCURDY—O'CONNELL.—On Dec. 26, at Oxford, Robert McCurdy, MB, surgeon MN, to Joan Daphne O'Connell.

## DEATHS

ALLEN.—On Dec. 28, at Letchworth, Frank James Allen, MA, MD Camb, formerly professor of physiology, Mason College, Birmingham, aged 88.  
 KILLERY.—On Dec. 18, in Salisbury, Rhodesia, St. John Browne Killery, MRCS, lieutenant-colonel RAMC ret'd., aged 74.  
 LEACH.—On Dec. 26, at Llandrindod Wells, Abraham Richard Leach, MB EDIN.  
 SPENCER.—On Dec. 31, at Alcester, Warwickshire, Richard Henry Spencer, MD, MS, MAO, RUJ.  
 THOMPSON.—On Dec. 27, at Allestree, Derby, George Kenworthy Thompson, MB MANC, DPH, aged 55.

## ADEQUATE TREATMENT OF GONORRHOEA WITH SULPHATHIAZOLE

F. J. G. JEFFERISS  
M R C SG. L. M. McELLIGOTT  
M A OXF, M R C SSQUADRON-LEADER RAFVR; WING-COMMANDER RAFVR; SENIOR  
SPECIALIST IN VENEREAL DISEASES AT A RAF HOSPITAL SPECIALIST IN VENEREAL DISEASES,  
ROYAL AIR FORCE

SULPHATHIAZOLE is now well known as an anti-gonococcal bacteriostatic agent that rivals sulphapyridine, not only in efficiency but also in lack of toxicity, but no extensive trial of it has yet been possible owing to the short supply of the drug. Promising results in a small number of cases were obtained in 1940 by Lloyd and Erskine and by Batchelor, Murrell and Thomson, but it has not hitherto been possible to verify the spectacular claims of Gaté and Cuilleret (1940) in France and Miescher (1940) in Switzerland.

In the autumn of 1941 this hospital was fortunate in obtaining a limited supply of the drug which increased during the next few months. Before this became available, we had for many months successfully treated 87% of our cases of acute uncomplicated gonorrhoea with one five-day course of sulphapyridine, 6 g. being given on the first day and 4 g. on each of the other four days, making a total of 22 g. It was therefore decided to follow in Miescher's footsteps, and by gradually reducing the period of medication to determine the minimum time in which we could produce with sulphathiazole results at least as good as those we had obtained with sulphapyridine.

We have analysed 567 cases of acute uncomplicated gonorrhoea treated with sulphathiazole, the vast majority being first infections, all cases in which there was any likelihood of relapse from a previous attack being excluded. The results of the various schemes of treatment are tabulated. It will be seen that most of the patients were treated for three days or less, for once it became apparent that good results followed the shorter courses, those of four and five days were discontinued; 155 cases had an extra 2 g. added to their first dose (i.e., those who had 8 g. in the first 24 hours) but this was later abandoned as the end-result showed no obvious improvement.

Whatever scheme of dosage was employed, the drug was given four-hourly night and day, in order that the concentration in the blood might be continuously maintained at a high level, but more recent experience suggests that this practice is unnecessary and that medication may safely be confined to the waking hours. No adjuvant treatment such as irrigation was given and no dietetic taboos were enforced, but a daily fluid intake of at least five pints was insisted on. Morning smears were frequently examined by one of us.

There is a remarkable similarity in the results obtained by each scheme until the period of medication is reduced to twelve hours; then there is a well-marked deterioration, even though the majority of the cases received 10 g. of the drug. It was noted that every case showed some initial response, that gonococci were very rarely seen in the smear after twelve hours, and that if they did reappear they almost invariably did so within three or four days of the cessation of chemotherapy.

The successful cases, who had three days' treatment or less, were able to leave hospital about a week after admission. None of them did so until his discharge had finally ceased and his morning urine had become clear and free from "threads"; this process was usually not complete until about three or four days after the end of treatment. The urethra probably takes a few days to recover from the effects of a bacterial infection after the cause has been removed, and the presence of some pus cells in the urethral secretion and "threads" in the urine after chemotherapy need cause no anxiety, provided these do not persist beyond the tenth day.

Cultural control was not carried out and the possibility of temporarily non-pathogenic gonococci surviving cannot be excluded, though from what we have seen during the follow-up period we consider this extremely unlikely.

After leaving hospital, patients report weekly to their unit medical officers for six weeks' observation, at the end of which time they return to an approved centre for tests of cure. These include examination of the prostate and its secretion, palpation of the urethra over a curved metal sound, and a provocative injection of gonococcal vaccine (500 million), after which the patient shows his morning urine to his unit medical officer for three successive days. As an additional precaution every patient reports again to the centre for a final examination after a further six weeks. It has however been our experience that these classical methods of provocation are singularly ineffective and that the very few relapses we have noted do not seem to be in any way connected with them.

For the purpose of this investigation we have called a case a "non-gonococcal failure" if an apparently non-gonococcal discharge persisted, or the urine remained hazy for more than ten days. A case that left hospital without a discharge but returned later with one in which no gonococci could be found is referred to as a "non-gonococcal relapse." Although these cases are always viewed with the gravest suspicion and the possibility of concealed gonococcal infection cannot be altogether excluded, it is somewhat significant that they did not react to further chemotherapy and were ultimately cured by mild local treatment and increased fluid intake, and—perhaps most important of all—the lapse of time. It is not unreasonable to suppose that these cases may have been originally infected with secondary organisms

## RESULTS OF TREATMENT OF 567 CASES OF GONORRHOEA WITH SULPHATHIAZOLE

Four-hourly dosage (g.)	Duration of treatment	Cases treated	Successful cases	Unsuccessful cases	Analysis of unsuccessful cases			
					Early gonococcal relapses*	Late gonococcal relapses†	Non-gonococcal failures and relapses	Gonorrhoeal complications‡
<i>Courses of 2 days or more.</i>								
8, 6, 6, 4, 4 .. ..	5 days	20	19	1	0	0	1	0
6, 6, 6, 6 (12 cases) .. } 8, 6, 5, 5 (16 cases) .. }	4 days	28	26	2	0	1	1	0
6, 6, 6 (143 cases) .. } 8, 6, 6 (76 cases) .. }	3 days	219	197 (90%)	22 (10%)	11 (5%)	3	6	2
6, 6 (100 cases) .. } 8, 6 (43 cases) .. }	2 days	143	128 (89.5%)	15 (10.5%)	8 (5.6%)	1	6	0
Total .. ..	..	410	370 (90.2%)	40 (9.8%)	19 (4.6%)	5 (1.2%)	14 (3.4%)	2 (0.5%)
<i>Courses of 12 hours or less.</i>								
4, 2, 2, 2 .. ..	12 hours	44	37	7	4	2	1	0
5, 3, 2 .. ..	8 hours	100	81	19	13	0	6	0
3, 3 .. ..	4 hours	13	11	2	2	0	0	0
Total .. ..	..	157	129 (82.2%)	28 (17.8%)	19 (12.1%)	2 (1.3%)	7 (4.4%)	0
Grand total .. ..	..	567	499 (88%)	68 (12%)	38 (6.7%)	7 (1.2%)	21 (3.7%)	2 (0.35%)

\* Occurring while in hospital. † Occurring after leaving hospital. ‡ Occurring after treatment started.  
Percentages are considered significant only when the number of cases analysed exceeds 100.

as well as with gonococci. Primary non-gonococcal urethritis from one cause or another is not an uncommon condition, and there is no reason why it should not occasionally exist in conjunction with gonorrhoea.

None of the serious toxic effects of sulphathiazole treatment has been observed, though a few cases of drug rash appeared among the unsuccessful cases when further chemotherapy was attempted. Two of these were of the erythema nodosum type. Though many of the patients admitted to a slight headache, nausea, or a "feeling of heat" during treatment, few of them complained, and the symptoms were as transient as they were insignificant.

#### CONCLUSIONS

From an analysis of 567 cases of acute gonorrhoea treated with various courses of sulphathiazole this drug appeared to be more effective than sulphapyridine, and a success rate of 89.5% was achieved with a course of 6 g. a day for two days. These findings confirm the opinions of Colonel L. W. Harrison (1942) and to a certain extent the reported claims of the German Army venereologists (Heyn 1942, Iaggesele 1942, Morschhäuser 1942).

Gonococcal relapses almost invariably declare themselves within four days of the cessation of chemotherapy.

Sulphathiazole is far less toxic than sulphapyridine and the duration of treatment is shortened by its use; thus, the outpatient is more likely to complete his treatment and the Service man is returned to duty sooner.

We wish to thank the Director-General of Medical Services, Royal Air Force, and Group-Captain W. E. Barnes, officer commanding the hospital, for permission to publish this article.

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## FAILING LACTATION

### A STUDY IN 1100 CASES

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 ASSISTANT MEDICAL OFFICER OF HEALTH FOR LIVERPOOL

In the infant-welfare centre at Norris Green during 1938-40 detailed notes on 1100 consecutive cases of premature weaning were taken at the time of the failure to continue breast-feeding. All cases of cessation of breast-feeding before the end of the seventh month were considered premature. About 40% of the women could give no reason for their failure to continue breast-feeding and no reason could be found on examination; the milk just "dried up" and resisted all efforts to increase it. Most of these cases were carefully watched throughout the entire period of failure in the hope that some cause would be revealed. A little over 4% had only a temporary failure due to worry, cracked nipples, or acute illness in the mother or baby.

#### NORMAL LACTATION

The following description of the normal lactation cycle is the result of many observations made on women who were successfully feeding their infants.

1. The *period of filling* lasted about 10-30 minutes, and during it the mother became increasingly aware of a sense of heaviness in her breasts; this seems to be due to an increase in the fluid rather than the solid part of the milk, for it develops suddenly and is not present in the solid type of failure (see later); before the heaviness is felt no milk can be pumped out. The rate of filling was peculiar to each woman, and in some did not begin until the infant had begun to suck. Tgetgel (1926) mentions a similar increase in pressure in the udders of cows.

2. The *period of emptying* usually lasted 5-7 minutes, and rarely as long as 10 minutes where the breast and nipple were normal. During this period the pressure in the breast falls and the sense of heaviness disappears. The emptying of the breast was brought about by the rhythmic pumping out of the milk at the rate of 40-60 jets per minute. The jets seemed to vary in force and

length, according to the fullness of the breast; and the rate of emptying of the breast depended on the force exerted by the pumping mechanism and the quantity of secretion present.

The pumping could start spontaneously either: (a) in both breasts, if, by withholding the baby at its usual feed-time, they were allowed to become over-full (i.e., when the pressure reached a certain level the pumping started); or (b) in one breast, while the other was being stimulated by suckling or by expression. Schäfer (1913) has shown that the injection into lactating women of an extract of the posterior lobe of the pituitary caused in a few seconds "contraction of the muscles of the mammary glands" and the discharge of milk. Recently, Swanson and Turner (1941) have reported, in animals, the presence of smooth muscle cells around the mammary alveoli as well as in the duct tissue. If these smooth muscle cells were present in women (I cannot find any reference to them) this would explain the rhythmic pumping out of the milk by means of peristaltic waves along the ducts and alveoli. Since smooth muscle may be affected by emotion, this would also explain the sudden temporary suppression of the milk which is known to be brought about by worry, fear and anger. The centre for the initiation of the pumping seems to lie beneath the extra-areolar ring. Pumping could be elicited on stimulation of this area by the pressure of the baby's gums, or of the observer's forefinger and thumb. This pumping is probably the same as the "letting down" of the milk in the cow, which Hammond (1936) says is the result of nervous impulses excited by stimulation of the teats. The mothers were able to tell when their breasts were empty in the first two months after parturition by the cessation of what they termed "pringling" in the breast, and in the later months by the disappearance of the sense of heaviness.

A few women felt neither pringling nor any heaviness after the second week of lactation, and yet had an adequate milk-supply. These were the cases in which suckling and filling occurred simultaneously. Since pumping always takes place from both breasts at the same time, stimulation of the pumping centre of one breast probably causes impulses to be sent to the posterior pituitary gland, whose secretion will circulate through the two breasts at about the same concentration and will therefore stimulate the hypothetical smooth muscles of the ducts and alveoli of both breasts simultaneously.

Some doubt was cast on this theory by Smith (1932) and Houssay (1935) because removal of the posterior pituitary did not interfere with lactation. However, Gomez (1939) reported that lactating hypophysectomised rats could be maintained in lactation by suitable replacement therapy (anterior pituitary), though the young seemed unable to obtain the milk present in the gland. Injections of posterior pituitary extract (PPE) along with the daily "lactation-maintaining" therapy (anterior pituitary) permitted the young to get the milk from the mammary glands. Later Gomez (1940) found that eight-hourly injections of PPE plus "maintenance therapy" allowed the young rats to be reared to weaning age. Withdrawal of PPE at any time during the course of the experiment was immediately followed by a rapid loss of weight in the young, and death unless the injections were recommenced.

3. A *refractory period* set in after the breast had been emptied, and lasted 2½-3 hours. During this period manual expression produced small beads of milk on the nipple, but no pumping could be elicited. Schäfer (1914-15), having previously (1913) shown that one injection of PPE emptied the breast, found that a second injection given soon after the first did not produce any milk. Folley (1940) mentions the various ductless glands which have been shown to take part in lactation. Later (1941) he states that the oestrogenic hormones increase the percentage of solids in the milk as well as inhibiting secretion. They may also govern the length of the refractory period, during which it is possible that the milk solids are manufactured, whereas the fluid is secreted during the period of filling.

#### TYPES OF FAILURE

The types of failure were the same in cases where a reason was found for failure as in those which remained unexplained.

1. *Dry.* (a) *Partial failure.*—This was not uncommon to find the milk secretion failing to increase with the needs of the infant. If the deficiency was made good by supplementary bottles, this low level of secretion would often continue for the full 9 months. Engel (1941) showed how the quantity of breast tissue present varies from woman to woman, which may have some bearing on this type of inadequate lactation. According to Mixner, Lewis and Turner (1940) this would be due to deficient mammogen I and II during pregnancy.

(b) *Complete failure.*—This, the commonest type of failure, was characterised by either a sudden or a gradual cessation of both the solid and the liquid part of the secretion in one or both breasts, and appeared at any time during the 9 months. Where lactation had been established in both breasts, the failure in one heralded the failure in the other; but where lactation had only been established in one breast, that breast usually continued to lactate satisfactorily for the full 9 months. The failure was sometimes so sudden that at one feed there was plenty of milk and at the next there was none. As in the refractory period of the lactation cycle, one could always express a few drops of milk, but there was neither a sense of heaviness nor could any pumping be elicited. In other words, the filling and the emptying stages of the normal lactation cycle had either ceased altogether or were delayed for anything up to 24 hours (i.e., giving one feed a day). More often than not, when the filling stage of the lactation cycle did return the rate of secretion was slower and the total output smaller. In this type of failure the controlling mechanism of the whole lactation cycle seemed to be at fault.

Tallerman and Hamilton (1928) found from a series of analyses of successful lactations that the average volume of the midday breast-feed was only slightly more than half that of the early morning feed, while the last feed at night tended to be a little larger than the midday feed. It seems therefore that the gradual failure of lactation was not a uniform lowering of the normal rate of secretion, for as a rule the first feed to become deficient was the last one at night, and the others usually failed in the following order—6 PM, 12 noon, 3 PM. Many women retained the first feed in the morning and the last one at night for some time after the others had ceased. In my experience, regular suckling at the empty breast did not prevent failure, but rather hastened it owing to the worry it entailed. This should be distinguished from the above-mentioned partial failure, which is preserved by the regular emptying of the partially filled breast.

That the amount of milk secreted is in inverse proportion to the amount of muscular exercise taken was observed in the women suffering from a gradual failure of lactation. In these women the number of supplementary feeds varied from day to day—e.g., on cleaning and washing days the baby was mainly bottle-fed, whereas on days of more sedentary occupations fewer and smaller supplementary feeds were required. The order in which the feeds began to fail and the order of the household duties seemed to bear a constant relationship to one another. The relaxation of the muscles produced by a hot bath commonly caused lactorrhœa, while fear, anger and loss of sleep caused suppression of the secretion.

2. *Wet.*—During the period of failure, or just before it, these mothers complained that their milk had turned to 'blue water.' This was accompanied by soft breasts and a distressing lactorrhœa which was almost continuous. In fact, the smooth muscle (if it is present) in the duct walls seemed to have become over-active in the same way as does that of the bowel in diarrhœa. In other words, the breasts could not retain the milk secretion owing to excessive peristalsis. Both breasts were usually affected, the failure being gradual and occurring but rarely after the fourth month of lactation. It seems here that the ductless glands which control the filling and the emptying periods of the lactation cycle were over-active.

3. *Solid.*—A small number of mothers who ceased to breast-feed before the end of the sixth week complained that their babies refused to empty, and even in some cases to suck, at their breasts, which were tender and heavy with milk. On examination, tense nodular breasts were found. Manual expression produced beads of thick creamy secretion, but no pumping could be elicited. This absence of pumping made it impossible

to empty the breasts, and persistence in manual expression nearly always resulted in abscess formation. As a rule, both breasts were affected together. Here it seems that the breast had the power to manufacture the milk solids but none to cause the filling with fluid and the subsequent pumping out of the milk.

4. *Alactœa.*—Complete absence of lactation is rare. The 4 patients who never fed their babies because of a difficult labour probably belonged to this class.

#### CAUSES OF FAILURE

Some of the 39.8% of mothers in whom no cause for failure could be found had fed all their previous children, some had fed none, others only a few. One or two said that early in pregnancy their breasts had not given them the usual sense of growth; but the others asserted that there was no difference in either their health or circumstances during successful and unsuccessful lactations. Each lactation seems to be peculiar to its previous pregnancy, and pregnancy and lactation should be considered together, instead of as separate entities. As pregnancy may fail at any stage so lactation may fail at any stage. As some women are habitual aborters, so some women are habitual failures as lactators, whereas others abort or fail in lactation only occasionally. Each time a fertilised ovum is implanted in the uterus a fresh impulse is given to the system of ductless glands controlling lactation, and this impulse normally continues to the end of lactation, when the baby can live separate from the mother and eat adult food without harm. It seems reasonable to postulate a fault in this mechanism as a cause of at least some of the obscure failures of lactation.

The reasons obtained for weaning are set out in the table. About 12% of the mothers felt that they could not continue feeding their infants. Most of them had previously been poor lactators. The breasts of normally lactating women, when not emptied regularly, become very painful, hard and tender. One woman did her best not to feed her baby, but being a good lactator her breasts became so painful that she had to begin again and continue until the baby was over 9 months. In my experience, normal lactation cannot be suddenly stopped, but can be gradually reduced by never allowing the baby to empty the breast completely at each feed. This is the reason why lactation usually fails before the sixth week when the baby is mentally defective, for these infants take little interest in food and are poor suckers.

The reasons given for weaning could be placed in the following order:

- (1) Health of the mother, 23%.
- (2) Condition of the infant, 12%.
- (3) Environment, 8%.

Since irregular feeding, crying at night, constipation and "wind" appeared to be rather the symptoms of failing lactation than the cause, I think they should be deducted from the reasons related to the condition of the infant; if this is done the percentage is reduced from 12 to 7%. Hence the health of the mother was about three times as common as either of the other two reasons. Conditions affecting the breasts were more common than those affecting the general health of the mother, and were almost equally divided between acute illness and "general debility." Among the conditions affecting the breast, those affecting the nipple were about three times as common as those affecting the breast tissue, and cracked nipples made up three-fifths of the whole. Nearly two-thirds of the mothers suffering from debility could not feed their babies beyond the first month; this was also true in nearly all cases of flat nipples and in all cases of mastitis. Most of the 48 temporary failures were due to acute illness, the lactation cycle recurring with greater frequency and intensity as the severity of the diseases abated. Menstruation and pregnancy each accounted for only 1 case.

An inquiry into the time when the mother's menstrual period recommenced after labour showed that of 413 mothers who fed their babies for eight months and over, 24% had their first period at six weeks; 17% between six weeks and weaning; and 59% after weaning. Among 238 mothers who weaned their babies early, 24% had their first period at six weeks; 8% between six weeks and weaning; and 68% between weaning and ten months.

REASONS FOR PREMATURE WEANING

—	No.	%	Number weaning at (months)		
			0-1	2-3	4-7
No cause for failure ..	438	39.8	232	136	70
Temporary failure ..	48	4.4	24	14	10
<i>Conditions affecting mother</i>					
Acute illness of mother ..	59	5.4	24	25	10
Debility of mother ..	49	4.5	30	13	6
Feels unable to feed*	2	0.2	2	0	0
Low mentality of mother ..	2	0.2	1	1	0
Onset of menstruation ..	1	0.1	0	0	1
Starting another pregnancy	1	0.1	0	0	1
Had a difficult labour ..	4	0.4	4	0	0
Breasts { Mastitis ..	1	0.1	1	0	0
{ Abscesses ..	33	3.0	17	12	4
{ Only one functioning	2	0.2	1	1	0
Nipples { Flat ..	16	1.5	15	1	0
{ Cracked ..	85	7.7	45	35	5
Total ..	255	23.2			
Refused to feed { Weaned baby herself	69	5.3	29	30	10
{ Convinced she cannot†	26	2.4	21	4	1
{ Won't try ..	22	2.0	18	4	0
{ Hysterical ..	15	1.4	8	6	1
Total ..	132	12.0			
<i>Environment</i>					
Illegitimate ..	38	3.5	30	6	2
Illness in the family ..	20	1.8	10	7	3
Worry at home ..	14	1.3	4	8	2
Mother has to work ..	5	0.5	5	0	0
Death in family ..	5	0.5	0	3	2
On advice of her own doctor	4	0.4	3	0	1
Father suddenly unemployed	3	0.3	3	0	0
Living in rooms ..	2	0.2	0	2	0
Total ..	91	8.3			
<i>Condition of the baby</i>					
Illness of child ..	38	3.5	6	17	15
Twins ..	22	2.0	17	5	0
Prematurity ..	12	1.1	9	3	0
Mentally defective ..	6	0.6	5	1	0
Cleft palate ..	1	0.1	1	0	0
Total ..	79	7.2			
Baby cries all night ..	45	4.1	15	23	7
Irregular feeding ..	8	0.7	3	3	2
"Wind" ..	3	0.3	0	3	0
Constipation ..	1	0.1	0	1	0
Total ..	57	5.2			
Grand totals ..	1100	..	583	364	153

\* These mothers gave up breast-feeding because they felt ill after each attempt.

† These mothers gave up breast-feeding because the baby did not thrive.

It seems therefore that menstruation is neither a reason for weaning nor a cause for failure; its function seems to be independent of lactation.

Since it is a popular superstition that breast-feeding prevents conception, mothers who had no return of menstruation until after weaning did not recognise a superimposed pregnancy until they felt foetal movements. By this time the foetus was about 18-20 weeks, and the infant at least 7 months old, which means that adequate lactation had continued at the same time as a pregnancy for nearly 5 months. By the seventh month, in most women, lactation is normally beginning to decline, so that a decline in output in these pregnant women could hardly be attributed to the pregnancy. I have noticed that where there was pregnancy without knowledge lactation continued normally, but where it was discovered the fear of damaging the infant or the foetus led to weaning, often resulting in tender breasts or abscess formation. Turner and Meites (1941) demonstrated that pregnancy in rabbits had no effect on the lactogenic hormone. They found that on the twentieth day post partum the lactogenic hormone present in the pituitaries of 10 rabbits who were simultaneously pregnant and lactating was just as high (27.65 RTU) as in 10 rabbits who were only lactating (27.10 RTU). Previously, it had been shown by Holst and Turner (1939) that on the twentieth day post partum the pituitaries of 10 lactating rabbits contained an average of 26.63 RTU of lactogenic hormone, whereas during pregnancy alone only 10-14 RTU were present.

Among the reasons given which were related to the environment, illegitimacy ranks highest, and in 30 of these 38 cases weaning was due to the mother having to work. The next in importance are illness in the family and worry at home; together they almost equal illegitimacy. As the result of examining and questioning those mothers who have illness in the family or home worries, it seems that the cause of their failure is the extra muscular activity plus the loss of sleep. In addition, the lack of time and patience to sit down quietly until the baby has completely emptied the breast may be the initial cause of the failing secretion.

Among the conditions affecting the baby, illness of the child and prematurity—either due to twins or other causes—are the most frequent reasons given for weaning and are of about equal importance. All the weanings due to prematurity occurred before the end of the third month, and I have reasons to believe that the greater the prematurity the less milk is secreted per feed and the shorter the lactation period. Further investigations into this question are being carried out. Additional support may be given to this idea by the claim of Ehrhardt (1936) and Lessman (1939) to have extracted large amounts of lactogenic hormone from placental tissue. Selye and his colleagues (1933) and Newton and Beck (1939) found that a transient lactation can occur in animals even if they have had their hypophysis removed during pregnancy. It may be that the placenta gives the initial stimulus to lactation and that the pituitary gland carries on. Turner and Meites (1941) found that it was shortly after parturition that the lactogenic hormone increased two- to four-fold in the anterior pituitary of animals.

Illness of the infant caused weaning, particularly where the mother had the extra muscular exercise of attending hospital to feed the baby several times a day. If the mother expressed her breast milk regularly every four hours and went but seldom to the hospital she could often re-establish breast-feeding after the infant had been discharged, by slowly replacing the supplementary bottle-feeds with breast milk.

SUMMARY

The cause of about half of the failures of lactation are unknown, and some of the others are doubtful. The failures may be due to a break in any one of the links in the chain of ductless glands controlling lactation.

In 1100 cases of failing lactation investigated most of the reasons given for weaning were connected with the health of the mother.

Where there was a gradual failure of milk secretion, a definite relationship was seen to exist between muscular exercise and the amount of milk secreted.

Prematurity appeared to be related to a scanty milk secretion, while pregnancy and menstruation were not so related.

Each of the four types of failure described—dry, wet, solid and alactea—may have a different origin.

The types of failure were the same whether or not a reason could be found for the failure.

Permission to publish this paper has been given by Dr. W.M. Frazer, medical officer of health for Liverpool, and by Dr. R. Bell, senior assistant medical officer for maternity and child welfare.

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## A REFLEX GOVERNING THE OUTFLOW OF MILK FROM THE BREAST

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FAILURE of lactation shortly after the birth of the child is very common, and the almost automatic ease which characterises breast-feeding once the early weeks are successfully passed, is in striking contrast with the difficulties met with at the outset. That something other than the action of the lactogenic hormone is necessary for the continuance of milk secretion is seen in the rapid involution of the breasts when the child is stillborn, and in the regressive changes in one breast when suckling is confined to the other. Histological studies of the mammary gland indicate the manner in which overfilling of the alveoli arrests milk production by compression of the secretory cells; and although engorgement of the breasts is recognised as a troublesome incident of the lying-in period, its relief is usually attempted on account of the discomfort it causes rather than because it constitutes a threat to the maintenance of secretion.

### BREAST TENSION AND FAILURE OF LACTATION

In order to get some estimate of the frequency of breast engorgement and its consequences, questions were put to a consecutive series of women whose first attendance at an infant-welfare centre was made within 4 weeks of their confinement. Of 52 questioned all but 4 had been delivered in hospital, where they had made an average stay of 12.8 days. No case giving a history of abnormal pregnancy, labour or the puerperium was included, with the exception of 3 who had mastitis. They are divided into two groups: the 22 who at 4 weeks were still breast-feeding their babies, and the 30 who had already ceased to do so.

Six questions on their experience during the first fortnight were answered as follows:

	Breast	Bottle
Type of feeding at 4 weeks .. ..	22 (42.3%)	30 (57.7%)
Early milk plentiful .. ..	20	26
Overloading of breasts .. ..	10	24
Relief attempted by breast-pump, &c. . .	6	21
Child unable to obtain milk easily .. .	4	17
Injury to nipples .. ..	8	22
Mastitis .. ..	0	3

To the first question, whether their milk was plentiful in the first week after delivery, 46 out of 52 replied that it was so; both groups giving practically identical answers; indeed one sentence almost served for the whole number: "I had plenty of milk at the start." On the point of overfilling there was a wide divergence. Typical replies from those in the second group were: "My baby couldn't get the milk out." "The nurse said I had too much milk." "They had to draw my milk off." As a rule withdrawal by a breast-pump or by hand was made two or three times; in a few cases twice daily for 2 days. As far as could be judged the amount withdrawn was usually less than 100 c.cm. Damage to the nipples was experienced by nearly three-quarters of those who failed to continue breast-feeding, and in just over a third in the successful group. One woman suffered a breast abscess which required incision on the sixteenth day. Trauma of the nipples and mastitis are complications closely associated with overloading and stasis.

Failure to withdraw milk might be attributable to weakness in the baby, but there was little in the mother's statements to support this, or in the babies' birth-weights.

	Breast	Bottle
Av. weight at birth .. ..	7 lb. 1 oz.	6 lb. 14 oz.
" " " 4 weeks .. ..	7 lb. 14 oz.	7 lb.

Failure was commoner with the firstborn. In 38 primiparæ the ratio of breast- to bottle-feeding was 12:26, and in 14 multiparæ 10:4. There was little difference in the women's ages, the average age of the primiparæ being 23.5, and of the multiparæ 25.2 years. For the most part these 52 women had been told during pregnancy that their prospects of being able to breast-feed their babies were good. Disappointment was the rule among those who failed. Many had left hospital with

the assurance that their yield would increase if they persevered with feeding, and in some this had happened. On the other hand, in several instances this assurance had clearly been given when regression was already far advanced.

Of the 52 women, 46 described their milk as plentiful during the first days, and 34 as excessive. Only 6 said it was deficient, and 2 of these were in the group which succeeded. In taking a history of the lying-in period this is an important point. Many who say in good faith they had no milk from the start will, on further questioning, correct this to the statement that for a few days their breasts were full or overfull but that after that the milk seemed to leave them suddenly. Some dozen women in this series readily agreed to this correction. Small as is the number of women in this inquiry, it reveals that more than half had failed to feed their baby almost from the very start. This proportion is almost certainly too high to be representative of the material from which it was drawn, because a baby that has to be artificially fed is an inducement to the mother to bring it early to a clinic. This view is supported by the small amount of weight gained in the first 4 weeks of life by the bottle-fed babies compared with the breast-fed. Nevertheless if the number of failures to breast-feed in the series were halved the result would still be unsatisfactory. Three conclusions are suggested by the data: that the common tendency of the breasts to become overfull at the outset of lactation involves a risk to the continuance of milk secretion; that the risk of arrest is greatest in the first lactation; and that the child's demands for food are unreliable as a means of reducing a state of high breast tension to a level ensuring continuance of milk production. These conclusions are in accord with clinical experience whenever the evidence of overloading in the early days is carefully sought.

It may seem that in singling out this particular feature, and representing it as fraught with special risk to the continuance of milk secretion, a number of other well-recognised hindrances to the successful establishment of suckling are being disregarded; but in as much as they all involve interference with the easy and effective performance of breast-feeding they all favour retention of milk within the breasts. This is true of the child's inability to cope with a malformed nipple, especially the type that resists protraction; or of the occasional case where the child almost suffocates in the effort to continue feeding when its nasal breathing is obstructed. It holds good when the compression effects on the baby of a difficult or too forceful labour take days to wear off, or when the necessary energy to feed declines during the lethargy of jaundice. Delays due to these and other causes are described in all textbooks on infant-feeding, but seldom is the connexion drawn between them and the threat to milk production. Still less is it suggested that in their absence lactation may yet be summarily brought to an end by a state of high milk-tension alone. We have no standard by which to gauge overfilling, and it is my impression that its frequency is much underestimated and that quite severe degrees are often ignored.

In so far as the task of withdrawing milk calls for strength, the heavier baby should be at an advantage. Although there was little difference in the birth-weights of the two groups of babies it happened that among the bottle-fed were two who at birth were among the heaviest of the whole number (8 lb. 13 oz., and 8 lb. 10 oz.); while among the breast-fed was one who had weighed but 4 lb. 15 oz., and who had gained 17 oz. in the first 4 weeks. This must arouse the suspicion that the child's physical strength is offset by another factor, also variable—the ease with which the milk flows. On occasion the advantage may, in fact, be with the weakly.

An overloaded state of the breasts in the early days after delivery does not arouse much concern; but teaching in this country is emphatic that later on the security of lactation depends on the breasts being regularly drained. "The baby should empty the breasts at each feed." In this advice two points deserve notice. First, the emphasis is not directly on any particular degree of fullness, but on the degree of emptiness to which the breasts are reduced when the child has finished feeding. I suspect the form of this injunction derives from experience in the artificial milking of animals. By stripping the udder there is less risk of it becoming overfull by the

end of the long interval customary in dairy-farming; thus the value of complete emptying in the human may be related to the length of time between suckling. The other point is of greater significance: the advice puts on the baby the whole responsibility for emptying the breasts. It is, we are told, the vigour which the child puts into the act of feeding which counts; and more specifically "the strength with which it sucks." There is truth in this, but it is surely a half-truth. It is impossible to suppose that a gland with the structure of the breast can be drained, much less emptied, by suction through the nipple. It was one of the earliest physiological discoveries that to extract milk from an animal's udder something more is needed than mere muscle power. The cow must not be frightened or disturbed if she is to "let down" her milk. She yields more to the accustomed milker than to a stranger, from whom, indeed, it may be "held up" entirely. These facts suggest that outflow is dependent on a reflex mechanism, highly susceptible to interference and conditioning.

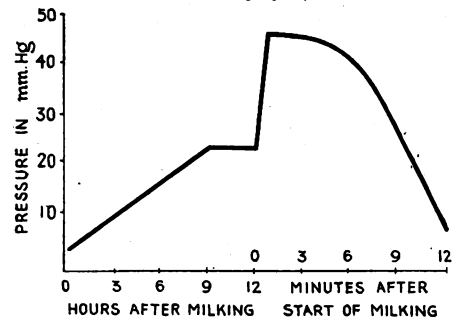
EXPERIMENTAL FINDINGS

Light was thrown on the nature of this mechanism by the discovery of Tgetgel<sup>1</sup> that a sudden rise of tension within the udder accompanies the start of milking (see figure). Hammond<sup>2</sup> has suggested that this represents a reflex venous engorgement produced by stimulation of the teats, exerting pressure on the fat-laden milk in the alveoli and finest tubules and forcing it into the larger ducts and sinuses. Part of the evidence used to support this view is based on fractional milking. If the four quarters of the cow's udder are milked in turn, a marked difference between the fat content of fore and hind milk is found in the first quarter; but the difference is almost obliterated by the time the fourth quarter is milked. This is due to the diffusion of fat which has occurred meanwhile as a result of the rise of pressure. The same difference between fore and hind milk which has repeatedly been found in the human takes on a new significance if it can be shown to be the result of a force within the breast arising reflexly and driving the milk towards the child.

The method of fractional milking can be applied to the problem under consideration by comparing the fat content of the milk in the two breasts.

If the reflex exists, the essential changes can be thus anticipated: let the fat content of fore milk be ascertained in the first breast at which the baby feeds; then by the time feeding from that breast is finished, the fat content of fore milk in the other breast should stand at a higher level. As fore milk gives place to hind milk, the accompanying rise in fat content should be greater in the

Diagram of milk pressure in the cow's udder. (From Tgetgel.)



first breast than in the second, since fat should have diffused in the second breast while feeding was in progress at the first.

In an experiment devised to test these points, the method used to collect milk needs a few words of explanation.

That it reproduces the natural method well enough is based on a belief that when the baby feeds the rôle of suction is not to extract milk from the depth of the gland but to draw the nipple far to the back of the mouth and keep it there. In this position the lacteal sinuses are brought within reach of the jaws, and the milk they contain is squeezed out by the action of the mandible. In support of this view is the fact that if the position of the sinuses be first defined, an almost continuous flow of milk can be obtained by compressing them between thumb and finger in a series of pinches not unlike the action of the baby's jaws. The use of this method for the purpose in mind calls for two essential precautions: we must avoid

TABLES I AND II

MILK TAKEN FROM BOTH BREASTS IN 14 CASES

Order of samples: (1) fore milk from first breast; (2) hind milk from first breast; (3) fore milk from second breast; (4) hind milk from second breast.

Time	Samples taken				Fat %				Age of baby (weeks)	Parity of mother
	1	2	3	4	1	2	3	4		
9-55	15	19	27	3-6	9-1	5-2	8-1	6	2	
1-55	13	17	25	3-0	8-0	5-6	6-2	6	1	
2-15	7	10	19	1-2	9-0	3-0	5-5	9½	1	
2-2	8	11	18	2-0	6-2	2-1	4-0	25	3	
10-12	8	11	18	4-6	6-6	4-3	4-8	13	3	
10-15	10	15	22	2-6	6-3	2-4	3-0	12	2	
2-8	7	10	19	6-2	11-9	5-6	9-9	10½	1	
1-55	10	15	25	7-0	8-3	8-6	9-1	13	1	
9-48	7	9	19	4-0	6-1	5-2	6-0	7	1	
2-20	7	10	17	2-0	4-7	4-6	6-6	12½	2	
10-5	9	10	21	3-5	7-6	5-5	6-1	14	3	
10-1	7	11	17	3-0	7-9	4-2	7-2	7½	1	
9-45	30	33	42	2-3	9-8	7-0	11-4	11½	1	
2-2	7	10	18	2-9	4-9	5-0	6-8	8½	1	
Av.	10-3	13-7	21-4	3-4	7-6	4-9	6-8	11-1	1-6	

Order of samples: (1) fore milk from first breast; (2) fore milk from second breast; (3) hind milk from first breast; (4) hind milk from second breast.

	1	2	3	4	1	2	3	4		
9-55	3	5	17	1-6	7-0	8-1	8-6	35	1	
1-57	3	13	18	4-9	6-4	12-3	11-2	18½	2	
10-25	3	12	19	5-5	1-7	9-8	3-5	15	1	
9-45	4	25	32	1-8	3-2	8-4	6-0	8½	2	
1-45	5	25	35	4-0	5-6	6-6	8-1	8	1	
1-50	4	20	30	4-2	5-8	6-3	8-6	8½	1	
9-45	5	17	30	1-6	4-5	8-3	8-0	8½	2	
10-20	5	18	25	2-1	3-4	9-5	6-6	17	1	
9-45	5	25	37	1-1	4-9	2-3	7-4	9	2	
9-50	5	16	25	0-8	1-5	5-0	3-6	21	5	
1-50	4	15	26	1-0	1-6	5-0	1-6	23	3	
9-25	5	16	26	4-4	6-3	6-1	8-4	12	1	
1-50	5	15	19	2-1	1-1	4-0	1-6	24	3	
9-56	2	12	19	3-4	5-2	6-1	6-5	5	1	
Av.	4-1	16-7	25-6	2-7	4-1	7-0	6-3	15-2	1-9	

disturbing the woman for fear of inhibiting the reflex for which we are searching, and must refrain from applying to the breast as a whole an external pressure through the hands, for this could produce artificially a downward passage of the fat-laden milk from the alveoli and fine ducts into the larger ducts and sinuses. In our experiments it is believed these sources of error were successfully overcome. The collection of milk samples was entrusted to a nurse who, as a midwife and health visitor, had acquired great skill in the manual withdrawal of milk. The object of the experiment was not explained to her; she was merely instructed to obtain samples in the manner described and impressed with the importance of avoiding the above two pitfalls. The ease with which she gained the confidence and coöperation of the women chosen is a fair guarantee of their freedom from emotional disturbance. If any woman was inconvenienced or circumstances seemed unfavourable, withdrawal of milk was postponed until a better opportunity offered or abandoned.

Samples were taken at the usual feed times from women who had made a practice of nursing at fixed intervals. In all cases chosen the thriving condition of the infants was proof that lactation was free and secure. The nurse often paid two or three preliminary visits to the house to establish an easy relationship with the mother. Since she was concerned solely with accuracy of method and not with the rationale of the experiment, it is fair to assume any changes in the fat content of milk which were found were true physiological differences. A group of 26 women provided milk. The fat content was estimated by Gerber's method.

In the first experiment (table 1) the order in which samples were taken was: (1) fore milk and (2) hind milk from the first breast at which the baby fed; then (3) fore milk and (4) hind milk from the second breast. The changes in fat content (%) were as follows:

	1st breast		2nd breast
Fore milk	3-4	Fore milk	4-9
Hind milk	7-6	Hind milk	6-8
Rise	4-2	Rise	1-9

1. Tgetgel, B. Schweiz. Arch. Tierheilk. 1916, 68, 6.  
2. Hammond, J. Vet. Rec. 1936, 16, 520.



These figures fulfil the conditions laid down; but we had overlooked the need to ascertain whether the fat content of the fore milks stood at the same level in the two breasts before the baby began to feed. A second series was taken to make good the omission. This time (table II) the order of samples was: (1) fore milk from the first breast; (2) fore milk from the second breast. The baby was then fed at the first breast from which a sample of hind milk (3) was taken; in the same way hind milk (4) was collected after it had fed at the second breast. The fat contents (%) were as follows:

	1st breast		2nd breast
Fore milk ..	2.7	Fore milk ..	4.1
Hind milk ..	7.0	Hind milk ..	6.3
Rise ..	4.3	Rise ..	2.2

It was a surprise to find that the figures were almost identical with those of the first series and that the change in the order in which the samples were taken was not reflected in the analyses. Without the influence of the baby feeding, in 12 out of 14 women the second sample of fore milk again showed the higher fat content—a rise of 1.4%, compared with 1.5% in the previous series. The times at which the samples had been taken had been recorded, and it was found that in the second series an average of 4 minutes was occupied by the nurse in obtaining, sealing and labelling the first. Was it possible a reflex rise of pressure had been caused by the resemblance of her manipulations to the normal stimulus of the baby? This explanation is supported by the findings in a third series of samples, fore milk this time being withdrawn simultaneously from both breasts (table III). This time we get: breast A, fore milk 3.9%; breast B, fore milk 4.3%. The difference here is only 0.4%. Two cases show a wide divergence from the others, and in both the nurse suspected most of the feeding was habitually from one side only; if we exclude these, the average for the other 12 is 4.1% and 4.2%, a difference of but 0.1% between the two fore milks.

The experiment provides, on a small scale, evidence of a change in the composition of breast-milk corresponding with that found in animals. This has been attributed to a rapid forcing of fat-laden milk from the alveoli down through the duct system, and is a direct result of the sudden rise of pressure. I believe that on the evidence here adduced we are entitled to assume the existence of a similar mechanism in the human.

TABLE III—FORE MILK FROM EACH BREAST. SAMPLES TAKEN SIMULTANEOUSLY \*

Fore milks fat %		Age of baby (weeks)	Parity of mother	
A	B			
6.6	4.7	9½	1	
3.9	3.0	15	1	
2.2	5.4	13½	1	
5.2	5.5	16	1	
6.0	4.6	16	1	
5.0	5.0	10	1	
3.4	3.3	10½	1	
3.0	4.8	6	1	
4.9	4.7	18	3	
5.1†	1.4	16½	2	
2.2	5.8	20	1	
3.8	2.2	17½	1	
4.0	3.8	4½	1	
0.6†	6.8	20	?	
Average	3.9	4.3	13.8	1.3

\* It will be noticed that the fat content of the fore milks in this series is higher than those for the first samples in both tables I and II. This may be partly due to the longer time occupied in taking the milk. The nurse had no previous experience of obtaining simultaneous samples from the two breasts and found it difficult. Considerable variations in fat content are found in the same animals milked on successive days, and the same phenomenon may account for the higher figure recorded in this experiment. The first samples in table I also gave a higher reading than those in table II.

† These 2 cases show a wide divergence (see text).

CLINICAL EXPERIENCE

Clinical facts in support of these experimental findings are plentiful; not only the existence of a reflex mechanism such as we have been discussing, but considerable understanding of its function and importance are constantly being revealed in women's account of breast-feeding.

An expulsive character in the outflow of milk is most clearly seen when lactation has been in progress 6 or 8

weeks—that is to say, after the phase during which the breasts are almost continuously full. In that early stage, although the baby may drink freely each time it feeds, it appears to make little impression on the abundance of milk. It is usually towards the end of the first month that the fullness diminishes, and though the child does not necessarily drink more the breasts are now appreciably lightened when the feed is finished. They re-fill gradually in the hours which follow, so that as the time for suckling becomes due the woman is aware of their increasing heaviness. Distinct from this, both in time and character, is a sharp pricking or tingling which radiates through both breasts simultaneously as the child mouths the nipple and tries to withdraw milk. There are many descriptions of this feeling; among the women I have questioned the most usual are "a feeling like pins and needles" or "a drawing." Some liken it to cold water running over the skin. Of special interest is the statement that the breasts "harden." In some I have satisfied myself that this is so, for a transient increase in firmness can be distinctly felt. Occasionally an alteration can actually be seen, and for a few moments faint indentations appear outlining the lobes of breast tissue, but I have only twice been able to observe this.

To this sensation, and the hardening that goes with it, women have given the name of the "draught." With it, they say, the milk "comes in"; but it would, in fact, be more accurate to say it tells them the milk is about to run out. For within a second or two the child is greeted by an outrush of milk which may be so sudden and copious that he chokes and is compelled to break off feeding to take breath. At such a moment one may get a striking demonstration of milk pouring from the duct openings in a horizontal stream; I have notes of this distance being measured and found to exceed a foot. Simultaneously an outflow occurs from the other breast, though it is less forcible as a rule and not so copious. My impression is that though the sensation of the draught is felt in both breasts, this spontaneous outrush tends to become confined to the breast at which the baby is feeding; so that by about 8 weeks, the date chosen for this description, it has become almost unilateral, though a simultaneous stream from both sides may have been evident enough a little earlier.

As the weeks pass, circumstances connected with the act of suckling clearly develop a conditioned reflex. Such an association may be the preparatory rousing of the child from sleep, or the decision to stop some task as the hour for feeding approaches. Another is the drinking of a glass of water, often recommended as a preliminary to nursing. The draught then "comes in," though the child may still be sleeping and in another room. In the early weeks it is accompanied by an outpouring of milk, but later if this occurs at all it is as a rule small in amount. Women who have practised punctual feeding relate that if the child sleeps beyond the appointed hour they may feel the draught repeated several times, and it becomes uncomfortable enough to make them wake the child for their own relief. Examples from the clinical field can be increased almost indefinitely by anyone working at an infant-welfare centre.

DISCUSSION

Of the various factors on which the maintenance of milk secretion depends, it is claimed that one is a reflex expelling mechanism which governs the outflow from the breast, and which for convenience may be called the draught reflex. The widely held view that the infant extracts its food by the force of suction thus needs to be modified to one which recognises that normally the milk is, to a large extent, delivered to it by this mechanism. Indeed, when interference with the reflex occurs, a baby which has learnt to rely on its assistance may refuse the attempt to obtain milk.

The conditions which favour and impede the reflex would surely repay study. It is strange that while women themselves attach importance to the mechanism discussed, and probably have always done so, we who frame rules of management for breast-feeding seem almost wholly to have ignored it. If we knew more of the nature of the reflex many of the common hindrances to lactation might be brought under control. For example, the reflex might respond to methods of conditioning less crude and haphazard than those to which it is commonly

subjected. To some extent its requirements seem to have been met by the institution of a regular interval between feeds, probably by affording relief when milk tension reaches a certain point. But the recommendation of a fixed interval has always placed the needs of the baby before those of the breast. Not long ago the regulation spacing in this country was 2 hours; some 25 years ago it gave place to 3 hours, and later still to 4. A reflex as delicate as this is unlikely to be suited by arbitrary measures of this nature. Further studies may well reveal that something fundamentally different is called for during the earliest days if the danger of overload is to be avoided; and management may need to be adapted far more closely to the individual woman.

The investigation reported here was undertaken in the hope of finding some clue to the frequent early failures of lactation. The draught reflex, which is so characteristic a feature once feeding is established, does not seem to come into effective operation when the breasts first begin active secretion, a time which seems particularly appropriate to its appearance. In multiparous women who have successfully nursed their babies, secretion and expulsion sometimes coincide, in which case the child obtains large quantities of milk from the outset and the continuance of lactation is seldom endangered. In primiparae, on the other hand, the reflex if present must often be frustrated almost at once. In them the breast often seems incapable of achieving a balance between secretion and outflow, so that stasis and overloading result. These are liable to be followed within a short time by all the involuntory changes seen when nursing ends at the normal time and the child is weaned. We are, in fact, confronted by the curious phenomenon of a gland secreting against obstruction to outflow, and persisting up to a point when its activity is summarily brought to a close.

During the state of engorgement, when the breasts may contain enormous quantities of milk, even the strongest baby may be able to obtain virtually nothing. A frequent and unfortunate result of its efforts to feed is damage to the nipples, involving the woman in great suffering and exposing her to the risk of acute infective mastitis. The pain may have a further inhibitory influence on the reflex, for many refer to it as worse than the pangs of labour and confess it makes them dread the feed times. This type of injury is almost limited to the first weeks of suckling and I suspect is dependent on oedema of the epithelium covering the nipple which results from engorgement. It is surely a misreading of the pathology of this lesion to consider that the nipple must become accustomed to suction by the child before it is secure against trauma. The swollen watery surface seen at this stage is in striking contrast to the dry parched appearance it assumes soon after outflow from the breasts becomes free. Nine out of ten acute abscesses of the breast occur within the first month after delivery and a high proportion are in primiparous women.

We badly need to know what proportion of early failures arise from intrinsic defects in the structure of the breast and nipple, from faulty performance by the child, or from some artefact in the management of the lying-in period at variance with physiological requirements. I believe we shall see a satisfactory reduction in the number of these early failures, which are responsible for many babies having to be artificially fed at the most dangerous age, only when we learn to prevent, or at least curtail, the initial over-filling of the breasts, and can ensure that the draught reflex comes promptly and effectively into action.

The fat contents of milk set out here call for a reconsideration of the advice often given that a baby should be put to only one breast at each feed. The notion underlying this advice is that only so does it obtain milk containing the requisite amount of fat, but the figures hardly justify this assumption. Moreover, with the 4-hourly regime usually practised, this plan by exposing each breast to a delay of 8 hours before its milk is withdrawn favours overloading. Applied in the early weeks it is so often followed by a decline in the total yield and regressive changes that it cannot be justified.

#### SUMMARY

Evidence is presented for the existence of a reflex mechanism governing the outflow of milk from the breast analogous to one already known to exist in animals.

This mechanism, here called the draught reflex, is susceptible to interference and conditioning.

The early suppression of milk secretion is commonly associated with overloading of the breasts in the first weeks of lactation. This state of engorgement may involve frustration of the draught reflex.

I am indebted to the maternity and child-welfare committee of the Cambridge borough council for leave to obtain samples of milk from women attending the council's infant-welfare centres; to the medical officer of health and his assistant for their co-operation; to Dr. John Hammond for advice and for permitting the fat estimations to be made by Mr. W. Oxley in the laboratory of the Cambridge School of Agriculture; and to Miss E. Raynham Smith for collecting milk samples.

## POISONING BY CHLORINATED NAPHTHALENE

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In April, 1941, the Home Office issued an order extending the list of scheduled industrial diseases under the Workmen's Compensation Act to include poisoning by chlorinated naphthalene or its sequelae. It is therefore important for medical practitioners in general, and for industrial medical officers, examining factory surgeons and medical referees appointed under the terms of the act in particular, to know the toxic effects which chlorinated naphthalene can produce. The following cases—12 of dermatitis and 1 of acute yellow atrophy of the liver—among workers in an engineering establishment exposed to the fumes and dust of chlorinated naphthalene, may be of interest.

Naphthalene, (C<sub>10</sub>H<sub>8</sub>) which is obtained from the distillation of coal tar has chemical properties akin to benzene and is extremely volatile. It is commonly used for impregnating wood in the manufacture of fire-lighters and is itself non-toxic. When naphthalene is chlorinated a wax-like substance is produced, used in industry as an insulating coat on wires of electrical apparatus, or on metal bars to circumscribe the action of plating processes—for example, in chromium plating. The wax is usually melted in a bath and the articles may be dipped in the bath directly, or the wax applied to them by means of a brush.

Poisoning by chlorinated naphthalene may take two forms: damage to the skin, producing an acne, particularly of the face; and toxic jaundice produced by either an acute or subacute necrosis of the liver, or by acute yellow atrophy of the liver.

AGE, DISTRIBUTION AND SEVERITY OF CHLORACNE IN A  
SERIES OF 12 CASES

Case	Age (years)	Exposure before onset (months)	Site of first lesion	Sites of final lesions	Degree
1	38	3½	Angle jaw, rt.	Sides, face and neck	Sl.
2	39	10	Lt. ear, side, neck	"neck", forearms	Sl.
3	21	9	Both sides face	Face, neck	Sev.
4	25	9½	Angle jaw, rt.	Sides, neck	Mod.
5	35	8	Rt. side, neck	Sides, face and neck;	Sl.
6	35	5	Both sides, face	shoulders	Sev.
7	20	2	Angle both jaws	Sides, face and neck;	Sev.
8	47	5½	Angle, jaw, rt.	lt. shoulder, axilla	Sl.
9	33	9	Rt. side neck	Sides, face and neck	Sl.
10	30	8	" "	" " "	Mod.
11	28	3½	"Angle jaw, rt.	" Sides, face	Mod.
12	23	8½	Rt. side, face	" "	Sl.

#### DAMAGE TO THE SKIN

Jones (1941) has already described 37 cases of chloracne among workers employed in a chemical industry which manufactures chlorinated naphthalene. This typical skin condition, caused by exposure to the dust or fumes of chlorinated naphthalene, starts on the face, around the angle of the jaws or over the malar prominences (see figure), and from there spreads on to the sides of the face and on to the sides and back of the neck. The skin lesions in a typical case are comedones, papules, pustules, and in severe cases small cysts. In some of my

cases there was also a spread on to the shoulders and forearms, and in one case into the left axilla.

During September and October, 1941, there was an outbreak of chloracne of varying degrees of severity among 12 employees in the chromium plating department, who were exposed to the dust or fumes of chlorinated naphthalene; 2 were young women. The relevant facts in each case were as shown in the table.



Chloracne of the skin. A. Showing that lesions begin chiefly on the sides of the face; note the relatively few lesions on the forehead and nose. B. Profuse lesions on left side of face.

No cases had a previous history of acne and no case had, at any time, been taking bromides or iodides. In classifying the severity of the cases, Bloch's method has been utilised:

- Slight = 5-20 comedones.
- Moderate = 20-50 comedones or papules and pustules.
- Severe = 50 or more comedones or papules and pustules.

**Etiology.**—For 3-4 months before the onset of these cases there had been technical difficulties about getting efficient exhaust ventilation for the fumes rising from the bath in which the chlorinated naphthalene was being melted. The onset also coincided with a period of warm, humid weather which had lasted several weeks. During such weather the skin glands are active, and the chlorinated naphthalene dust is trapped in the secretion. Prosser White (1934) considers that the chlorinated naphthalene fumes or dust have a direct external, irritating effect on the skin and this view is supported by H.M. Chief Inspector of Factories (1936). The oil acne or dermatitis seen in workers in engineering factories is also regarded as being caused by a direct external irritation. Jones considers that where workers neglect personal cleanliness, the chlorinated naphthalene dust or fumes irritate the sebaceous glands of the skin, causing the cells to proliferate and produce an excess of secretion, so that the glands become plugged. Cleanliness is thus a factor of prime importance in prevention.

In all my cases the faces were affected. Only a few lesions were present on foreheads and none was seen on noses. No case was seen with an eruption on the chest. Employees handling the cold wax never develop chloracne.

Apart from the skin, chlorinated naphthalene, like tetrachlorethane, damages no organ but the liver. The following case was the first death in Scotland from acute yellow atrophy of the liver, caused by exposure to the dust and fumes of chlorinated naphthalene.

#### CASE-HISTORY

The patient was a woman of 41 working in the chromium plating department in which the cases of chloracne occurred. She started work in the department on June 9, 1941, and was engaged in cutting cold chlorinated naphthalene wax off small parts, after these had been 'dipped' in the bath in which the chlorinated naphthalene was melted. She was never actually engaged in "dipping" and she never came in very close proximity with the fumes of the melted chlorinated naphthalene wax. In cutting off the wax, however, she was seated 15 feet from the bath, and worked there during the whole of the time of the technical difficulties in constructing efficient exhaust ventilation for the fumes coming from the bath. Thus she was exposed to whatever concentration of fumes could reach her from June to December, when the technical

difficulties were overcome and the exhaust ventilation was pronounced to be satisfactory. Other four women engaged on the same task and seated at the same table have not been affected in any way. She ceased work on Dec. 26, when she came under the care of her own doctor, who treated her till Jan. 17, 1942, as a case of catarrhal jaundice. As she was making no improvement, she was then admitted to the Western Infirmary.

On admission she gave an 8 weeks history of feeling off colour, and of swelling of the feet, ankles and eyelids towards the end of the day. About 2 weeks later she noticed slight breathlessness on exertion; 4½ weeks before admission she was becoming slightly jaundiced and began to have troublesome nausea. She noted that her urine was dark and her stools greyish. Later the nausea was accompanied by vomiting. Her only other complaint was of increased thirst. There was no pain and no loss of weight during the illness. An attack of acute rheumatism 9 years before had left her with an endocarditis. In addition to icterus she had a purpuric rash of the legs and lower abdomen. There was no free fluid in the peritoneal cavity. The superficial area of liver dullness was 4½ in. On Jan. 20 she was sick and drowsy after breakfast. About noon she became unconscious. Muscular twitchings of all limbs were noted, but the only other abnormality of the central nervous system was a slight dilatation of the pupils. A patchy brownish discoloration of the skin developed; liver dullness 3½ in. Glucose saline was given intravenously and the muscular twitchings stopped, but otherwise the condition was much the same until death. All this time the liver dullness was decreasing, until no dullness could be detected on Jan. 22, when she died.

The following investigations were carried out:

Urine: deeply coloured; contained bile.

Fractional test-meal: high total acidity with no free hydrochloric acid; blood present in all specimens. Stools: yellowish; contained occult blood. Blood-count: slight leucocytosis, otherwise normal. Blood-urea: within normal limits. Van der Bergh: immediate positive direct reaction.

At autopsy there were 2 pints of straw-coloured fluid in the peritoneal cavity. The liver (650 g.) was very small and the capsule appeared wrinkled; consistence very soft with moderately hard lumps throughout, varying in size from ¼ to ½ in. in diameter. The cut surface showed large areas where the parenchyma had disappeared and the liver tissue was represented by dark red areas of sinusoids. The moderately firm lumps were areas of surviving liver tissue, yellowish and slightly lobular appearance. Histological examination showed the acute stages of acute yellow atrophy. Heart: moderate hypertrophy of the right ventricle, with chronic valvular disease. All other organs normal.

#### DISCUSSION

I am of the opinion that the damage to the heart may have produced some damage also to the liver, which made that organ more susceptible to the toxic properties of chlorinated naphthalene than it would otherwise have been. Drinker and his colleagues (1937) state that chlorinated naphthalene attacks the liver alone of the internal organs. Greenburg (1939) has described three deaths caused by liver damage. In a Home Office memorandum (1941) on poisoning by chlorinated naphthalene 2 fatal cases of jaundice are mentioned, one in 1935 and the other in 1938. In each case the worker had been exposed to chlorinated naphthalene in a radio factory, though it was not definitely established in either case that the death was due to the employment. Later 2 more fatal cases of jaundice in different factories were traced, in both of which there was some history of exposure to chlorinated naphthalene; and localised exhaust ventilation and other precautions were enforced to prevent workers from coming into contact with it and inhaling the fumes or dust. Notwithstanding these measures, 2 further deaths have recently been reported (November, 1940, and January, 1941). American workers have reported 9 cases of subacute necrosis of the liver due to exposure to chlorinated naphthalene wax.

**Preventive measures.**—Overheating of the wax causes increased quantities of fumes to be evolved. The wax therefore should not be overheated; a temperature of 10-15° C. in excess of the melting-point will be found quite sufficient to produce a mobile fluid. As it is usually melted in open baths and the fumes or dust are therefore liberated into the atmosphere, it is important to provide an efficient exhaust ventilation at the point where the

fumes or dust are evolved. The medical officer, with the co-operation of the head of the department, should scrutinise the plant at regular intervals to assure himself that it is working efficiently. All workers should be instructed on the protection afforded by personal cleanliness. Ample washing facilities, with hot and cold water, nail brushes, soap and towels should be provided. The general cleanliness of the industrial establishment should be of a high standard. General ventilation also should be good. Medical examination of new applicants who will be working with chlorinated naphthalene is also important. Those who have a previous history of acne or seborrhoea should be excluded because of their susceptibility, and so should all those with a history of liver trouble—cirrhosis or jaundice—and of heart disease. Regular medical examinations at weekly intervals should be undertaken in all workers who are exposed to the fumes or dust of chlorinated naphthalene. Any employee showing signs of an incipient acne should be immediately transferred to other employment. Liver function tests should be performed also on all employees who begin to complain of anorexia and vomiting, or who show signs of early jaundice.

#### SUMMARY

Poisoning by chlorinated naphthalene may result in chloracne of the face, particularly of the sides of the face; 12 such cases arising among workers who were exposed to the fumes or dust of chlorinated naphthalene are reported.

It may also produce acute yellow atrophy or necrosis of the liver. In a typical case with systemic effects, the liver is usually the only organ showing damage. One fatal case is described fully.

If cases of poisoning are to be prevented, the wax must not be overheated, and the fumes and dust must be properly carried away by exhaust ventilation. Workers must be instructed in the importance of personal cleanliness, and must be medically examined every week for signs of acne or jaundice.

I wish to thank Dr. W. R. Snodgrass of the Western Infirmary, Glasgow, for permission to publish clinical data relating to the fatal case.

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## SULPHAPYRIDINE ANURIA TREATED BY UNILATERAL NEPHROSTOMY

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It is at present impossible entirely to eliminate the renal complications of sulphonamide therapy, especially in infants and young children, and it is therefore important that the treatment of sulphapyridine anuria should be established on a definite basis. In our view ureteric catheterisation should never be regarded as the last resort. On the contrary, we think it should be attempted early, and if it fails, as is likely in some cases, other operative procedures should be adopted without delay.

#### CASE-RECORD

A girl aged 2 years was admitted to hospital with cerebrospinal fever and was treated with full doses of sulphapyridine. Two days after admission a guaiacum test performed on the urine voided in the bed showed a positive reaction. The drug was immediately withdrawn and the usual administration of intravenous fluids, including magnesium sulphate, instituted, but in spite of this she proceeded to complete anuria. Catheterisation after 12 hours anuria produced only a few c.cm. of almost pure blood mixed with cellular debris. During the next 12 hours two specimens of clear urine, each of about 2 c.cm., were passed naturally, but after this suppression was complete and remained so until after operation, a period of

three days, which we now consider to have been dangerously long. At the end of this time the child's general condition was alarming, with increasing drowsiness, vomiting and general oedema. Lumbar puncture showed that the meningitis had subsided, but the CSF urea was 90 mg. per 100 c.cm. It was now obvious that the child would die unless immediate relief could be given.

Ureteric catheterisation was considered first as the established method of treatment but was rejected for reasons which are discussed later. We next considered bilateral decapsulation of the kidneys with the passage of bougies down the ureters, an operation which has been carried out once in America, though we have been unable to discover its result. This, too, we rejected because we did not think the child would survive a long operation. Tsao's (1939) suggestion of (? bilateral) nephrostomy was also discussed (we could find no record of its ever having been performed), but it seemed possible that the simpler operation of unilateral nephrostomy might relieve the symptoms temporarily and allow any necessary procedures to be carried out when the child's condition had improved. We hoped that the renal tubules were not irreparably damaged and that nephrostomy might drain the kidney above the level of complete obstruction.

Since there was no reason to expect that one kidney was more affected than the other, the left kidney was exposed. It was oedematous and friable and both it and the pelvis were at least five times the normal size. No concretions were actually felt in the pelvis. A nephrostomy tube was inserted into the pelvis and the wound closed, the whole operation being completed in less than ten minutes. No urine flowed through the tube at the time of operation. The child returned to the ward apparently moribund but within 4 hours the dressing was soaked with clear urine and within 12 hours clear urine was also passed in large amounts per urethram. A few hours later the child was sitting up and asking for food and the blood-urea was found to be 24 mg. per 100 c.cm.

She was discharged quite well a few weeks after operation. Before discharge her urine and blood-urea were both normal. An intravenous pyelogram showed a normal urinary tract on the right side, while the only abnormality seen on the left was that the renal pelvis was  $1\frac{1}{2}$  times the size of the normal right pelvis. Excretion of the dye was normal on both sides.

#### DISCUSSION

We suggest that a reasonable course of treatment to adopt in cases of sulphonamide anuria is as follows.

As soon as macroscopic haematuria appears the drug should of course be withdrawn, if this has not already been done, and now seems to be the time to consider the cautious administration of intravenous fluids, including magnesium sulphate. If suppression of urine nevertheless occurs operative procedures should be adopted before the patient's general condition has had time to deteriorate, and we suggest that if anuria has lasted 24 hours cystoscopy and ureteric catheterisation should be done. It should not be supposed, however, that ureteric catheterisation will always be successful.

Carroll and others (1940) have shown pyelograms in which the calyces as well as the pelvis and ureters are full of concretions and they say that at least half an hour's ureteric lavage must be carried out. Carson and Stewart Smith (1942) record a fatal case in which no operation was attempted. At autopsy they found the ureters and pelvis full of concretions and they think that ureteric catheterisation would not have been successful. Tsao gives details of an autopsy in which a probe could not be passed from the bladder into either ureteric orifice. Ureteric catheterisation, even when there is no such obstruction, often presents extreme technical difficulty. Dourmashkin and Worton (1941) describe such a case in which the catheters had to be left in the ureters for 24 hours, and Williams (1941) reports one in which the catheter could not be passed up one ureter until the third attempt in 5 days. Benson and Percival (1942) report a case in which at cystoscopy both ureteric orifices were extremely oedematous and the right difficult to locate, while the catheter was passed up the left ureter only with difficulty. In the difficult case specialised experience and equipment are required which are only available in the larger hospitals. Moreover, there are circumstances in which ureteric catheterisation and prolonged lavage may be impossible—for instance in infants.

It seems, therefore, that some method of treatment is needed for those cases in which ureteric catheterisation

is unsuccessful and we suggest that unilateral nephrostomy is worthy of further investigation. It may be argued that success in this case may have been fortuitous and that operation on the other kidney would not have produced a similar result. The pathology of our case can be explained in one of two ways. (1) Both kidneys and ureters may have been equally obstructed. This is what the recorded cases of autopsy and of ureteric catheterisation after sulphonamide anuria would lead one to expect. With this pathology, the choice of kidney for operation is immaterial. (2) Alternatively the obstruction may have been in one kidney and ureter only and suppression in the other side have been due to some mechanism analogous to the reno-renal reflex of calculus anuria. This may have been the condition in our case because a few c.cm. of clear urine were passed after the initial period of anuria, operation was quickly followed by a copious flow of clear urine per urethram, and a later, intravenous pyelogram showed a normal right urinary tract. Even if this were the pathology of many cases, we still think that unilateral nephrostomy should be tried, and that, if not successful within a reasonable time, it should be followed by drainage of the other kidney as is sometimes necessary in calculus anuria.

We wish to thank Dr. Kenneth Playfair for permission to publish this case and for his advice.

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## GRAVES'S DISEASE—MYXŒDEMA— GRAVES'S DISEASE

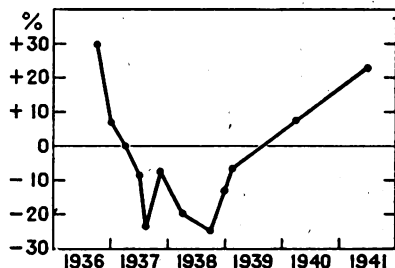
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THE following case throws some light on functional exhaustion of the thyroid gland.

A woman of 34 with a history of malaria and recurrent attacks of tonsillitis was admitted to hospital in September, 1936, for Graves's disease. For a year she had had palpitations, loss of weight, sweating and nervousness. She had been treated with Lugol's solution, min. 6, four times a day, di-iodotyrosine, and X rays to the thyroid gland. Her symptoms had improved for a time but had then recurred. She had slight goitre with a palpable thrill over it, tremor, hyperactive tendon reflexes, a tendency to diarrhoea, and exophthalmos especially on the left side; von Graefe's sign was present. Her pulse-rate was 120 per min. and basal metabolic rate between +23% and +30%. She was treated with 'Cortigen' (Richter), liver extract, carbachol, physostigmine, calcium and phenobarbitone. Examined again in January, 1937, she was feeling well and had gained weight. BMR +7%. Pulse-rate 90. In March she was still well and had married. Pulse-rate 70; BMR ±0%. By August she had gained considerably in weight and her voice had become hoarser; no menstruation for four months; BMR -8%. September: voice still hoarser; hardly any perspiration; sluggish tendon reflexes, swelling of the face, apathy; pulse-rate 70. Electrocardiogram: conduction time 0.18 sec.; low voltages in all leads; P<sub>3</sub> +, T<sub>3</sub> almost absent. Blood-cholesterol, 290 mg. per 100 c.cm. BMR -24%. Radiogram: heart moderately enlarged. She was treated with cestrone, and with thyroid gr. 2 four times a week. By January, 1938, she had lost 4 kg. in weight; BMR -7%. By April, 1938, her BMR was -20%; thyroid, gr. 2, was given three times a week. In December, 1938, after feeling fairly well for several months, she began to gain weight, her voice became hoarse again, her eyelids swelled, her limbs became cold, her bowels constipated and her skin rough; no sweating; pulse-rate 66; BMR -25%. She was given thyroid, gr. 10 daily. By February, 1939, she was feeling well again and she had lost 4 kg. in weight; BMR -13%. Thyroid reduced to gr. 3 daily, and stopped altogether for short intervals. In March she still felt well; BMR -6.5%. In February, 1940, she gave birth to a normal child. No thyroid was taken during pregnancy or after delivery. When seen in April, 1940,

she was perfectly healthy; pulse-rate 70; slight swelling of ankles; BMR +8%. Capillaries on microscopic examination constricted but numerous; circulation time for 10% magnesium sulphate solution, 12 sec. No treatment given. She had pneumonia during the winter 1940-41 and recovered completely. She was seen next in July, 1941, when she had been emotionally disturbed for several weeks by air-raid alarms. She had had an attack of tonsillitis with high fever 14 days before. She had lost much weight and was showing tremor, exophthalmos and von Graefe's sign; pulse-rate 120-140; hyperactive tendon reflexes; no thyroid enlargement; BMR +23%. Capillaries constricted but numerous. X ray of skull: sella turcica normal; osseous structure rather thin; deep impression in the region of the middle meningeal artery. The graph (see figure) shows the fluctuations in the BMR in the course of the disease.



## DISCUSSION

There has been no case previously recorded, to my knowledge, of thyroid function twice changing its direction. It may help to decide whether, or to what extent, the symptoms observed clinically are caused by primary changes in the hormone-producing cells themselves. In this case a change in the cells seems improbable; the sudden rise in their activity not merely to a normal level but even to one of increased function late in the disease could scarcely be explained by such a supposition. The fact that the change was sudden and apparently influenced by emotional factors suggests that the decisive rôle must have been played by extrathyroid factors—either cerebroneurotic stimulation, or increased production of thyrotropic hormone by the anterior pituitary lobe. It is still an open question however whether cerebroneurotic impulses act directly on the thyroid gland, or indirectly through primary stimulation of the anterior pituitary lobe. These impulses could conceivably be transmitted through the infundibular stalk, or perhaps the cervical sympathetic fibres.

The case offers further evidence that the central nervous system plays an important part in the aetiology of both Graves's disease and myxœdema. That myxœdema may be of pituitary origin is evident from clinical experience (secondary myxœdema). In 1926 I reported the case<sup>1</sup> of a woman aged 55, suffering from pituitary tumour, who developed typical myxœdema during the course of her disease. I also described a case of eosinophil adenoma of the anterior pituitary lobe producing acromegaly, associated with fully developed signs of Graves's disease.

## SUMMARY

A woman of 34 years, presenting in 1936 typical signs of thyrotoxicosis, recovered after treatment with iodine and irradiation of the thyroid, but in the course of a year developed typical myxœdema. Thyroid was given, at first in rather small, later in larger dosage (up to gr. 10 a day). The myxœdema lasted nearly 4 years, in the course of which she became pregnant; during pregnancy she stopped taking thyroid without relapse. After delivery she was in good health for a year. During this time an attack of pneumonia did not affect the thyroid condition either way. Emotional disturbance in 1941 (air-raid alarms) was followed by a return of the signs of Graves's disease. Under treatment by rest, sedatives and glucose injections she gradually recovered.

The case shows that periods of hyperfunction and hypofunction of the epithelial cells of the thyroid gland can occur successively.

The hypothesis that temporary functional exhaustion of the thyroid gland induces the shift from Graves's disease to myxœdema must therefore be discarded.

1. Zondek, H. *The Diseases of the Endocrine Glands*, London, 1935, p. 194; Zondek, H. and Karp, I. *Helv. med. Acta*, 1939, 6, 348.

## Reviews of Books

### Neural Mechanisms in Poliomyelitis

HOWARD A. HOWE, MD, associate in anatomy, Johns Hopkins University, Baltimore; DAVID BODIAN, PhD, MD, assistant professor of anatomy, Western Reserve University, Cleveland. London: Humphrey Milford, Oxford University Press. Pp. 234. 20s.

THIS monograph surveys the impressive series of animal experiments made by Howe and Bodian in connexion with poliomyelitis. Many of their results have already been reported but they are reassembled here with new and amplifying observations. Both in conception and presentation the work is a model, establishing the neuronal theory of the propagation of poliomyelitis virus on a firm footing. Pathological patterns obtained by selecting various sites for inoculation illustrate many biological and neurological points—for example the varying susceptibility of different groups of neurones in the central nervous system, and the fact that otherwise susceptible neurones are refractory to infection after division of their axis-cylinders and during the period of regeneration. The emphasis now laid upon the intestinal tract as a probable port of entry in man raises fresh problems in preventive medicine and encourages the hope, expressed by the authors, that the next few years will see further advances towards control of this disease.

### Medicine: Essentials for Practitioners and Students

(4th ed.) G. E. BEAUMONT, DM Oxf, FRCP. London: J. and A. Churchill. Pp. 800. 28s.

THIS book is now an established friend, having reached the important age of 10. The new edition shows little of the effects of war, paper, printing and price all being reasonable. That the "one man" textbook still has a useful place the popularity of Beaumont among students shows. As a working textbook for practitioners it is less helpful because its teaching is necessarily compressed and at times dogmatic. The new articles are somewhat uneven but there is much new material and little of importance has been omitted. As in previous editions diseases are dealt with system by system; there are chapters on the infectious fevers and tropical diseases. Mental disorders are not mentioned except for hysteria and neurasthenia; it might be useful in further editions to include such symptoms as delusions or depression in the index with appropriate brief accounts of them.

### Eye Manifestations of Internal Diseases

I. S. TASSMAN, MD, associate professor of ophthalmology, University of Pennsylvania, Philadelphia. London: Henry Kimpton. Pp. 542. 48s.

IN the first 200 pages of this book Professor Tassman describes the methods of examining the eye, its appearance in health and changes in disease. In so small a space it has been necessary to be rather sketchy; and some diseases—such as retinal detachment with tear—which have no association with general disease might have been left out. Its matter has been covered in so many other manuals that this volume might well have stuck by its title. The remaining 300 pages are a comprehensive account of those diseases which have eye complications, and there are few omissions. The ocular palsies of toxic goitre deserved fuller treatment than the solitary remark that "paralysis of the ocular muscles and diplopia may occur." The book includes nearly 200 photographs of a higher standard than that of the coloured plates, some of which are hardly worthy of the volume. As a reference book for those engaged in general medicine it serves a real purpose, being written with a balanced judgment.

### A Glasgow Manual of Obstetrics

(4th ed.) SAMUEL J. CAMERON, MD Glasg., FRCOC; JOHN HEWITT, MB, FRCOG; ELLEN HEWITT, FRCOG. London: Edward Arnold. Pp. 704. 25s.

THIS is essentially a textbook of practical obstetrics designed to be of assistance to the young obstetrician when dealing with emergencies. It is an equally good, sound textbook for the final-year student. A refreshing feature is the abundance of physiological and patho-

logical material incorporated in the text. The recent work of other authors has been critically surveyed and assessed and the whole atmosphere of the book is contemporary with one very notable exception: the methods of administering and collecting blood for transfusion as described and illustrated on pp. 340-344 are out of date. Though they may work well, it seems a pity not to teach the standard technique used by the transfusion services. The illustrations in the book are good and strikingly clear.

### Minor Medicine

Editors: Sir HUMPHRY ROLLESTON, Bt., MD, Camb, FRCP; ALAN MONCRIEFF, MD Lond, FRCP. London: Eyre and Spottiswoode, for *The Practitioner*. Pp. 223. 16s.

SOME of the two dozen articles in this interesting collection of little monographs are better than others and it is not quite clear whether conditions—such as obstinate hiccup or acute food poisoning—which may terminate in death, rightly fall within the province of minor medicine. The sane and balanced account, in the Hurst tradition, of chronic constipation by Sir Adolphe Abrahams merits the serious attention of patients as well as doctors. In his otherwise thorough account of the common cold Dr. J. Browning Alexander makes no reference to fatigue—especially in children—as a precipitating factor, nor does he call attention to the prophylactic value of daily exercise in the fresh air at all seasons and in all weathers. Dr. F. M. R. Walshe writing on herpes is as honest, if as therapeutically depressing, as ever and Dr. T. L. Hardy rightly stresses the almost omnipresent factor of mental strain as a cause of minor digestive disturbances. As sometimes happens in accounts of common diseases written by consultants there is not much evidence of therapeutic resource; thus, writing of migraine, Dr. Harry Lee Parker discounts the oral use of ergotamine tartrate and omits sodium glycocholate and nitroglycerin from the category of prophylactic drugs worthy of trial. Dr. Ivor J. Davies tells us firmly that an initial purge is necessary in influenza but does not tell us why. He might have pointed out, too, what a long time it takes to recover fully from this disease. Dr. F. Lee Lander urges the city-dweller with chronic bronchitis to seek the pure air of the country—where, alas, he will find plenty of fellow-sufferers.

### Aids to Surgical Anatomy

(2nd ed.) J. S. BAXTER, MB, MSc Belf, FRCSI. London: Baillière, Tindall and Cox. Pp. 193. 4s. 6d.

THIS handy book has been brought up to date. The terminology is stated to be that of the Birmingham revision, which is now commonly used in the schools, but there still seems too much confusion between medial and lateral, and inner and outer so that these terms are used indiscriminately, sometimes in the same sentence ("the inner two thirds of the foot... is supplied by the medial plantar"). There are 26 black-and-white drawings. It must be difficult to select a small number of diagrams for such a book, but some of those included illustrate points of no great importance, and some are too sketchy. The subject matter is comprehensive enough to be useful for revision before the final vivas.

### Tropical Tips for Troops

(2nd ed.) Lieut.-Colonel E. T. BURKE, MB, Glasg. London: W. Heinemann. Pp. 74. 2s. 6d.

THIS little book, based upon letters written by the author to his son leaving for active service in the East, has evidently filled a need. It gives hints on tropical kit, the sun, the common tropical diseases, vermin, mental readjustment and concludes with a chapter for women who may be called upon to serve in the tropics. But it is not altogether a safe guide. While the need for drinking water when engaged in physical exertion seems recognised by the author he apparently believes this need should not be met during the day-time. He makes no mention of mosquito boots and in fact recommends shoes for evening wear, and he states that a fair degree of protection against malaria is given by a small dose of pamaquin. He also states that there is no protective inoculation against typhus.

# THE LANCET

LONDON: SATURDAY, JANUARY 16, 1943

## UNEXPLAINED JAUNDICE

IN 1937 the CHIEF MEDICAL OFFICER of the Ministry of Health wrote<sup>1</sup> of a disquieting series of cases of infective jaundice reported to him. Most of them were mild but a small number died with classical symptoms of acute necrosis of the liver. On inquiry it was found that some of the patients, having been in contact with measles, had been given convalescent measles serum of a certain batch. Unused remainder of this batch was found to be sterile and non-toxic and the situation offered a pretty problem for the diagnostic acumen of the central health department. The scope of the problem has been widened by reports of similar happenings in the Americas with yellow-fever vaccine and other excitants, already discussed in our leader columns (Oct. 31, 1942). Elsewhere in this issue is a closely reasoned summary, prepared by medical officers of the Ministry, of what is now known about this homologous serum jaundice. The facts available at present indicate that the blood or blood-products of certain individuals possess some factor which when inoculated into certain other individuals will produce symptoms of varying degrees of severity. It may be a fleeting disturbance to a few liver cells with resulting mild symptoms of gastro-intestinal disturbance with bile in the urine for a day; more severe cases may have skin lesions in the form of urticaria or erythema multiforme, pains in the joints, splenomegaly, and frank icteric coloration of sclera and skin. Many of these patients have high icterus with remarkably little loss of appetite. A very small proportion of those affected die with acute atrophy of the liver. Those who recover do so, it seems, with little or no residual damage to the liver. Whether the incriminated product contained liquid human serum, reconstituted dried serum or plasma the clinical picture has been the same.

At the time of the earlier "outbreaks" it was suggested<sup>2</sup> that the condition was epidemic catarrhal jaundice, but this idea has been discarded because of the much longer incubation period of the disease under discussion. The possibility that yellow-fever virus was to blame has also been eliminated. Whatever the causative agents may be, they are exceedingly potent despite the long incubation period; in some of the yellow-fever vaccine cases each man received not more than 0.05 c.cm. serum. Oddly enough this amount subcutaneously has produced more disturbance than several hundredfold by transfusion. The fact that children given convalescent serum as a protection against measles came off badly may be related to the relatively large dose. In contrast is the low incidence in children following injection of vaccine in Brazil.<sup>3</sup> Another curious variant is the extreme range of severity among an apparently uniform group of men inoculated with the same material. When this occurs in epidemic infective hepatitis it is

explained by assuming different degrees of exposure, but this can hardly apply to a group receiving the same intravenous injection from a pool of liquid plasma.<sup>4</sup> In the light of this wide range in signs, symptoms and severity in different countries—let alone the variety of exciting agents: yellow-fever vaccine, human serum and plasma—are we then right in gathering them together like this as a single entity? Whether they indeed result from the action of a common causative agent has yet to be proven. Clinically they have been distinguished from cases of catarrhal jaundice by the triad of joint pains, splenomegaly and erythema multiforme. But in several accounts<sup>2, 3, 5</sup> there has been no mention of skin lesions or joint pains, and splenomegaly does not seem to have been a notable feature of the yellow-fever vaccine cases. We must not overlook, however, that many of these cases were only studied retrospectively, weeks after the beginning of the illness, when signs may have been forgotten or were no longer recognisable.

Frankly the evidence is not yet ready for a grand jury to be sure of a prima-facie case for trial, and the main reason for the publication of the Ministry's memo at this stage is to put the medical profession on its guard against the possible occurrence of jaundice following the use of human blood or blood-products. POPE had a prevision of the nature of the quest when he wrote<sup>6</sup> "All seems infected that th' infected spy, as all looks yellow to the jaundic'd eye." Much of the delay in getting to the root of this problem has been the failure to realise its existence, so that many of the data in each outbreak had to be collected in retrospect. If the condition appears to be infrequent it may become commoner if looked out for more carefully. The cases set out in the memo which followed transfusion with reconstituted dried serum might have been overlooked had they not all occurred in one hospital where a house-physician had seen some of the convalescent serum cases. Practitioners unaware of the possibility would not relate an attack of anorexia, nausea and jaundice with a transfusion given two to six months before. Cases transfused from a common lot of blood might have dispersed widely in the interval. For example, one man who developed jaundice ten weeks after transfusion had during the short period since his discharge from hospital had no known contact with another case. Investigation showed that of the four others who were transfused from the same pool, while one was alive and well, three were dead without apparent liver damage within less than ten weeks—and none of the original blood was left for examination. One of the main hindrances in investigating these cases has been the lack of clinical data and of an exact record of the material used for transfusion.

All attempts at animal transmission<sup>5, 7</sup> have been unsuccessful, but there are still many who pin their faith on a virus aetiology. The possibility of finding the cause in some altered or peculiar protein in certain bloods has been seen by LEVINE and STATE<sup>8</sup> who record fatal anaphylactic reactions in 20% of a group of 109 people transfused with a certain plasma. These

4. Chesney, G. J. E., Hawley, W., MacFarlane, A. and Stegman, A. Unpublished communication.

5. Soper, F. L. and Smith, H. H. *Amer. J. Trop. Med.* 1938, 18, 111.

6. An Essay on Criticism, Part II, line 358.

7. Findlay, G. M., MacCallum, F. O., and Murgatroyd, F. *Trans. R. Soc. trop. Med. Hyg.* 1939, 32, 575.

8. Levine, M. and State, D. *Science*, 1942, 96, 68.

1. *Rep. med. Offr. Minist. Hlth. Lond.* 1937.

2. Findlay, G. M. and MacCallum, F. O. *Trans. R. Soc. trop. Med. Hyg.* 1937, 31, 297.

3. Fox, J. P., Manso, C., Penna, H. A. and Para, M. *Amer. J. Hyg.* 1942, 36, 68.

patients were found to be hypersensitive to intradermal injection of one or more monovalent samples of plasma, and when transfused they developed headache, dyspnoea, epigastric distress, chills, fever and urticaria. Transfer of dermal sensitivity from reacting to non-reacting patients was readily effected. But nearly all the outbreaks have followed the use of pooled serum or plasma and no-one has yet reported a history of jaundice in any donor of an incriminated batch. While the mixing of many samples may sometimes result in an incompatibility for certain individuals, the pooling on the other hand may be the means of neutralising one or two virus-containing samples by a number of immune ones. If however the agent is really a virus it is difficult to understand how the same noxa can be highly virulent for children in one episode and almost avirulent in another. The low incidence reported in the large groups who received bad batches of yellow-fever vaccine suggests that, whatever may be the agent, a high proportion of individuals in the USA and Brazil are immune or resistant to it.

It is to be hoped that all this lively research will bear fruit in the coming months. Meanwhile, by watchful eye and accurate recording of clinical and laboratory data on the part of all who are using blood or blood products, it should be possible to identify and eliminate suspicious batches and this in time should give some clue to the conundrum. These inquirers will be stimulated by learning of the prodigious amount of work done by the backroom doctors at the Ministry.

### FAILURE OF LACTATION

A PHYSIOLOGICAL breakdown such as occurs when breast-feeding fails is not only unsatisfactory for the women immediately concerned but, repeated on a large scale, may prove disastrous for the race or section of the race which it affects. The decline in breast-feeding in this country has been a matter for critical comment in the past decade, the general feeling left by such reports being that mothers are increasingly unwilling to coöperate or frankly unable to cope with the physiological situation. Elsewhere in this issue Dr. MARGARET ROBINSON analyses 1100 consecutive examples of breast-feeding prematurely discontinued. In 40% no reason for the failure was offered by the mothers and no cause could be found on examination. Breast abscess, cracked nipple, acute illness and debility of the mother made up the chief morbid reasons for weaning. Over 100 mothers in the series refused to feed their babies; the environment was wrong in less than 10% and the baby was blamed in nearly 14%, although clearly the digestive symptoms which led to weaning were usually due to an already declining lactation. Approaching the subject from another angle, a subcommittee of the British Pædiatric Association recently investigated the effect of modern labour conditions on breast-feeding in Birmingham.<sup>1</sup> There it was possible to compare a survey made before the war with one made in 1942 and it is reported that the incidence of breast-feeding has not been materially affected by the period of open hostilities. This is satisfactory as far as it goes, but the report also shows that only 50% of women are prepared to continue breast-feeding their

baby for longer than three months. It may be true that it is in the early months that natural feeding matters most, but it is certainly true that the difficulties in successful breast-feeding have mostly been overcome by the third month, so that from the physiological aspect breast-feeding ought to be easily continued. Of the influences adverse to breast-feeding in Birmingham the report picks out one important group. "Doctors," it states, "are still responsible for weaning babies more than any other single factor. They still take babies off the breast whenever there is any difficulty, rather than take the trouble to go into the whole difficult question of successful breast-feeding." Yet in Liverpool ROBINSON only blames the doctor in 4 instances out of her 1100 cases. Clearly some other factors must be at work. GORDON in a recent study<sup>2</sup> of some social aspects of infant feeding eliminates air-raids and evacuation as possible accelerating factors in the wholesale decline now taking place; and he is also able to show that although the place of breast-feeding has largely been taken by dried milk, the distribution of dried milk at the infant welfare centres has, per child, diminished over the period studied (1920 to 1938) during which the decline in breast-feeding has occurred.

Since social and environmental factors appear to play a minor part it seems logical to seek a physiological reason for a physiological failure. This has been attempted by Dr. H. K. WALLER, whose contribution in this issue will repay careful study. WALLER starts from the well-known fact that many mothers who fail to feed their babies appear to have had plenty of milk in the early days of lactation. Putting all the responsibility on the baby to "empty" the breasts in the early stages is unsatisfactory, because it is not a simple question of suction. Something more is involved and in the veterinary world experts are agreed that the outflow is dependent on a reflex mechanism. HAMMOND suggests<sup>3</sup> that in the cow this takes the form of a reflex venous engorgement, produced by stimulation of the teats, exerting pressure on the fat-laden milk in the alveoli and finest tubules, and forcing it into the larger ducts and sinuses. He used an ingenious method of fractional milking and fat analysis to prove his thesis and this has been followed by WALLER in the human subject with similar results. The vascular element of the theory is not essential: smooth muscle is present in the human breast, certainly around the large lactiferous ducts and also to some extent around the alveoli—a specialised type of myo-epithelial tissue of ectodermal origin. The clinical significance of this conception of what WALLER terms a draught reflex is of great importance. Clearly it is a delicate thing which must be carefully cherished in the early stages of lactation; as WALLER puts it, the reflex might respond to methods of conditioning less crude and haphazard than those to which it is commonly subjected. In a contribution to the Banting memorial number of the *Canadian Medical Association Journal*, GUNTHER indicates<sup>4</sup> that workers at the Banting Research Foundation have reached similar conclusions and she enumerates many factors which may inhibit the essential reflexes. Clearly the whole technique of

1. Where Dr. A. V. Neale secured the help of Drs. Ethel Cassie, Frances Braid and Milla Pierce.

2. Gordon, I. *Arch. Dis. Childh.* 1942, 17, 139.

3. Hammond, J. *Vet. Rec.* 1936, 16, 519.

4. Gunther, M. *Canad. med. Ass. J.* 1942, 47, 410.



breast-feeding should be carefully reviewed in the light of a reflex expulsion mechanism. The use of both breasts at each feeding-time, for example, appears to both WALLER and GUNTHER as an immediate practical deduction and they condemn the alternating single-breast method. But there are many more details than this in the early stages to be reconsidered. The higher centres, through fear or unwillingness, clearly play a part and this may help to explain ROBINSON'S large group of unrecognised causation. Lactation is of great clinical and national importance. Of the two articles here presented, the first states the problem, the second indicates one line along which its solution may be sought.

### PERSISTENT GONORRHOEA

THREE months ago HARRISON,<sup>1</sup> from his signal-box at the Ministry of Health, appealed to practitioners to accelerate the campaign against venereal diseases by using sulphonamides effectively in the treatment of gonorrhoea. Timid dosage is not only ineffective but carries the risk of producing resistant strains of gonococci which would take us back to the futility of the pre-sulphonamide period. He indicated what 5 g. of sulphathiazole on 4 successive days might achieve and his experience tallied with that in the German army.<sup>2</sup> In our last issue PETRO, working at a Royal Naval base, distinguished between naturally drug-fast cases and the acquired resistance of imperfect dosage. In our present issue McELLAGOTT and JEFFERISS, summarising their observations in the Royal Air Force, report a success-rate of nearly 90% with a course of sulphathiazole 6 g. a day for two days, which in no case gave rise to serious toxic symptoms.

While this is encouraging it will be seen that even with the latest drugs used under ideal conditions it is seldom possible, by chemotherapy alone, to effect a cure in more than 90% of cases of gonorrhoea in the male. This proportion may be slightly increased by combining chemotherapy with local measures but a hard core of resistant cases remains. Such resistance may arise from a true drug-resistance but in many cases is due to the inability of the sulphonamide to reach some "closed" focus of infection. These resistant cases frequently drag on for many weeks and develop acute prostatitis, epididymitis and such metastatic complications as arthritis and conjunctivitis. They are discouraging to patient and doctor alike and, in the Services at least, involve a loss in man-power and efficiency. Treatment with repeated courses of different sulphonamides, supported by the use of local measures, vaccines and the intravenous injection of TAB vaccine, proves ineffective in a proportion of these resistant cases. These measures normally exhaust the facilities available in most treatment centres but where it is possible to combine chemotherapy with inductotherapy, BATCHELOR, THOMSON and HUGGAN<sup>3</sup> have developed a routine holding out, as they suggest, a prospect of success approaching 100% in the treatment of such cases of protracted or intractable gonorrhoea. The essential points are stated to be (1) on the day preceding fever treatment, 6-8 g. of intravenous soluble

sulphapyridine given in divided dosage—2.0 g. in 30 c.cm. sterile distilled water; (2) on the morning of treatment 2.0 g. sulphapyridine by mouth; (3) a minimum of 8 hours fever above 106° F. in the inductotherm cabinet<sup>4</sup>; (4) the administration during the fever of a further 6-8 g. sulphapyridine by mouth or, where necessary, intravenously; (5) continuation of sulphapyridine by mouth for five days at 8 to 12 tablets per day, depending on the patient's weight. Local treatment is not required, they say, after fever therapy except in the presence of a secondary urethral infection.

BATCHELOR and his colleagues have found this routine as successful in cases with prostatitis and epididymitis as in uncomplicated cases. Renal complications, such as hæmaturia and anuria, did not arise as the thirst induced in the inductotherm cabinet insured an adequate fluid intake. Vomiting, presumably of central origin, frequently occurred within one to three minutes of giving the intravenous sulphapyridine. Over twenty cases have been so treated of which six are reported in some detail. The results certainly appear to justify the authors' claims and favourable reports have also appeared in the American literature. It may well be that in combined chemotherapy and inductotherapy we have a cure for gonorrhoea which has proved resistant to ordinary measures.

### Annotations

#### CRILE'S CONTRIBUTION TO SURGERY

WHEN consciousness is extinguished by an anaesthetic the mindless organism left on the operating table is still capable of responding to painful stimuli by reflexes through lower levels of the central nervous system; and the sum of these responses may be the condition of surgical shock. This conception we owe to Crile, whose death on Jan. 6 in Cleveland, Ohio, robs the world of a great surgeon. Following up his conception of shock at the time of the 1914-18 war, he set himself to abolish the harmful side-effects of operations. The apprehension of patients was allayed by preliminary sedation, they were anaesthetised with nitrous oxide, the least harmful anaesthetic then known, and all afferent impulses from the operation area to the central nervous system were cut off by the injection of local anaesthetics. Though his original technique was not wholly effective and successful, this conception of anoci-association, as he called it, continues to influence anaesthetists and surgeons to this day. After its enunciation in his book, *Surgical Shock and Shockless Operation*, the rough and ready hurried operating of previous days was revealed as crude, almost primitive.

George Washington Crile was born in 1864 and graduated in 1877 at Wooster University, Ohio, where he was professor from 1890 to 1900; afterwards he held the surgical chair at Western Reserve University before helping to found the famous clinic in Cleveland in 1924. He served in the Porto Rican campaign of the Spanish-American War, and his experience there stood him in good stead during the last European War, when he served as a colonel and received decorations from all the Allies. The Crile clinic at Cleveland, which ranks among the first four in America, is known for the surgical treatment of exophthalmic goitre in which he was a pioneer. Patients came not only from America but from all parts of the world and his technical skill in this branch of surgery was outstanding. His interest in shock led him to the study of the suprarenals.

1. Harrison, L. W. *Lancet*, 1942, ii, 527.

2. *Ibid.*, p. 558.

3. Batchelor, R. C. L., Thomson, G. M. and Huggan, J. L. *Edinb. med. J.* 1942, 49, 581.

4. Thomson, G. M. *Ibid.*, 1941, 48, 629.

and he was the first to advocate sympathectomy for hypertension. Whatever he touched—and his interests were very wide—he enriched. His dynamic personality was for many years a stimulus to the young surgeons who worked with him and who subsequently carried his teaching into other clinics; while visitors from abroad were caught by his enthusiasm, originality and insight. He leaves what few can hope to do—a lasting impression on surgical practice.

#### PAIN IN THE CHEST

Harrison<sup>1</sup> contends with much truth that the only common serious cause for chronic pain in the chest is coronary disease. He discusses conditions which may simulate such pain, at least superficially. For example, pain in the region of the left shoulder may be due to myalgia or arthralgia, yet it may be related to exercise because the affected arm is swung in walking. The patient must be asked to walk keeping the affected arm quite still, and if the pain is due to local causes it naturally fails to develop. Pain in the same region may be associated with angina pectoris, and has been attributed to reflex muscle spasm resulting from disease of the heart; it may be associated with actual tenderness in the deltoid or pectoral regions. Thus any middle-aged or elderly patient complaining of pain in the region of the left shoulder should be investigated to exclude angina. Ordinary cases of acute pericarditis can seldom be confused with angina pectoris or coronary thrombosis, but Barnes and Burchell<sup>2</sup> as well as Harrison have drawn attention to a type which may be. Such cases are seen in winter in patients who have had a recent respiratory infection. The onset is sudden and the only points differentiating it from coronary thrombosis (apart from the cardiogram) are that the pain is usually more stabbing than constricting and is accentuated by breathing. Harrison mentions mediastinal lymphadenitis as another possible cause of substernal pain and reports 2 examples of it. Here the preponderance of respiratory symptoms and signs, and the radiological findings, clarify the issue. Almost any lesion in the upper abdomen may simulate pain of cardiac origin, among the rarer causes being diverticulum of the stomach, "cascade stomach," and duodenal ulcer. An occasional cause is hypoglycæmia; Harrison reports a case of the kind in which pain in the chest was not associated with coronary disease; this condition must be differentiated from the attacks of genuine angina pectoris or coronary thrombosis sometimes seen in hypoglycæmia, whether spontaneous or induced.

A careful history must be taken in every case; association of the pain with exertion clinches the diagnosis of angina pectoris. The second important feature is the site of the pain; if this is not substernal or in one of the common sites of radiation such as the left arm or the back of the neck in the collar-stud area, then the diagnosis of angina should be made with caution. Harrison does not stress this last point, and his cryptic remark that the pain of myocardial anoxia may be felt "in almost any region between the nose and navel" is graphic but misleading, particularly for angina. The pain of coronary thrombosis may radiate widely, though even here the original site of the pain is usually substernal, but in angina the localisation of the pain is much more precise. Another American aphorism—if a patient complains of pain below the left diaphragm, think of the heart; if he complains of the heart, think of the stomach; if he complains of both, think of the thyroid—aptly sets out the possibilities, but should be used with caution by the inexperienced. In doubtful cases, as Harrison points out, the response of the patient to exercise under observation may be helpful. Provided the amount of exercise is carefully controlled, there is little danger in the

procedure, and if it produces a pain which the patient describes as similar to his original pain practically establishes the diagnosis—even without observing changes in the electrocardiogram on exertion or on breathing low tensions of oxygen. Where the pain is due to gastric distension and not to heart disease, distension of the stomach with air may also be a useful diagnostic procedure. But there is seldom need to submit a patient to a barrage of complicated, time-consuming, and expensive investigations. A full and careful history will often suffice, leaving other investigations for cases in which all the findings do not fit into the picture.

#### CANCER OF MICE AND MEN

THE unravelling of the complexities of the hereditary influence in mammary cancer of mice by Bittner and Little of the Jackson Memorial Laboratories, Bar Harbour, Maine, is the most arresting of recent advances in cancer research.<sup>1,2,3</sup> Sir Alfred Webb-Johnson, president of the Royal College of Surgeons, referred to it in proposing the adoption of the annual report of the British Empire Cancer Campaign. British workers have confirmed the American finding that the hereditary influence is ineffective unless accompanied by an extrachromosomal factor which is conveyed in the mother's milk. The report mentions Gilmour (London), Bonser (Leeds), and Pybus and Millar (Newcastle) as supporting the evidence of a milk-borne influence. The significance of this remarkable discovery is not appreciated in its proper context. Attempts are made to apply the observations directly to an interpretation of the incidence of human mammary cancer. Statistical evidence has been collected, by Wassink in Holland and Waaler in Norway, to suggest that heredity may have some influence over the incidence of human breast cancer. In Leeds an inquiry has now been carried out by Miss Waiman and her colleagues<sup>2</sup> into the family history of 600 women with cancer of the breast; with the assistance of Dr. Percy Stocks, of the Registrar-General's office, she has shown that the incidence of breast cancer among the mothers of these 600 cases and the incidence for the country as a whole, were 14 and 15 out of every 79 cases of cancer in women—that is, substantially the same. As the Leeds authors point out in breeding<sup>3</sup> to the degree achieved in mice is not a factor in human cancer. Intensive inbreeding of mice is analogous to the standardisation of chemical substances in test-tube experiments; brother-sister matings so standardise their genetic constitution that all mice born, say, in the 40th generation are identical apart from sex differences and those due to postnatal events. With such material, one known factor after another can be introduced separately into the lives of the mice, and thus the decisive element in the cause of their mammary cancer becomes apparent. The nature of these experiments is deliberately artificial, and is designed to enlighten us, not on the natural occurrence of a particular form of human cancer, but upon its ultimate cause; and this is the true significance of Bittner's work.

Some further questions have now been answered by Bittner and others.<sup>4</sup> They have shown that the milk influence is present in the blood and spleens of high cancer strains of mice, and in mammary tumour tissue; and that it is active and can be filtered, dried and kept in glycerin. Like other ultramicroscopic agents of disease of high molecular weight which can be centrifuged out from suspensions of fowl sarcomas and from the papillomas of rabbits, the active milk influence has been spun out of milk from high cancer strain mothers. How are all these indications of the virus nature of the influence to be reconciled with its sudden appearance, apparently *de novo*, in animals which have not

1. Harrison, T. R. J. *Amer. med. Ass.* 1942, 120, 519.

2. Barnes, A. R. and Burchell, H. B. *Amer. Heart J.* 1942, 23, 247.

3. Annual Report of the Imperial Cancer Research Fund, 1941-42.

4. Annual Report of the British Empire Cancer Campaign, 1942.

3. *Lancet*, 1942, ii, 101.

4. Bittner, J. J. *Cancer Res.* 1942, 2, 710.

been in contact with those having a high incidence of mammary cancer? And can it be obtained from mammary tumours due to the chemical carcinogens? If experiments designed to answer such questions lead towards some unifying principle (as they seem likely to do), then, even if our knowledge still remains incomplete, we shall have learned something more about the cause, though not the incidence, of cancer.

### RECOVERY FROM INJURY

THE beautiful complexity of compensation cases makes them an adventure in surgery, psychology and social medicine; it is a considerable achievement to be able to look back on such a case and to feel that the best has been done for the patient at every stage in his story. Dr. Henry H. Jordan in a book<sup>1</sup> addressed mainly to those doctors who have occasion from time to time to examine and report on injured workmen, and to the officials of insurance companies which cover employers' liability risks, disclaims any intention of writing a comprehensive textbook of traumatic surgery. He confines himself to a discussion of practical problems arising in his own extensive experience as associate orthopaedic surgeon to Lennox Hill Hospital, New York, which includes some 30,000 cases seen during 18 years. It is, as St. Denis is reputed to have remarked when his head was cut off, the first step that counts: no-one can foresee how complicated any case may become, or how valuable it may eventually be to have a record of the exact condition immediately after the accident, and besides this is the best time to plan treatment as a whole, and to obtain an accurate history of the accident. He believes in exact measurements whenever possible, so that the injured and the uninjured side of the body can be compared and the range of movement in the joints recorded; and he directs attention to muscle groups which activate more than one joint, such as the ischio-crural and gastrocnemius groups. Many cases will benefit from reference to a specialist—a fractured wrist for reduction and immobilisation, or a knee with a strained internal lateral ligament for fixation in plaster-of-paris; after such treatment the patient may well continue under the care of the general practitioner. He agrees with the usual experience in industrial accident practice, that deliberate exaggeration of symptoms and malingering is rare in workmen, but that tact and sympathy may be required to understand the nature and origin of the complaints of a patient when these do not appear to accord with the clinical findings. Greed is by no means the only motive which may prompt a man to claim an excessive degree of disability—a subconscious craving for sympathy or an urge to vindicate his real or supposed rights, or merely a reaction to what is felt to be a harsh or unjust attitude on the part of his employer or an insurer may lead to an overemphasis of symptoms difficult to distinguish from a fraudulent claim. Thorough and repeated examinations may be required in some cases before clinical signs can be detected to account for pain, where this is due to an early bone tumour or deep-seated infection. A form of atrophy, first described by Sudeck in 1900, may supervene after even slight injury, leading to decalcification of the limb bones and pain.

Jordan is rightly critical of the schedules introduced in different parts of the United States as a guide to the evaluation of disability, and reports favourably on a system which has been followed for many years in Switzerland, under which the injured workman is re-examined at fixed intervals of 3, 6, 12, and 24 months after the accident, and the rate of his compensation adjusted accordingly. Griffiths and others, over here, consider that no opinion as to working capacity can be of much value unless the examiner is conversant with the condition of the patient, and the nature and physiological

demands of his work. Jordan insists on the need for adequate rest to an injured part at the beginning of treatment, by immobilisation in plaster or otherwise, coupled with active use of the rest of the body; this applies not only to fractures, but to many kinds of injury to soft parts. The risk of joints becoming stiff in bad position must be avoided; for instance, the shoulder should be kept at rest on an abduction splint rather than in a sling, and talipes decubitus should be prevented by suitable supports.

In a chapter on so-called traumatic neuroses Paul Hoch notes the significance of the constitutional factor in the development of neurosis after injury. Early diagnosis and treatment are important; not every patient who appears anxious and apprehensive is suffering from neurosis, but many are given treatment in the absence of a physical defect, which can only have the effect of prolonging the disability. Thus it may be disastrous to prescribe a long course of physiotherapy or the wearing of an appliance to correct some physical disorder which does not in fact exist. He has noted recovery from neurosis in only 25–35% of cases, but he quotes the finding of Lewandowsky that there was recovery in 70% of people affected by traumatic neurosis who received a lump sum compensation, as compared with a recovery-rate of 7% in those who received continuous compensation in the form of a monthly allowance. No doubt early settlement of a claim will often avert or abort neurosis, but to suggest that such a result may be expected in as much as 70% of cases is to ignore the experience of our Ministry of Pensions or of such American authorities as Norcott. In fact the therapeutic value of the lump sum has been greatly over-estimated; it may be a convenient way of terminating the liability of the employer or of his insurer, it seldom does any lasting good to the recipient. But it is quite true, as Jordan says, that "the quick settlement of a compensation claim is essential, otherwise the neurosis becomes ingrained and very difficult to eliminate."

### THE TUBERCLE BACILLUS IN BOOKS

BACTERIOLOGISTS specialising in tuberculosis are often asked by laymen whether books and magazines used by sputum-positive patients are infectious, and if so what can be done about it. There has been singularly little effort to find out what is the actual risk apart from general research on the survival of the bacillus outside the body; indeed, Smith,<sup>1</sup> who has lately answered the question after undertaking experiments with books, papers and catalogues artificially infected with sputum and tubercle cultures, was able to quote only two previous studies on the subject. In its inquiry into books as fomites fifteen years ago the consultative committee to the Board of Education was dealing with school books and the common infections of school life. In conveying these Brincker<sup>2</sup> agreed with the view expressed by McCartney<sup>3</sup> that books are insignificant as compared with other agents. But neither was considering the special question of tubercle. Smith found that at room temperature tubercle bacilli survived only a few days in room light, and from 2 weeks to 3½ months in the dark. Printer's ink seemed to have no effect on survival, bacilli living as long on printed as on blank paper. Almost all papers are composed of wood pulp chemically treated in one way or another with acids and alkalis, bleaching agents, sizings and loadings; and printing ink is equally full of chemicals; but Smith believes that with most varieties of paper and printing ink the active chemicals likely to kill the tubercle bacillus have usually been removed or neutralised. All the papers he tested, however, had pH values between 5 and 6, well below the optimum level for the cultivation of the tubercle bacillus. Natural

1. Smith, C. R. *Amer. Rev. Tub.* 1942, 46, 549.

2. Brincker, J. A. *Books in public schools.* HMSO, 1928.

3. McCartney, J. E. *Lancet*, 1925, ii, 212.

1. *Workmen's Compensation and the Physician.* London: Humphrey Milford, Oxford University Press. Pp. 172. 16s.

infection by patients is presumably much lighter than deliberately planned experimental infection; most likely it takes place by droplet infection or direct contact, or as a result of moistening a thumb in order to turn a page (a practice which should be as obsolete as shuttle-kissing). Smith suggests that a book quarantine would be effective; storage for a month should be enough in most cases to allow for natural death of the bacilli, and in many cases the books doubtless remain on the shelves for longer than this. Active sterilisation could not be carried out without damage to the books, and even the use of ultraviolet lamps would require the methodical exposure of each page. The risks in the case of lending libraries are probably not very alarming: there are much graver risks of transmission of tuberculosis in everyday life which have not yet been explored. But hospital libraries and book-trolleys in tuberculosis institutions need special consideration. The supply of books is usually limited and their circulation intensive, so that long quarantine of books may seem impossible. Replaceable or washable covers could be used with advantage; and it would be wise to get rid of well-worn books. A ragged book is likely to be an infected book.

#### NUTRITION IN PREGNANCY

DEBATES on nutrition generally reveal what enormous tracts remain to be covered in this field, and the meeting of the Scottish group of the Nutrition Society, held in Edinburgh on Dec. 12, was no exception. Prof. R. C. Garry, who presided, discussed the influence of diet during pregnancy. This physiological strain may bring latent defects into the open; but the rational treatment of such disturbances must wait for a fuller understanding of maternal and foetal physiology. Prof. A. St. G. Huggett was equally cautious about the placenta—a secretory, storage and transfusion organ controlled by factors as yet little understood. This endocrine structure reaches its maximum development relatively early in pregnancy, but nearly three-quarters of the final weight of the foetus is built up in the last three months of pregnancy when the placenta has ceased to grow and may even be showing signs of regression. In animal experiments, restriction of the mother's carbohydrate intake causes a fall in her liver glycogen but does not affect the liver glycogen of the foetus; on the other hand if the mother is given excess of carbohydrate her own liver glycogen rises only slightly, whereas the foetal liver glycogen shows a great increase. Through all these fluctuations the glycogen content of the placenta remains almost unchanged. Dr. H. M. Sinclair reviewed what evidence we have of nutritional deficiencies during pregnancy. Supplementary feeding with vitamins A and D is said to lower the incidence of puerperal sepsis, but it is doubtful if the action is specific. Reports are conflicting on the effects of the vitamin-B complex in preventing the toxæmias of pregnancy, gestational polyneuritis and Wernicke's encephalopathy. Claims that vitamin E prevents abortion have still to be substantiated, and it is not yet clear whether vitamin C or vitamin K or both play any part in preventing accidental hæmorrhage during pregnancy or excessive bleeding at parturition. Hyperplasia of the gums is not uncommon during pregnancy but does not yield to vitamin C, and there is some evidence that it is due to excessive quantities of oestrogens in the tissues. Iron-deficiency anæmia is often seen in pregnant women but he pointed out that the physiological hydræmia of pregnancy must be taken into account in assessing the severity of this anæmia. The demands of the foetus for calcium during the second half of pregnancy are large enough to deplete the maternal reserves; yet supplementary feeding with calcium may prolong pregnancy and harden the infant's skull. Prof. Dugald Baird remarked that stillbirths and neonatal deaths are more common in hospital than in specialist practice (3.3% as against 0.6%). Standards of medical

and nursing care are comparable in the two groups and the responsible factor is probably dietetic; diet is also probably responsible for the greater percentage of premature labours—9 as against 2—in hospital as compared with specialist practice. The diet of pregnant women often falls short of the standard of the League of Nations technical commission, and evidence is accumulating that by raising diets to this standard it is possible to lower prematurity and stillbirth-rates. Mr. W. Godden, FIC, discussed some deficiencies in farm animals. Iron deficiency, especially it seems in the sow, does not affect fertility but does reduce the viability of the young during the suckling period. Adequate supplies of vitamins A and D are essential for successful pregnancy in cattle, sheep and pigs, but the evidence about vitamin-B complex is equivocal and there is no clear proof that vitamin-E deficiency affects animals other than the rat. Miss I. Leitch, DSc, drew attention to the high stillbirth and neonatal death-rates in Scotland—80 per 1000 as compared with 66 for England and Wales and 51 for New Zealand—another phenomenon presumably due to unexplained dietary factors.

#### PIONEERS OF INDUSTRIAL MEDICINE

THE retirement of Dr. J. C. Bridge from the position of senior medical inspector of factories is a historical event. The post was created in 1898 and its first occupant was Sir Thomas Legge who resigned in 1926 because he believed the Government had let him down on precautions about the use of white lead. Bridge succeeded Legge with whom he had already worked since 1913. For the past 44 years therefore the inception and development of industrial medicine in this country has been directed successively by two outstanding public servants. The present intense and widespread interest in the health of the industrial worker and in occupational medicine is a tribute to the soundness of the foundations which these pioneers have laid, and they have shown the way not only to this country but to the rest of the world. Dr. Bridge associated himself with no special subject, but—like Francis Bacon who took all knowledge for his province—with all those subjects whether medical, chemical, engineering, legal, industrial, sociological or humanitarian, which have any bearing on the health and well-being of industrial workers. And naturally he has had a place on all the committees, and they are many, that have the word "industrial" in their titles. During his 15 years in command problems have become more complex, and the number of medical inspectors has increased steadily; these he has guided with a sure hand and the affection with which they regard him bears witness to his qualities as a chief. One attribute which has endeared him to those who work with him is his capacity for listening with sympathy and without condescension. He is fond of saying that he continually learns from his junior colleagues and his modesty in this respect covers an unrivalled knowledge of industrial and occupational health matters. But perhaps his most striking qualities are his common sense—really an uncommon quality—and his flair for picking out the essentials of a complicated subject which in his case really does include ships and shoes and sealing wax. His sense of humour and love of a fair deal, coupled with a legal training and a prodigious memory make him the ideal chairman who ensures a hearing for the timid, tactful suppression of the vociferous, and the right decision at the end of the discussion. Unassuming himself, he is somewhat impatient of pretentiousness and pomposity. His work at Geneva has brought him into touch with continental authorities, his reputation being deservedly international. It seems a pity that such an experienced leader should have to step down at a time like this on account of the age-limit; and it is to be hoped that his retirement will not deprive the country, industry and the medical profession of his wise counsel.

## Special Articles

## HOMOLOGOUS SERUM JAUNDICE

MEMORANDUM PREPARED BY MEDICAL OFFICERS OF THE  
MINISTRY OF HEALTH

BETWEEN Aug. 13 and Sept. 1, 1885, 1289 persons employed in a shipbuilding yard in Bremen were vaccinated with "glycerinated humanised" lymph and of these 191 developed jaundice after an incubation period of several weeks. In two other groups of 87 and 500 workmen in the same yard vaccinated at the same time with different lymph there were no cases of jaundice (Lurman 1885).

During 1937, 41 of 109 recipients of a single batch of measles convalescent serum administered subcutaneously developed jaundice and 8 died. These cases were scattered proportionately over a wide area in the South of England. A batch of measles adult serum, pooled and Berkefeld candled in the same laboratory, gave rise to at least 11 cases of jaundice with one death. Other batches of measles serum were also suspect (Annual Report of the Chief Medical Officer 1937).

In the same year a similar sequence of events was reported in persons receiving yellow fever vaccine subcutaneously (Findlay and MacCallum 1937) and since then the icterogenicity of certain lots of yellow fever vaccine has been demonstrated repeatedly. In Brazil in 1939, 187 lots of vaccine were used to immunise 1,300,000 people. One of these lots was followed by jaundice in 304 persons, an attack-rate of 27%. The vaccine contained human serum, and although for a time change in the seed virus appeared to eliminate the causal factor, it reappeared in 1940, when two of 78 lots of vaccine caused attack-rates of jaundice of 7.66% and 1.56%, with fatalities of 2.58% and 2.00% respectively among 19,191 persons immunised. Other lots of vaccine were also mildly icterogenic (Fox et al, 1942). During the first six months of 1942, 28,585 cases of jaundice appeared in American troops who had had yellow fever vaccine containing human serum; 62 died (Editorials 1942).

In March, 1942, 266 British troops were each given less than 14 c.cm. of Seitz filtered pooled mumps convalescent plasma in one or two doses intravenously; 86 of them developed jaundice (Chesney, Gordon, Hawley, MacFarlane and Stegman, unpublished communication).

Of 36 patients treated at an EMS hospital with massive transfusions of Seitz filtered pooled and dried human serum for various forms of peripheral vascular disease (Hayward 1942, Hayward and Jordan 1942) 8 are known to have developed jaundice (Morgan and Williamson, unpublished communication).

Full details of the yellow fever vaccine incidents have been published and a recurrence prevented by eliminating human serum from the vaccine. Reports on the mumps convalescent serum and the transfusion cases, which are still under investigation, are promised by the observers. The measles convalescent serum story, now six years old, was not published in detail, and, since in the light of recent events it assumes a greater importance, the following account has been reconstructed from the contemporary records.

## Measles Serum Hepatitis

Epidemic (catarrhal) jaundice was known to have occurred sporadically among school-children in a county town during 1936, and inquiry of all practitioners brought to light 53 cases between March, 1935, and March, 1937. During the same period 185 children in the town had received measles serum from one and the same laboratory, 110 of them before Feb. 10, 1937, on which day a new batch of serum which will be referred to as K60 came into use. The 110 remained well, but among the remaining 75, 18 developed jaundice 16-114 days later and 4 died of hepatic necrosis, from which cause there were no other deaths in the city. The injections associated with jaundice were given during the period Feb. 16 to March 31, and although in 11 of them only was the measles serum batch number recorded all 18 patients probably received K60.

At a small preparatory boarding-school of 80 boys in an adjacent county 7 boys exposed to measles in the same dormitory were given K60 serum on Feb. 9, 1937; 4 of

them developed jaundice (3 severely ill) about 66 days later. Only one other boy, who had returned to school late and was in a different dormitory, received serum. This was on March 4. The boy became ill 61 days later and was the only other case of jaundice in the school.

These events in themselves were not beyond the bounds of coincidence. Multiple deaths in a family during attacks of non-spirochetal hepatitis are recorded (Bulmer 1923, Symmers 1920, Hirschberger 1936), and epidemic jaundice is a very common disease in communities. For example, in the five years 1930-34, in 21 boys' and 10 girls' residential schools jaundice occurred in all but one of the boys' schools and all but 3 of the girls' schools (MRC Special Report 1938). But while these events were being investigated news was received that in a county institution 100 miles or more away 7 of 8 mentally deficient children injected with K60 on June 1, 1937, became ill on an average 82 days later (in August); 6 of them had jaundice and 3 died. There were 42 children in this community among a total of 541 inmates and 94 staff. The children were divided by an outbreak of dysentery in January, 1937. Measles first appeared in the diarrhoea-free group in April but did not invade the dysentery group until May 24. It may therefore be assumed that the 11 members of the dysentery group who remained on June 1 were reasonably well isolated. None of the 8 inoculated had left this group since it was formed, although 4 of the other patients and the nursing staff had been in contact with the outside world. It is known beyond doubt that there was no antecedent or concurrent infective hepatitis in the institution and the case against K60 might have been complete but for the fact that jaundice appeared in 2 uninoculated children in the dysentery group in the following November (Probert 1942).

Batch K60 was pooled measles convalescent serum amounting to 880 c.cm. derived from 26 donors residing in four localities and collected by four practitioners during April, 1936. It was candled and treated with 0.5% of an equal mixture of phenol and ether before being bottled in 171 phials; 121 of these phials were distributed between April, 1936, and June, 1937, in nine localities scattered over a wide area in the South and East of England, and 82 persons were certainly, and a further 27 probably, inoculated with it. Of the 109 recipients, 41, proportionately scattered over the nine localities, subsequently became ill, 37 with jaundice; 8 died—a phenomenally high fatality of 12%—and, more significantly, they all died between the 61st and 93rd day after receiving serum.

All unused serum of the batch (K60) had been recalled by November, 1937, and the laboratory has not issued measles convalescent serum since the middle of 1938. This laboratory is beyond reproach both structurally and so far as its technique and staff are concerned, and has had long experience in handling serum and similar biological products. The proprietors provided comprehensive information concerning the distribution of measles serum, and a specific inquiry disclosed numerous other cases of jaundice following the administration of certain other batches of serum from the laboratory. At Leeds (Jervis 1939) 9 batches were employed to protect 158 children during 1936, 1937 and 1938, and jaundice appeared four weeks to four months later in 23 children receiving serum from 5 of the 9 batches. Careful survey covering the same three-year period brought to light only 309 cases of epidemic hepatitis scattered throughout the city. Different sets of donors contributed to each batch of measles serum, yet 2 of the batches appeared to be more hepatotoxic than the others and one of these, K488, is believed to have given rise to jaundice elsewhere, including a South coast town, where of 130 c.cm. received 58 c.cm. was injected into 14 children, 6 of whom subsequently developed jaundice and one died.

Hepatitis following measles serum therefore occurred among persons who were for the most part young children recently exposed to measles. It included, however, some boys of public-school age and one man of 61. The sexes were evenly represented. The Registrar-General reported that during the period 1928-36 there was no increase in the total mortality from all diseases of the liver and gall-bladder (excluding tumours or gallstones), in children under 15 years. During the period Jan. 1,

1937, to July 9, 1938, there were 62 deaths. In 15 of these cases a biological product had been administered at some time before the onset of jaundice, in 6 more than a year previously and in 9 between two and four months before death. Of these 9, 7 had received either K488 or K60 measles serum.

#### CLINICAL FEATURES

Unfortunately, as is to be expected when special interest is aroused only long after the event, very few clinical notes are available. In addition there is the difficulty of judging whether serum from any given batch was or was not a factor in the subsequent development of jaundice. Only with regard to two batches, K60 and K488, did suspicion amount to strong probability, and for this reason a discussion of the clinical features must be confined to the notes on 34 cases associated with these batches in which the story goes beyond a diagnosis of "hepatitis" or "jaundice." The number of times certain signs and symptoms are mentioned in these 34 histories is shown in table 1.

TABLE 1—SIGNS AND SYMPTOMS RECORDED IN MEASLES SERUM HEPATITIS

	Recovered		Deaths		Total
	K60	K488	K60	K488	
Records available .. .. .	20	5	8	1	34
Malaise .. .. .	2	..	1	..	3
Anorexia .. .. .	..	..	3	..	3
Tiredness, depression .. .. .	2	..	1	..	3
Irritability, restlessness .. .. .	2	..	7	1	10
Screaming .. .. .	1	..	4	..	5
Intractability .. .. .	1	..	5	..	6
Nausea .. .. .	1	..	..	..	1
Vomiting .. .. .	10	1	7	1	19
Constipation .. .. .	1	..	3	..	4
Loose stools .. .. .	1	..	1	..	2
Jaundice .. .. .	15	5	7	1	28
Bile in urine .. .. .	2	1	2	1	6
Clay-coloured stools .. .. .	1	1	1	1	4
Liver palpable .. .. .	6	1	2	..	9
Abdominal pain .. .. .	2	..	1	..	3
Hæmatemesis .. .. .	2	..	6	..	8
Convulsions .. .. .	..	..	4	..	4
Tetany .. .. .	..	..	1	..	1
Delirium .. .. .	4	..	3	..	7
Extensor plantars .. .. .	1	..	2	..	3
Squint .. .. .	..	..	1	..	1
Temperature normal .. .. .	1	..	3	1	5
Temperature elevated .. .. .	5	..	4	..	9
Pulse normal .. .. .	2	..	3	..	5
Brusling .. .. .	..	..	2	..	2
Urticaria .. .. .	1	1	3	..	5

Except for the mention of irritability, restlessness, intractability, screaming and delirium, and the occurrence of urticaria and extensor plantar responses, this list does not suggest a diagnosis other than epidemic hepatitis or catarrhal jaundice in the recovered cases, and the infrequent mention of clay-coloured stools may easily result from inadequate record. The long interval between onset of symptoms and appearance of jaundice in some cases was of interest.

Day of disease	1	2	3	4	5	6	7	Later
Recovered	1	..	3	1	..	1	1	1 on 12th day
Died ..	..	..	2	1	2	..	..	1 on 40th day 1 on 16th day
Totals (15)	1	..	5	2	2	1	1	3

#### FATAL CASES

Those who died exhibited some unusual features which are best presented in the words of the contemporary histories.

CASE 1.—A girl, aged 13 years, received 10 c.cm. of K60 between March 25 and 30, 1937; 53 or 58 days later, on May 22, developed violent urticaria; temperature normal. 2nd day: confirmed in church; felt a little queer afterwards. 3rd day: evening temperature 100.2° F.; seen by doctor who could make nothing of her but vaguely thought of measles. 4th day:

evening temperature 104° F. but no signs or symptoms except constipation and violent dislike for food. 5th day: slightly jaundiced but not thought to be ill; in evening became very restless and noisy and did not recognise her mother. 6th day: temperature normal in morning; restless, requiring to be kept in bed; once rolled on the floor calling out "Oh dear, oh dear" and could not be quietened; doctor thought her liver dullness was less and that he had missed an appendix; consultant saw her and diagnosed acute yellow atrophy; gums bled, passed blood in stool, became unconscious and went downhill very rapidly. 8th day: fits began and continued till she died on evening of 9th day.

CASE 2.—A girl, aged 10 months, received K60 on March 18, 1937; 71 days later, on May 28, refused 6 PM feed. 2nd day: vomited after morning feed; irritable; objected to being moved about; slight rash between legs. 3rd day: rash became general. 4th day: rash faded; refused feeds; stool semi-solid; child pale; conjunctivæ slightly yellow; passed large white fatty stool. 6th day: coffee-ground vomit first seen by doctor in afternoon; definitely jaundiced; temperature and pulse normal; another large coffee-ground vomit and at 5.45 PM died suddenly (June 3).

CASE 3.—A girl, aged 7 years, received 5 c.cm. of K60 on Feb. 26, 1937; 62 days later, on April 29, vomited after breakfast but was able to travel 120 miles. Well throughout day but vomited several times in evening. 2nd day: sleepy and off colour; constipated; no abnormal physical signs. 3rd day: poor appetite; listless; no fever; no abnormal signs. At 1 PM became restless and began screaming; generalised abdominal pain, so enema given which resulted in flatus only; not thought to be ill; chastised by mother for screaming which continued throughout night. Seen again by doctor during night; temperature and pulse normal but very restless; examinations, possible only in calmer intervals, negative; vomiting frequent. 4th day: small coffee-ground vomit at 8 AM, becoming profuse later in the day; first noticed to be slightly jaundiced. Child found lying on floor; when attempt made to pick her up she struggled violently and crawled under furniture. Heroin, gr.  $\frac{1}{4}$ , given at noon and child became quieter, but at 4.30 PM she was restless and screaming and was noticed to be rigid. At 6 PM was unconscious; slightly jaundiced; various bruises from her struggles. Temperature 100° F., pulse-rate 80. Tongue and throat dry and red. Pupils small and reacted only slightly to light; fundi and eardrums normal; well-marked divergent squint with independent movement of eyes. General flaccidity apart from jaw and neck; abdominal reflexes absent, plantar responses strongly extensor, other reflexes brisk; no Kernig sign. Short systolic murmur at base of heart, otherwise heart and lungs normal. BP 130/70 mm. Hg. Liver edge firm, palpable 1 in. below costal margin; abdominal movements normal, peristalsis heard. Urine contained bile and trace of protein. Cerebrospinal fluid normal. At 7 PM several coffee-ground vomits and tetany. At 9 PM condition worse with spasms of generalised rigidity, cyanosis, Cheyne-Stokes breathing and bad pulse; coffee-ground vomits continued. Died on May 3, 5th day of disease. Autopsy obtained.

CASE 4.—A boy, aged 4½ years, brother of case 3, received 5 c.cm. of K60 on Feb. 26, 1937; 63 days later, on April 30, developed malaise, vomiting and constipation; trace of tenderness in right loin. 2nd day: did not appear to be ill; temperature normal; urine contained trace of protein but no bile. After 2 PM, except for drowsy intervals, restlessness and screaming continued throughout night, during which child was delirious and twice fell out of bed. 3rd day: better and sitting up, but at 1 PM produced a coffee-ground vomit and later became drowsy. By 6.30 PM looked ill; slightly jaundiced; on any attempt at examination screamed and struggled violently. Bruises on body from struggles during night; optic fundi normal; eardrums a little injected inferiorly; tongue dry and red. Examination difficult. Extensor plantar responses were the only abnormal sign found except for a firm liver palpable 1 in. below costal margin. Lumbar puncture impossible on account of struggles but child drowsy throughout night. 4th day: quiet; temperature normal; took fluids well and seemed better. At noon coffee-ground vomiting became continuous and at 6 PM tetany appeared; temperature 99.6° F. At 6.30 PM became worse; temperature 100.6° F., pulse-rate 145. At 8 PM transfused with 100 c.cm. of father's blood (both group A). At 9 PM was a little better with pulse-rate 90 but vomiting continued and became more bloody. Died at 11.40 PM (May 2).

Records of 5 autopsies are available, but, with two exceptions, are sketchy and incomplete. The findings recorded are set out in table II.

TABLE II—AUTOPSY FINDINGS IN CASES OF MEASLES SERUM HEPATITIS

		K60	K488	Total
No. of autopsies .. .. .		4	1	5
Skin :	Bruises .. .. .	1	..	1
	Jaundice .. .. .	1	..	1
Intestines :	Extreme catarrh .. .. .	1	..	1
	Superficial necrosis .. .. .	1	..	1
Liver :	Subacute atrophy .. .. .	1	..	1
	Fatty degeneration .. .. .	1	1	2
Heart :	Gross necrosis .. .. .	3	..	3
	Fatty degeneration .. .. .	1	..	1
Kidneys :	Necrosis .. .. .	1	..	1
	Fatty degeneration, necrosis .. .. .	3	..	3
Hæmorrhages :	Blood in stomach .. .. .	2	1	3
	into viscera .. .. .	1	1	2
	into serous sacs .. .. .	1	1	2
	into brain .. .. .	1	..	1

**Histology.**—Blocks from 4 cases showed widespread atrophy of the liver cells; few of these appeared normal and the majority showed extensive vacuolation with "foamy" cell body and degenerative changes in the nuclei. Elsewhere numerous liver cells were completely necrotic. The records do not mention the orientation of the damage in the liver and it is not clear whether the necrosis was mainly central, peripheral or uniformly diffuse. There is nothing characteristic about the descriptions of microscopic lesions in other organs.

LABORATORY INVESTIGATIONS

For the most part the available reports relate to the acute stage of the illness. Table III shows the available white counts.

TABLE III—WHITE CELL COUNTS IN CASES OF MEASLES SERUM HEPATITIS

Case	Day after onset of jaundice	Total whites	Percentages					
			Poly-morphs	Lympho-cytes	Mono-cytes	Large hyaline	Myelo-cytes	Eosino-phils
A	38	..	52	37	..	4	4	3
	42	..	52	38	..	3	4	3
	47	..	65	30	..	3	..	2
B	..	..	58	38	..	1	..	2
	..	..	79	19	..	2	..	..
C	15	Apparent leucocytosis	48	51	..	0	..	1
	35		82	16	..	2	..	..
D	18	Apparent leucocytosis	53	43	..	1.5	..	1.5
	..		4950	54	21	25	..	1
E	..	6400	52	38	9	..	1	
F	..	14,200	80	12	7	..	1	
G*	4†	..	25	66	2	..	7	
H	17	..	25	66	2	..	7	
I	..	5330	29	64	3	..	2†	

† Three hours after transfusion and one hour before death.  
\* Fatal case. † One mast cell per cent.

Two red-cell counts are recorded, both during the acute stage, in cases F and G of table III. The second case died soon after the count and had been bleeding. Case F: reds 4,050,000; Hb. 80%; CI 1. Case G: reds 4,430,000; Hb. 70%; CI 0.8.

Bacteriological findings were negative in the following investigations (K60 cases only). Animal inoculations of blood, urine or post-mortem fluid, including tests for leptospiriosis, 7 cases. Microscopy of tissues and/or culture, 5 cases. Cerebrospinal fluid, cytology, chemistry and culture, 1 case. Widal reaction, several cases.

Urinary bilirubin (Fouchet's test) was negative in 4 cases six months after onset.

Findings were positive in the following investigations.

*Van den Bergh*, 6 cases (during acute stage unless otherwise stated).

Direct positive (26 units in 1 case)	4 positive
Delayed direct	1 "
Indirect positive 0.4 unit	1 "
2.0 units (10 months after onset)	1 "

In the last case serum bilirubin (Fouchet) was weakly positive 10 months after onset and the serum showed no immunity to yellow fever.

Urinary urobilin was determined in 4 cases six months after onset and was abnormal in 2, suggesting excessive hæmolysis or persistent liver damage.

*Lævulose-tolerance test* was abnormal twelve months after onset in 1 case (50 g. lævulose by mouth).

Fasting blood .. .. .	100 g. per 100 c.cm.
1 hour .. .. .	133 " " "
2 hours .. .. .	111 " " "

INVESTIGATIONS ON THE SUSPECTED SERUM

No record of any similar incident could be found in the published work, and opportunity was taken to consult such persons \* as it was thought would be able to throw light on the matter. The problem was discussed from every angle which may have been even remotely concerned, but no conclusion was reached as to the mechanism of the disease, although the majority opinion attributed it directly to the "measles" serum. Since the case against K60 was most firmly established the unused residue of this batch was submitted to tests unfortunately limited by the small volume of serum available.

K60 was found to be sterile and to contain the proper quantity of antiseptic: 0.5% of an equal mixture of phenol and ether.

1 c.cm. was injected intracardially into each of 10 guinea-pigs. All survived the injection; 4 were killed on the second day and all organs found healthy both macroscopically and microscopically; the remaining 6 were killed on the 100th day and all organs were healthy.

A sample of the serum was ashed and analysed spectroscopically. As, Ba, Cd, Co, Mn, Ni, Ti, Tl and V were entirely absent. Exceedingly minute traces of Bi, Cr, Pb, Sb, Sn and Zn were detected, the evidence for antimony depending on a single very feeble line. There was nothing to suggest the presence of a hepatotoxic inorganic element.

Microscopic and dark-ground investigations failed to reveal any bodies which could be characteristically differentiated from the myriads of particles of all shapes and sizes seen.

The biophysical properties of K60 were compared with those of a control batch. Osmotic and refraction measurements on clarified sera showed the quotient "osmotic pressure/refraction increment" to be the same on the two samples. The value was less than that given by normal serum but not small enough to indicate gross disintegration of proteins. Ultracentrifuge fractionation revealed close similarity in the molecular composition of the two sera. In addition to the albumin boundary, three globulin components were present in both. The only difference between K60 and the control was a much more bulky deposit upon slow speed centrifugation of the K60. Since the serum was candled before bottling this deposit was either precipitated out of the serum, or foreign matter, living or dead, introduced since candling.

Donors were interrogated, particularly with regard to a past personal or family history of jaundice, asthma, urticaria or other allergic upset. The results were negative but serum was taken from two of the donors who had had some apparently unrelated illness years previously. These sera were used in agglutinations, precipitation and other serological tests to which K60 was also submitted. The donors' red cells were also investigated serologically. The blood of guinea-pigs injected intracardially with K60 was included in these tests, the results of which were not helpful. There is no record of any attempt to perform serological or sensitivity tests using K60 against those who survived jaundice.

DISCUSSION

In no single case of hepatitis could it be proved that natural causes were not operative, but on the epidemiological evidence the majority of the investigators concluded that the causal factor resided in K60 and possibly in K488. Conversely it was difficult to suppose a contributory abnormality in the recipients because of the high percentage of the inoculated who suffered from the disease. The causal abnormality may have been introduced during the handling of the serum—e.g., a non-specific delayed action poison; or a known or unknown virus with long incubation period. It may have been derived from one of the contributors—e.g., a virus which

\* Representatives of National Institute of Medical Research, London School of Hygiene and Tropical Medicine, Lister Institute of Preventive Medicine, Wellcome Physiological Research Laboratories, London County Council, Metropolitan Police Laboratory and General Register Office, and the Directors of Hygiene and the Services were consulted, as were also a number of clinicians.

could withstand carbolic and ether and has a long incubation period; or a mysterious antigen occurring naturally in one of the donors or produced by the interaction of several sera or by denaturation by antiseptics, or a sensitising serum from a sensitive donor, only 0.2 c.cm. of which would be received by each of the recipients of K60.

Sections of liver from 4 cases were specially stained by methods designed to demonstrate inclusion bodies. In 2, cytoplasmic inclusions were found which stained with acid dyes. No intranuclear inclusions were detected and the opinion was that cytoplasmic inclusions in degenerated liver cells could not be used as evidence of virus disorder since they have been found in 30% of livers at autopsy irrespective of cause of death. They have also been observed in the livers of normal monkeys, ferrets and guinea-pigs (Pappenheimer and Hawthorn 1936). Certain appearances suggested that some of the acidophil inclusions seen in the K60 cases arose from degenerated nuclei; the numbers found were small and quite disproportionate to the very extensive liver changes. No other evidence of virus disorder was detected histologically.

It was thought that the long "incubation period" (on the assumption that the causal factor was introduced into the diseased persons at the time of injection) was an argument against a virus infection; it was an equally strong point against any known "allergic" explanation. Since the investigations further information has become available concerning the "incubation period." Both the date of administration of serum and of onset of jaundice are known in 48 cases, as follows.

Batch	Cases	Incubation periods		Deaths	
		Range	Median	No.	Median day
K60	37	16-114th day	71	7	75
K488	11	78-161st day	123	1	134

The difference in array may have some significance and will be discussed later. K60 was prepared in April, 1936; K488 on Feb. 12, 1937. It was clear that numerous batches of serum produced in the same laboratory even at about the same time were not followed by jaundice. It is interesting that inquiry has failed to bring to light any evidence that jaundice had followed measles serum from other laboratories in this country or has come to notice in the USA or other countries represented at the International Health Division. For more than ten years the London County Council has used, as a routine, measles convalescent and adult serum for prophylaxis and attenuation in its hospitals; 366 litres obtained from over 3000 donors and processed in the LCC laboratories has been employed for this purpose and the majority of 36,000 recipients have been followed up after an interval of two months or more; no case of jaundice has been detected among them. The American serum institutes distribute homologous serum for various purposes on a very large scale. There is no record of jaundice having resulted from these practices, and generally speaking there is no evidence that measles attenuation with adult or convalescent serum is fraught with especial danger. K60 was obtained from measles convalescents and K488 was adult serum.

#### Transfusion Hepatitis

With the preceding summary in mind the incident at the EMS hospital can be discussed more effectively and the histories of two of the cases will be summarised.

CASE 5.—A toolmaker, aged 51, had suffered from intermittent claudication for 4-5 years. In December, 1940, he was buried in debris and sustained a Pott's fracture which was treated in plaster applied on Dec. 6. Plaster sores persisted, an ulcer 1½ in. in diameter developed and he was transferred to a medical ward (MG 1) for serum transfusion and remained there. He received 800 c.cm. of dried, reconstituted serum on six occasions (Jan. 29, 1941; Feb. 4, 11, 18, 25 and March 17, 1942). The batch and bottle numbers of the serum administered were not recorded except in the case of the last transfusion, and the origin of 4ths of the total of 4.8 litres used cannot be identified. All the serum was, however, processed at one and the same laboratory.

On May 24, 1942, 68 days after the last transfusion, a scarlatiniform punctate erythema appeared on the chest, abdomen and legs. The temperature rose steadily day by day until on the 7th day it reached a peak of 103.2° F.; thereafter it resolved by lysis, becoming normal 13 days after the appearance of the rash. Jaundice was noticed on May 26 or 27, when the liver was enlarged three finger-breadths and was tender. The stools were pale but not putty coloured. The spleen was not felt and there was neither vomiting nor bleeding. By June 19 the urine was free from bile, the liver not palpable and the jaundice almost gone. The plaster ulcer healed dramatically during the course of the jaundice.

CASE 6.—A publican, aged 58, was well until November, 1940, when he developed gangrene of the foot complicating thromboangiitis obliterans. He was admitted to hospital on Dec. 14, 1940. His foot was removed, and apart from two periods of leave in 1941 he remained in hospital. He received eight serum transfusions of 800 c.cm. each: four in ward MG 2 on Sept. 15 and 29 and Oct. 7 and 17, 1941, and four in ward MD on Feb. 12, March 1 and 20, and April 1, 1942, the second period of leave, at Christmas 1941, intervening between the two series of transfusions. He was transferred to ward MG 1 on May 6, 1942. On the morning of June 27, 1942, he answered his nurse's inquiry with the words "In the pink" and thought she was joking when she replied "You look yellow." Bile-pigments were present in the urine on this day, but apart from mild depression and drowsiness for two days beginning on June 29, and a rise in temperature to 99.0° F. there was no constitutional disturbance whatever.

At the time they developed icterus these men occupied beds fifteen feet apart in a ward containing 19 patients, of whom they were the only two who had received serum. Thirty-two days intervened between the dates of onset of jaundice in the two cases, and this interval conforms with the incubation period of epidemic hepatitis. No member of the staff of the hospital and no other patient in the ward had jaundice during material periods.

Although 5 of the remaining 6 cases of transfusion jaundice were transfused in other wards and 2 subsequently developed jaundice while still in this hospital, there were no circumstances suggesting previous contact with epidemic (catarrhal) jaundice. The evidence suggests that serum transfusion per se has caused hepatitis indistinguishable from that following convalescent measles serum, convalescent mumps serum and yellow fever vaccine containing human serum.

The appearance of this phenomenon was anticipated at the Ministry of Health where information had previously been received of another grave case of jaundice following whole blood and plasma transfusion, and on Aug. 13, 1942, a meeting of the principal blood-transfusion officers was called to inquire, inter alia, whether this was an isolated case or whether transfusion was more frequently followed by hepatitis. It transpired that not until Aug. 12 did the cases in the EMS hospital come to the notice of the transfusion officers. Since then the condition has been observed at three other hospitals and the total of known cases following transfusion is now 12. It must, however, be remembered that no systematic follow-up of transfused patients has been attempted, and that, since an association between transfusion and late jaundice is unlikely to be recognised spontaneously, it is not to be expected that such remote sequelæ would be brought to the notice of the blood-transfusion officers. For this reason it cannot be assumed that whole blood is innocent or that plasma is likely to be less icterogenic than serum.

#### Clinical Picture of Homologous Serum Jaundice

The description of jaundice following measles serum is based mainly on records of a few severe cases. The attacks following mumps convalescent plasma and yellow fever vaccine were for the most part less dramatic.

The cardinal sign of the condition has been jaundice but it is probable that the disorder occurs without the appearance of jaundice; thus, one child of a number receiving an otherwise implicated measles serum died of "meningismus" some twelve weeks later. The intensity of the jaundice and of liver damage has varied. Measles convalescent serum gave rise to fulminating hepatic necrosis and widespread pathological changes in other organs. Mumps convalescent serum produced relatively mild disease. In Brazil yellow fever vaccine



TABLE IV—SIGNS AND SYMPTOMS IN 48 CASES OF JAUNDICE FOLLOWING MUMP CONVALESCENT SERUM

	Severity of disease			Total no. of times symptoms mentioned	Per cent. incidence of symptoms
	Mild	Moderate	Severe		
Cases (total 48)	38	9	1		
<i>Symptoms recorded</i>					
Skin rashes	17	3	0	20	41.7
Anorexia	33	7	1	41	85.4
Abdominal pain	10	2	0	12	25.0
Indigestion	26	5	0	31	64.6
Change of bowel habits	13	2	0	15	31.2
Fatigue or sleepiness	25	6	1	32	66.7
Dark urine	37	9	1	47	97.9
Stiff joints	9	2	1	12	25.0
Headache	11	0	1	12	25.0
<i>Signs recorded</i>					
Jaundice: slight	48			17	35.4
moderate				22	45.8
severe				9	18.7
Rash	47			9	19.1
Conjunctivitis	41			27	65.9
Petechiae, hæmorrhages &c.	48			7	14.6
Liver enlarged	48			32	66.7
Liver tender	47			21	44.7
Spleen palpable	48			18	37.5
Spleen tender	47			9	19.1
Lymphadenopathy	47			8	17.0
Urine: bile	45			45	100%
albumin	42			22	52.4
casts	47			8	17.0

caused a significantly greater proportion of jaundice in the age-groups above 20 years.

No sign differentiating this condition from hepatitis due to other causes has been recognised, but most of the studies have been retrospective. The association between jaundice and homologous serum has been seldom suspected until the patient was either dead or recovered, and critical clinical observations have been reported in rare instances only. These reports suggest that differentiation from epidemic hepatitis should be possible and that erythema multiforme, stiff joints and splenic enlargement may in time be recognised as distinguishing points.

The most complete clinical survey so far available comes from the ARC Harvard Unit Hospital, where 48 men who had received mumps convalescent serum were subsequently treated for jaundice (table IV). The clinical severity of this series was classified as 79.2% mild, 18.8% moderate and 2.0% severe, and the severity was not necessarily proportionate to the degree of jaundice.

In 41.7% of the histories mention is made of the appearance of polymorphic rashes distinct from the petechial, purpuric and xanthomatous rashes usually associated with grave and persistent jaundice. Although the greatest incidence of rashes, so far recorded occurred after mumps convalescent serum the notes of 6 of 34 measles serum cases also mention "urticarial" rashes. The history of two of these patients was as follows.

CASE 7.—A boy, aged 5 years, received 4.5 c.cm. of K60 on June 1, 1937; 18 days later, on June 19, developed swelling of lips on left side and of joints. June 21, urticarial rash; temperature 101° F. June 24, temperature normal, rash gone. Aug. 12 (73 days after serum), fever and vomiting; appeared bright for about two days. Aug. 21, convulsions, delirium and coma; vomited terminally coffee ground; fever up to 103° F.; mild jaundice deepening after death.

CASE 8.—A girl, aged 8 years, received 4.5 c.cm. of K60 on April 1, 1937; 79 days later, on June 18, vomited. 3rd day: vomiting. 5th day: jaundice which deepened steadily until 19th day. 15-19th day: drowsiness marked with periods of delirium; fever variable, up to 100° F. 26th day: urticaria, rigor and temperature up to 100.2 F°. This was the third attack of urticaria accompanied by restlessness and fever during the course of disease. Rash was patchy and erythematous, fading in 3-6 hours. No history since 26th day. Child recovered.

The polymorphic rashes usually preceded jaundice by a few days only, but this period was in some cases extended to more than a month. On the other hand, there was nothing to suggest a comparison between these rashes and the urticaria of heterologous serum fever which usually occurs during the second week after injection. Although the rashes were polymorphic they should probably be grouped into one category as erythema multiforme. The "urticarial" types were not migratory and evanescent but tended to be fixed and to leave staining; they were commonly papular, pruritic and centrifugally disposed. Erythema circinata was seen and also a punctate erythema in discrete patches. In other cases the rash appeared on the abdomen and suggested pityriasis rosea; in others again it resembled psoriasis and became scaly. In one patient a hæmorrhagic rash and other signs led to a clinical diagnosis of meningococcal septicæmia, but he subsequently developed jaundice.

Another characteristic prodromal sign was stiffness in the joints of the extremities, particularly in the mornings. Pre-icteric pruritus was inconstant but occurred and a variable degree of fever was present. Anorexia and nausea appeared early with a sensation of heaviness in the epigastrium; this aching was exaggerated by walking or running and the patients said they thought they could feel their abdominal viscera bouncing. Vomiting was rare. Dark urine appeared three or four days after these prodromata and subsequently icterus developed gradually.

LATENT PERIOD

A feature present in all instances has been the long interval between the injection of human blood products and the appearance of the jaundice. The "incubation" period is most commonly 60-90 days (table V).

TABLE V—APPARENT INCUBATION PERIODS IN HOMOLOGOUS SERUM JAUNDICE

	No. of cases of jaundice	Incubation period (weeks)		
		Array	Med.	Av.
Humanised lymph	191	(Several weeks to 2 months)		
Measles convalescent serum (K60)	41	2-16	10	..
Measles adult serum (K483)	11	11-23	17	..
Yellow fever vaccine—				
(a) Brazil	467	16-21	16-21	..
Lot no. 489	736	2-68	..	17.8
490	150	2-80	..	20.4
(b) American troops in U.K.	338	12-32	21	..
Lot no. 351	53	8-24	15	..
368	169	5-28	13	..
Mumps convalescent serum	62	5-19	11	..
Serum transfusion*	5	10-12 (min.)	11	..
		14-41 (max.)	17	..

\* Peripheral vascular disease.

Although there is a wide array in most of these examples the curves show peaks about the median. The peaks for different batches do not coincide, suggesting considerable differences in the latent periods of different batches of the same inoculum. This point is worthy of investigation.

ANALOGOUS CONDITIONS IN HORSES

Disasters suggestive of the incidents described in this paper have been observed in horses. In England, 15 c.cm. of lamb dysentery horse serum prepared early in 1935 was given subcutaneously to each of 617 horses in 9 areas. An equally large group of untreated animals was observed as control. Although the serum had given no trouble when used in lambs in the same year, about 6 weeks (average 53 days) after injection some of the horses developed urticarial swelling of the nostrils and face followed by a long period of local desquamation. A proportion of the affected animals became dangerous to handle, attempted to savage their attendants and plunged wildly about before developing a staggering gait and eventually complete paralysis. Most of the affected animals showed well-marked icterus of the visible mucous membranes. In 30% (182) of the inoculated animals the disease was mild and might have been regarded as clover

sickness, 3 cases of which occurred among the control group. In 7.6% (47 of 617 inoculated) the disease was fatal and might have been diagnosed as "mad staggers," no case of which occurred among the control group. Yellow atrophy of the liver was a prominent feature at autopsy (Gordon 1935).

In Montana, 5193 horses were treated with either 2 c.cm. of 20% suspension of guinea-pig brain infected with equine encephalomyelitis in 50 c.cm. of horse serum used as a diluent, or with serum alone. Between the 32nd and 89th day after injection 89 animals became ill and 79 died "on their feet." Symptoms were excitement, muscular tremors, impaired vision and sweating. Mucous membranes were somewhat icteric. Some of the 89 had received serum alone. Later similar symptoms appeared in unimmunised animals, but out of a group of 861 horses 2 only died (Marsh 1937).

The first report of "mad staggers" apparently following the injection of homologous serum into horses came from South Africa. Staggers, jaundice and acute necrosis of the liver appeared 62-78 days after inoculation against horse sickness. It was later found that "staggers" had occurred in 4 of 160 non-immunised horses in the same district (Theiler 1919).

In Norway, anti-anthrax serum was produced from horses and cows, and either homologous or heterologous serum was injected into both. Acute or subacute necrosis of the liver occurred in the horses receiving homologous serum after an interval ranging from 8 to 97 days (50-60 days in the majority). In this group 4% (101) were affected and 50 died. The cows treated with either serum and the horses treated with heterologous serum were not affected (Stagsvold 1938).

#### Comment

The examples of homologous serum jaundice collected in this paper make it clear that the subject is one of major importance. Our understanding of the mechanism has not advanced since 1937 when measles serum jaundice was first described. One conclusion is now, however, evident: any doubt as to the reality of the association is removed by the frequency with which hepatitis has followed the injection of human blood products. The probability that further cases will occur, particularly after transfusion, must be faced.

Although aetiological studies are proceeding both in England and America it is unlikely that the problem will be easily solved or that a radical method for preventing the phenomenon will readily be found. Since there can be no question of withholding transfusion in emergency, prevention will for the time being depend on the identification and withdrawal of icterogenic batches of serum and plasma. Timely identification may be possible only under exceptional circumstances; it will depend on the care with which batch numbers are recorded at the time of transfusion, and on the speedy notification by practitioners to transfusion officers of cases of jaundice following, after a long interval, the injection of blood products.

It is impossible to mention by name the very large number of collaborators and other contributors who have provided the data assembled in this paper and to whom the reporters wish to express their thanks.

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## MEDICINE AND THE LAW

### Professional Negligence—Successful Appeal

THE Privy Council delivered an important judgment last month in *John Oni Akerele v. The King*, the appeal of a medical practitioner formerly practising in Nigeria. He had been tried in West Africa on charges of manslaughter and criminal negligence in connexion with the death of ten children whom he had inoculated for yaws. The West African court of appeal quashed the conviction on one charge and substituted a fine of £500 for the trial court's sentence which had included imprisonment. At the appeal in London, the sole question was whether the Privy Council found sufficient grounds to advise His Majesty to grant the appellant's petition against the conviction for manslaughter. The tribunal does not sit to re-try criminal cases from overseas; it will not interfere unless serious and substantial injustice has been done. It has decided that the doctor's petition should be granted and his appeal allowed.

Two substances, it seems, are used in West Africa for inoculating patients for yaws—(i) the arsenical preparation NAB, and (ii) 'Sobita,' a proprietary form of bismuth sodium tartrate, supplied in the form of a powder. As a rule the appellant doctor used the latter; the proper dose for an adult is 3 grains, for a child one grain. He notified the inhabitants of certain districts that they could be treated by him on certain dates. He seems to have treated 78 persons at Asaga on May 6 and 7, 1940, 57 of them being children, and 44 more, 36 of them being children, at Akanu later. No illness was reported from Akanu, but ten children from Asaga died after symptoms of stomatitis apparently induced by bismuth poisoning. Five, it seems, had been inoculated on the 6th and five on the 7th of May. As is usual in criminal cases, the charge related to the death of one child only. Two doctors, called by the Crown at the trial, inferred that death was due to an overdose of bismuth; the defence contended that, through peculiar susceptibility, the dead child succumbed to a dose which would not have harmed a normal child.

One important and elementary question of law arose over the admission of evidence about the symptoms, illnesses and deaths of the other nine children. This was certainly not admissible for the purpose of suggesting that, if the accused had been careless in other inoculations, he was likely to have been careless in the case to which the charge related. It was admissible, however, in order to show the contents of the bottle used for the injections, to negative the suggestion that this child's death was due to an idiosyncratic susceptibility, and to indicate that there must have been an overdose through injecting the right quantity of too strong a preparation. It would not have been admissible to establish an overdose due to the injection of too much of a proper mixture. The accused said that he himself dissolved the powder in sterile water and carried with him a bottle made up for his day's work. The Privy Council, after commenting on the fact that the medical witnesses called by the Crown at the trial were accustomed to use NAB, and had little experience of sobita, and that no evidence was given to indicate what excess of strength in the mixture would be required to produce the observed consequences in a normal patient or how widespread among medical practitioners was (or ought to be) the knowledge of the danger of an overdose, found occasion to criticise the summing-up of the trial judge in the following respect. He had used words which suggested that he somehow associated the degree of negligence (which he nowhere specifically analysed) with the fact that the injections administered by the doctor "managed to make at least eleven persons gravely ill with symptoms of the most revolting order." It was immaterial that the symptoms were revolting, or that several persons were made ill. The alleged negligence was the mixing of too strong a solution, a single act; ten deaths did not make ten acts of negligence.

"Their Lordships cannot accept the view that criminal negligence has been proved merely because a number of persons have been made gravely ill after receiving an injection of Sobita from the appellant coupled with a finding that a high degree of care has not been exercised. They do not think that, merely because too strong a mixture was once dispensed and a number of persons was made gravely ill, a criminal degree of negligence was proved."

On these grounds—the inexact drawing of the distinction between civil and criminal liability, the ill-defined statement of the ground of the criminal charge, and the increase of instances of negligence from one to many by imputing a fresh act of negligence for each death—the Privy Council concluded that there was ground for allowing the appeal. The defects in the trial amounted to something more than misdirection or the admission of improper evidence.

Earlier the Privy Council had discussed the difference between civil and criminal negligence—that is to say, the carelessness which justifies a plaintiff in obtaining an award of damages and the carelessness which is so gross as to justify punishment. It cited with approval passages from Lord Hewart's observations in *R. v. Bateman*,<sup>1</sup> such as the following :

“ A doctor is not criminally responsible for a patient's death unless his negligence or incompetence passed beyond a mere matter of compensation and showed such disregard for life and safety as to amount to a crime against the state.”

Negligence of a lesser degree cannot be transformed into gross negligence merely by giving it that appellation. It is not a mere question of epithets. The Privy Council referred in passing to two older cases. In *R. v. Noakes* (1866) a customer sent two bottles to a chemist, one for aconite, the other for henbane. The chemist by mistake put the aconite into the henbane bottle ; the customer took 30 drops of aconite and died. Chief Justice Erle told the jury the case was not strong enough to justify a conviction for felony. In *R. v. Crick* (1859) the accused, not a regular practitioner, administered lobelia with fatal results. Chief Baron Pollock then uttered his famous dictum :

“ If the prisoner had been a medical man, I should have recommended you to take the more favourable view of his conduct, for it would be most fatal to the efficiency of the medical profession if no one could administer medicine without a halter round his neck.”

#### GMC Procedure

A correspondent, whose letter is printed in another column, comments on a recent Parliamentary answer by the Attorney-General which indicates that the General Medical Council has struck a doctor's name off the register upon evidence deemed insufficient for an ordinary criminal prosecution after examination by the Director of Public Prosecutions. The alleged offence was that of giving false certificates to men desiring to evade military service. The correspondent draws the inference that the GMC, exercising powers over a practitioner possibly far heavier than those of the ordinary courts, must have fallen short of that standard of judicial fairness which the ordinary courts would apply.

The comparison perhaps is over-simplified. The Director of Public Prosecutions intervenes to prosecute in certain cases where the gravest charges are made ; but he takes action in only a small proportion of prosecutions. It is not unknown either for the police to take proceedings successfully where the Director has not seen fit to move, or for the public to regret his decision not to prosecute. The presumption in favour of the accused is a treasured principle of British justice, but the decision of the Director is not a certificate of guilt or innocence. The real difficulty of the comparison, however, is the difference of function between the GMC and the courts. The object of the criminal courts is to enforce the criminal law. They do so by applying rules of evidence which exclude much available information whereby the ordinary man would be influenced in making up his mind in his day-to-day problems. The object of the GMC is not to punish doctors but to keep a register of practitioners who satisfy accepted professional and ethical standards. In so doing, it fulfils its statutory purpose of enabling the public to know whether a particular practitioner is duly qualified or not. Instead of enforcing the general law, it acts as a domestic tribunal to enforce the maintenance of professional standards by a particular class. In ethics the standard may be higher than that of the criminal law. Sexual intimacy with a patient, for instance, is not a criminal offence, but it is undoubtedly “ infamous conduct in a professional respect ” within the meaning of section 29 of the Medical Act. Without the slightest

allusion to the case referred to by the Attorney-General, it is possible that lawyers' could imagine a course of dubious certification by a practitioner which might justify removal from the register though a criminal prosecution could not be launched with the certainty of success. The GMC need not observe the strict legal rules of evidence, though the presence and advice of a legal assessor presumably favours such observance. The evidence to which it listens “ differs in many respects,” as Lord Justice Bowen said in the Leeson case, “ from evidence which is adduced in a court of law.” Thus, inquiring into an allegation of wrongful certificates, the GMC would examine the doctor himself and, if possible, the persons who obtained the certificates. In a criminal court the prosecution could not put the doctor in the witness-box and would regard those persons as accomplices whose evidence needed corroboration by calling (from perhaps remote distances) members of the board deceived.

With many of these considerations our correspondent would probably agree. There are of course two schools of thought where the GMC is concerned. One of them would like its judicial and disciplinary functions reconstituted with a right of appeal to the High Court on the merits of each case—instead of, as at present, recourse to the High Court only where there has been some neglect of “ natural justice ” on the part of the GMC, such as bias or a failure to hear the evidence of the challenged practitioner. The other school is content with a system which leaves in the hands of representatives of the medical profession the control of professional standards to an extent not enjoyed by other professions. The Medical Act was not passed in order to enable surgeons and physicians to organise themselves into a defensive trade-union, but in the interests of the public. It is doubtful whether there is any public demand for its amendment. The recent Spackman case drew attention to one inherent difficulty. Judges have remarked upon the absence of power to summon witnesses and administer the oath. But is the public dissatisfied with the protection which the GMC provides ?

#### Conception without Consummation

In *Clarke v. Clarke*, decided by Mr. Justice Pilcher on Nov. 30, the medical evidence assisted the husband to succeed in what the judge described as an uphill task. The parties were married in 1926. According to the husband's evidence, which the judge accepted, the wife displayed repugnance towards normal matrimonial relations and there was never any consummation of the marriage. Consummation presumably is used in the courts as a synonym for penetration. In 1930 nevertheless the wife gave birth to a son of whom the husband was unquestionably the father. Maternity, stated the husband, did not diminish the wife's frigidity. In 1941 the husband, while interviewing his solicitor about a proposed deed of separation, learnt for the first time that, if he could establish in court his assertion of non-consummation, he would be entitled to a decree of nullity of marriage. The onus of proof would lie upon the husband. In view of the birth of the child and the subsequent period of ten years' cohabitation, the burden of proof would be particularly difficult. There is always a legal presumption in favour of the consummation of a marriage ; the birth of a child naturally strengthens the presumption. It was, however, as the judge observed, common ground between the parties that the birth of the child did not in itself establish consummation. Mr. W. G. Burns, giving evidence on behalf of the husband, said that it was well known in the medical profession that conception could occur without penetration of the vagina. Fecundation *ab extra*, however rare, is an established medical fact of which the courts have already taken note. The legal interest of the case arose from the so-called doctrine of “ approbation.” The husband, having approbated the marriage for 15 years, and having had the advantage of his wife's consortium, ought not (it was contended) to be allowed now to reprobate ; the fact that the parties had lived together so long might suggest that the husband was insincere in alleging non-consummation, his real motive being the desire to marry somebody else. The judge said that the sole issue of fact was the husband's allegation of non-consummation. He found in favour of the husband on this point ; that being so, the charge

1. *Lancet*, 1925, i, 1152.

of insincerity was irrelevant. The husband was granted a decree of nullity. This is spoken of as the first instance in medicolegal history of a finding of non-consummation where the husband is admittedly the father of a child of the marriage.

### WAR WORK AND AFTER

NOT for the first time the Select Committee on National Expenditure<sup>1</sup> has issued a report of importance to all interested in the welfare and efficiency of industrial workers. This time they deal with the health and welfare of women in war factories. Some of the facts are well enough known, but are none the worse for being rubbed in. The health of war workers is on the whole remarkably satisfactory, but the committee believe that the double burden which is being shouldered by married women workers should be lightened. They suggest that women should never be called upon to work more than 55 hours per week and point out that there can be no justification for asking women to work 12 hours a day, even if additional hours had not to be spent in travelling and shopping. They think that welfare personnel should be strengthened and further research undertaken to determine the best method of arranging a rota of shifts in Royal Ordnance Factories so as to reduce fatigue. Spells off duty should be given to allow women to do their shopping, working conditions and canteens should be improved, and rest rooms made more attractive than the dingy barracks they so often are. These pertinent suggestions will commend themselves to all experienced in industrial conditions; but it will not be easy to induce management to give a shopping break, for it has rather tended to look askance at the part-time employment of women. But employers should remember that though sickness absenteeism is surprisingly low, in most large factories women are doing work far above their physical resources. It is a poor prospect to return home tired and none too well at the end of a long shift to a cold house devoid of food, and these women must be liable to breakdown. It is a mistake to accept too readily the doctrine that there must be industrial casualties.

Important as are these more particular considerations, the main value of the report lies in its recognition that all is not well with the industrial health services. The present status, remuneration and security of tenure does not attract doctors to industrial medicine. The committee think that greater use should be made of women doctors in this work. Many doctors who have taken up industrial medicine have been discouraged. They have felt that they have had to subordinate constantly their ideas and ideals on the altar of expediency, that the process of mutual education has been soul-destroying, and that their position as the paid servants of industrial management is incompatible with freedom of action and judgment. The industrial medical service cannot hope for men and women of the right calibre until appointment and remuneration are placed on a more satisfactory basis. Nor does the report stop there. It believes that central direction of policy on general matters affecting the health of the industrial population is lacking, that the medical branch of the factory inspectorate should be enlarged and that medical women should be appointed as additional advisers to both the Ministry of Labour and the Ministry of Supply, and that there should be established immediately a central industrial health advisory committee with subsidiary regional advisory committees and a central bureau.

These criticisms of the organisation of industrial health services ring true. Central direction of policy is lacking, but this is not the fault of the medical inspectorate of factories, a corps of experts with a limited (intra-factory) field, and health and industrial efficiency take no cognisance of the factory gate. Conditions inside the factory are important, but so are conditions outside—in the home, in travelling, and in the everyday contacts of life. Industrial diseases are of minor importance in the total mass incapacity for work. A wider approach to the problem of industrial health could probably best be secured by linking the medical inspectorate of factories to the central health departments. The administrative complications might be awkward but not necessarily insurmountable. Failing this general linkage, there

should certainly be closer liaison between the Industrial Health Research Board, the Ministry of Labour, the Ministry of Fuel and Power, the Ministry of Supply, the central health authorities, and the central departments for education. A directing control should review constantly the multitude of common factors that govern health and working efficiency and create effective machinery to organise them. Vocational guidance, selection and training, rehabilitation, the treatment of the disabled, technical education, a guard on the beginnings of disease, the wider sphere of welfare are all subjects which need energetic handling by more than one central health department and it is not unfair to say that co-operation is yet rudimentary. Success depends on a real willingness to get together.

The time is ripe for an awakening of interest here in health and industrial efficiency. Surely our medical schools have a mission here. Teaching in industrial health has been seriously neglected. Where are the British counterparts of the American and Continental schools of industrial health? Industrial medicine has a future: indeed, it must have a future in any balanced development of medical services, and now is the time to encourage it.

### In England Now

#### *A Running Commentary by Peripatetic Correspondents*

THE colonel at the picture exhibition did not bother about art, he wanted to see a portrait of a fine-looking woman. But the difficulty is that our idea of good looks is as much subject to fashion as any other question of taste. We no more expect our eminent men to sport the full beards of their grandfathers than they in turn would have worn the wigs of a century earlier. Nor is it only a matter of wigs or beards, the very shape of the features seems to be turned out of period moulds. All those old Dutchmen in the anatomy groups have the same look of solemn purpose; all our eighteenth century forerunners the same pompous poise. Yet we only know our predecessors through their portraits. If we can see what Darwin or Hunter really looked like we expect some special insight into their character and work. The artist on whose statements we rely when we look at an old portrait was not primarily concerned with getting a likeness. He wanted to paint a successful picture in the fashionable style of his day, whether he contrasted a three-bottle nose against a red velvet curtain or set off a powdered coiffure by a bower of filmy leaves. In so far as his subject matter was a face he wrote an essay in imaginative psychology. What he has left to us is his idea of the type to which King Charles or Squire Western or the Vicar of Wakefield ought to have approximated. And photography has not changed all that. The Hollywood stars who set our face-fashions are as much idealised on the screen as Darwin and his contemporary lions were in Mrs. Cameron's famous photographs. But this search for the type can be carried too far. The medieval artist used a series of stock types—the emperor, the prophet, the doctor—and only selected the appropriate one when he needed a portrait. Modern democracy assumes that each individual has a right to a face of his own, an assumption derived from the self-assertive anatomists of the renaissance. Vesalius would not put a stock image of Galen in his book, he had a portrait of himself engraved by the artist who was doing his anatomical illustrations. This justifiable self-assertion has continued ever since and may long continue. Only the shortage of paper puts a temporary curb on the multiplication of photographs, and our English love of privacy keeps us from hanging an enlarged portrait of the hero of the day in every room. As long as we remember that we are looking at a likeness got up for propaganda purposes—even the so-called candid camera is only doing the same job in reverse, debunking instead of puffing—a good portrait does indeed give a shorthand report on a man as he seemed to his contemporaries. Any of us who feel this self-assertive urge ought to have our features perpetuated not in marble or bronze but by a capable photographer. And if we cannot emulate Vesalius by printing the portrait in our next textbook, we all write our recollections before middle-age nowadays, or at least we can

1. Third Report of the Select Committee on National Expenditure, 1942-43. London: HMSO. 4d.

deposit a print in some public collection. But from the concept of liberty—to every man his own face, we are imperceptibly moving to the admission of equality—no-one has a right to a better face than mine. Perhaps before many generations each human face will have resolved itself into one of the three basic types: the horse, the bird, or the bun.

Many years ago, before the days of telephones and motor-cars, when I was a very junior consultant, a telegram came asking me to go to a consultation at a village some miles away. It was from a Dr. X, whom I had never heard of before. A country consultation was then a rare event, and every new client called for prompt attention, so I wired back "Yes this afternoon." It was a lovely summer day, and the old-world village, as it was before the colliery was sunk nearby, looked very charming. The consultation was to be at the local inn, where I found Dr. X awaiting me. He was a tall good-looking man, about forty, and, as I found later, a keen sportsman and first-rate cricketer—two great assets for a country practitioner. He told me about the case in the room downstairs, before going up to see the patient. It is an old custom that in this procession to the sick-room the GP goes first, the consultant following solemnly in the rear. This piece of medical etiquette is unusually sensible. The GP knows the way to the sick-room, the consultant does not; moreover, going into the room first he can introduce the consultant, and break the shock of his coming at all. Being a very junior physician I was anxious to observe all such minor details; however, when we reached the bottom of the narrow, dark little staircase, Dr. X to my surprise courteously but firmly insisted on me going first, and I rather fancied that he had some difficulty in following me. I had thought he seemed queer in many little ways, and suspected that it might be alcohol. However, with a welcome fee in my pocket I drove home, trusting that alcoholic or not I had secured a permanent new client.

A few weeks later he wrote to ask me if I would come and see him as he was not very well; I went next day. It was the old sad story. A foolish escapade in student days and a primary infection inefficiently and insufficiently treated (this was long before the days of Wassermann or 606). There then followed a long interval of apparently complete recovery, during which he had married, had two or three healthy children, and worked up a large and successful country practice. Then the sword fell—lightning pains with increasing difficulty in walking. It was ataxia not alcohol that spoiled the order of procession upstairs at our first meeting. He told me that it had been gradually getting worse for months, that recently he had carried on with great difficulty, and that at last he had given in, and handed over his work to an assistant. He could no longer walk across his small room without someone on each side, and could not sign his name. It seemed rather desperate, but as it happened I had just been reading Fränkel's book on the re-education of the tabetic by systematic exercises. Here seemed to be an admirable opportunity of putting them to the test; I lent him the book. The result was remarkable. For the next few months he carried out the principles and practice laid down by Fränkel with a persistence and determination which few men would or could have shown. Before long he was able to walk across his garden with the help of two sticks, and to write legibly—at any rate as legibly as many of our colleagues ever do. He soon began to do some of his practice again, and in due course dismissed his assistant and did it all himself. How he managed to do this in spite of a quite considerable amount of ataxia showed an almost incredible originality and resourcefulness of mind. At later consultations, for he proved a very faithful client, I learned much. He drove himself in a little governess-car drawn by a pony; his man went with him and helped him in and out at the back. When the patient's cottage was reached, the man got out and knocked at the door which was then at once thrown wide open; if there was any other door at the back through which light could come it was opened too. Meanwhile Dr. X remained in the pony-car. The man now came back and helped him into the cottage and seated him on a chair put ready for him by the patient's side. If the

patient was upstairs, the procedure was much more elaborate. The man now placed little short bits of candle, which he always carried in his pocket, on the opposite sides of alternate stairs and lighted them. Any door at the top was also thrown wide open. He then fetched the doctor out of the pony-car, and when they reached the bottom of the little stairs the man, standing backwards on the first step and facing the doctor, took hold of each of his hands. Then slowly backing up each step, he held up the doctor who by the aid of the candle-lights was able to see where he was putting his feet. By this complicated arrangement the object was finally achieved—doctor and patient were brought together.

For some months I lost sight of him, but heard from time to time that he was carrying on, and that with the increased work of what was now a colliery centre he had built himself a house in the village. One day, receiving a call, I went over and there he was in a well built, fairly large stone house, standing back from the main street of the village, and quite out of keeping with its surroundings. I was shown into a big well-furnished consulting-room, perhaps more suited for Harley Street than for a small colliery village. He told me that it had been built to his own designs, so that all his rooms were on the ground floor. This seemed very sensible, seeing his difficulty in mounting stairs; at the same time it all seemed rather extravagant. At my next and last visit a few weeks later, he was again sitting in his consulting-room when I arrived. In reply to my greetings, I was horrified to hear him say: "Thank you, I am extraordinarily well, and what is more I find that my power of diagnosis has become so much more acute. I have now no need to examine my patients, or even to ask them any questions. I can diagnose their trouble directly they put their heads inside the door." There it was—the House that Jack, the Spirochete, built!

He became maniacal and died of taboparesis shortly after, leaving a widow and family penniless. The house still disfigures the village, but since it is now used for a miners' institute some good has come out of evil.

He was one of those stillborn looking babies, and the matron and I worked hard on him. After all the usual tricks and a bad quarter of an hour he decided to live; his colour returned, he began to breathe and finally to cry vigorously.

Next morning he had half a crown clutched in his small hand, a tip from his doting grandfather. The Matron sniffed, "After all we did for him last night," she said "he's not the one who ought to have it."

I have been surprised that in the timely and admirable discussion on homuncular pathology nothing has yet been heard of the homunculæ or little women. Following Louisa Alcott's well-known but now obsolete treatise, Brewer and Stewer (Proc. Widdecombe Med. and Chir. Soc. 1937, 52, 528) were able to show that the homunculæ, in addition to their purely domestic duties, were also responsible for many essentially beneficent phenomena. Sitting in opposing rows they rapidly bring about union of soft tissues with their little knitting needles, which are also responsible for the pricking and tickling sensations so often associated with healing. The purulent discharge from an infected wound is, of course, a conglomerate of the blood, tears, and sweat wrung from these unfortunate women as their stitches repeatedly tear out of the damaged and devitalised tissues.

Pursuing these researches further, Gurney and Davey were able to show that the homunculæ were all "day blind." Consequently when working on the surface of the body they become dazzled and distraught, thus explaining the slow healing of surface ulcers and the excellent results of the closed plaster technique. These workers also stated that Brewer and Stewer's conclusion that the union of fractures was brought about by serried ranks of homunculæ grouping themselves round the fracture and successively turning into pillars of calcium phosphate was not justified by the evidence. They were, however, unable to offer a better explanation.

The domestic duties have lately been more fully investigated (Whiddon, Hawke, Copley, T. et al.). This work is at present incomplete, but the results so far suggest that the normal temperature of the body is maintained by utilising the waste heat from their

domestic fires, pyrexia being the result of the extra cooking needed for the celebration of some particularly successful raid by the homunculi on the luckless tissues of their host. The full results of these researches will be published in due course, but there is obviously room for many more workers in this fascinating field.

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Speaking with no illusions on the subject and without false modesty I am compelled to regard myself as a fourth-class shot; for it is the essential criterion of a bad shot that, after missing a long series of tolerably easy birds, he brings off an occasional screamer. There is a place where I once went as a guest to which I shall never have the courage to go again. A cock-pheasant rose "orkard" and flew pretty swiftly down a line of five guns each of whom gave it two of the best without apparently disturbing a feather. Going all out and as tall as Troy the bird came over me at the end of the line. I fired and it crumpled up, dead. The truth is, I suppose, that it was carrying just about as much lead as it could and I probably added the single extra pellet that tipped the scale; or it may just have given up the struggle. But for the rest of the day I was treated by everyone with embarrassing respect and, as I say, I don't think I'll go there again. I was reminded of this incident by a similar occurrence this afternoon. I was out with a party who know my limitations only too well and an almost impossibly high pigeon came over us. With cartridges nearly fourpence each and scarce as hen's teeth the others wisely refrained from cracking at it but I couldn't resist the base impulse. Swinging wildly as it came over my head I loosed off and killed it. It may be that I've got a little something that the others haven't got; or may be they've got a lot that I haven't.

## Public Health

### Some Vital Statistics of 1942

WHEN the total figures for England and Wales have been totted up it is virtually certain that in spite of (or because of) the war several records will be broken. The Registrar-General's return for the quarter ended Sept. 30 shows that the birth-rate in that 3 months was 16.1 per 1000, the highest third-quarter rate since 1930. The corresponding figure in the second quarter was 16.2 and one has to go back to 1932 to find that level exceeded; the first-quarter figure of 15.5 was also relatively high. Any reasonable estimate for the final quarter of the year, not yet published, must give a rate for the whole year of about 15.5 per 1000 which will be the highest for at least a decade. Clearly the increase is likely to be due, at least in part, to the relatively high marriage-rates that have prevailed since the outbreak of war.

On the debit side the position has likewise been very favourable. The 5425 stillbirths in the third quarter represent 3.1% of the total births registered, the lowest proportion yet recorded, and for the first nine months of the year the figure has been only slightly above that level (3.3 per cent). The infant-mortality ratio is also very satisfactory, being but 40 per 1000 live births, or 5 points below the average of the 10 preceding third-quarters, and equal to the low record reached in 1939.

The death-rate at all ages was 9.3 per 1000 which is also slightly lower than any third-quarter rate in the last ten years. The weather was mild in the final quarter and influenza made no appearance, so that it is probable that the year's total death-rate will be as low as 11.5 per 1000, providing a new low record or a figure at least as good as any that has preceded it. In an appendix to his report the Registrar-General gives some interesting data bearing on this very favourable position—namely, the numbers of deaths in the first two quarters of 1942 compared with the similar periods in the first two years of the war. By adding the two quarters together, male and female combined, we obtain the instructive results shown in the table. Much of the total improvement in 1942 comes, it will be seen, from a pronounced absence of influenza and low figures for bronchitis and pneumonia. It is also satisfactory that considerable improvement is revealed in tuberculosis, both respiratory and other forms—a distinct change from the deterioration of 1941. Cerebrospinal fever shows a considerable decline and,

### DEATHS IN ENGLAND AND WALES, INCLUDING NON-CIVILIANS, IN THE FIRST HALF OF THREE RECENT YEARS

Cause of death	1940	1941	1942
Cerebrospinal fever .. .. .	1,826	1,525	830
Whooping-cough .. .. .	282	1,555	494
Diphtheria .. .. .	995	1,476	988
Measles .. .. .	292	1,042	174
Influenza .. .. .	10,198	6,003	5,555
Bronchitis .. .. .	34,852	25,211	17,859
Pneumonia .. .. .	19,781	17,890	13,317
Tuberculosis, respiratory	13,322	13,504	11,828
"    other forms .. .. .	2,457	2,874	2,581
Cancer (all sites) .. .. .	34,424	34,424	35,240
Diabetes .. .. .	3,009	2,775	2,487
Pernicious anemia .. .. .	1,222	1,354	1,368
Ulcer of stomach and duodenum	2,908	3,372	2,625
Appendicitis .. .. .	1,333	1,033	976
Intracranial vascular lesions	29,033	26,917	26,886
Nephritis .. .. .	8,693	8,085	7,436
Suicide .. .. .	2,506	2,281	1,972
Motor vehicle accidents .. .. .	2,526	3,811	2,744
All causes .. .. .	324,889	318,823	267,904

as in the last war, diabetes and suicide both give lower returns. Whooping-cough, diphtheria, and measles were all epidemic in 1941 and fell substantially in 1942, though the level for diphtheria remained regrettably high. But the first half of 1942 is too early to give any indication of the results of the immunisation campaign.

### Infectious Disease in England and Wales

WEEK ENDED JAN. 2

*Notifications.*—The following cases of infectious disease were notified during the week: smallpox, 1 (at Plympton St. Mary, Devon); scarlet fever, 2159; whooping-cough, 1187; diphtheria, 939; paratyphoid, 7; typhoid, 6; measles (excluding rubella), 14,989; pneumonia (primary or influenzal), 936; puerperal pyrexia, 165; cerebrospinal fever, 95; poliomyelitis, 4; polio-encephalitis, 1; encephalitis lethargica, 2; dysentery, 95; ophthalmia neonatorum, 74. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Dec. 23 was 2003, including scarlet fever, 637; diphtheria, 234; measles, 397; whooping-cough, 176; enteritis, 92; chicken-pox, 95; erysipelas, 39; mumps, 35; poliomyelitis, 2; dysentery, 32; cerebrospinal fever, 15; puerperal sepsis, 16; enteric fevers, 11; german measles, 6.

*Deaths.*—In 126 great towns there were no deaths from enteric fevers, 3 (0) from scarlet fever, 13 (1) from measles, 14 (2) from whooping-cough, 29 (2) from diphtheria, 45 (5) from diarrhoea and enteritis under two years, and 44 (5) from influenza. The figures in parentheses are those for London itself.

Birmingham had 9 deaths from influenza, no other great town more than 3. Manchester reported 8 deaths from diarrhoea. Birmingham 5. There were 3 fatal cases of diphtheria at Liverpool.

The number of stillbirths notified during the week was 234 (corresponding to a rate of 37 per thousand total births), including 25 in London.

### NEW YEAR HONOURS

THE New Year honours list has now been completed by the publication of awards in the civil division of the Order of the British Empire. The names of the following members of the medical profession are included:

#### OBE

HUGH G. CRAWFORD, MC, MRCS.

For services to the Boy Scout Movement in Staffs.

JAMES DUNLOP, MB GLASG.

MO for civil defence, Glasgow.

JOHN GILMOUR, MB GLASG., FRCS, FRFPs.

Regional MO, Department of Health for Scotland.

ALFRED T. SMITH, MD ABERD.

County Commissioner, St. John Ambulance Brigade, Hants and Isle of Wight—for services to civil defence.

#### MBE

ALEXANDER INNES, MB EDIN., FRCS.

MO i/c of surgical division, Calderstone Emergency Hospital, Lancs.

MARGARET S. SHARP, MB LOND.

Centre organiser for Bradford WVS—for civil defence.

## Letters to the Editor

### THE CHRISTMAS GIFT: RESULT

SIR.—I cannot convey more adequately my thanks to your readers for their most generous response to my Christmas appeal than by quoting the letter of a beneficiary, a doctor's widow, aged 88, who writes:

"Owing to being very feeble and at times not able to hold my pen, it is not possible to write, but I do want to thank you and my good medical friends who sent me the Christmas gift so acceptable. I am most grateful for I need much I cannot obtain. Again I beg to thank all to whom I have been indebted for so many years, but the time is getting short. I am very feeble and cannot help myself, also memory and deafness very trying. Yours gratefully, ———"

It is a satisfaction to me to know that thanks to your help and the generosity of many we have not failed to send a Christmas Gift to all our regular beneficiaries.

Balliol House, Manorfields,  
London, S.W.15.

THOMAS BARLOW,  
President, R.M.B.F.

### GMC PROCEDURE

SIR.—Year by year, as I read the reports of disciplinary inquiries by the General Medical Council, I am surprised and alarmed at the ease with which that body terminates the professional career of a medical practitioner as a result of evidence which, to me at any rate, seems anything but conclusive. I have not hitherto raised this point publicly because the possibility has occurred to me either that a summarised report is less satisfactory than the actual evidence, or that through mental defect, lack of legal training, or some other such disability in myself I was unable to follow what was in fact a clear and logical chain of evidence. It now seems, however, that the evidence in at least one case has been studied by someone well able to judge its value, the conclusion reached being that it was not sufficient to satisfy a court of law. On Dec. 9, 1942, the Attorney-General said in reply to a question in Parliament (I quote from the *Daily Telegraph* report):

"The activities of a doctor recently struck off the register for giving bogus certificates to enable men to evade military service were the subject of investigation by the Director of Public Prosecutions in 1940. It was decided that the available evidence did not afford a basis for criminal proceedings. Since the question was put down inquiries have been made to see whether the position has been altered, so far as the evidence is concerned. As at present advised I do not think it has."

We are therefore left with two possibilities. Either the GMC comes to its decisions as a result of facts known to it, but for some reason not put in evidence (and therefore not open to disproof), or it is more ready to assume the guilt of an accused person than is a court of law.

In this country an elaborate system of procedure has been built up to ensure that a person accused of a crime gets a fair trial. The GMC, however, which tries issues much greater than many which are tried in police-courts, gives little in the way of safeguards to the accused. It has no power to compel the attendance of witnesses; the evidence it hears must therefore often be incomplete, and it may happen that important witnesses for the defence cannot be obtained. There is no right of appeal, except, I believe, on some technicalities of procedure. The written evidence of persons still living is accepted. The verdict found is either "guilty" or "not proven," never "not guilty"; it may be said that this is a mere matter of words, but the general public attaches to a "not proven" verdict the same significance as it would attach to a similar verdict under Scottish law. It may be argued that an occasional erasure on insufficient evidence is necessary in the GMC's duty of protecting the public. But is it not a basic principle of the law that an accused person is innocent until *proved* guilty?

In your issue of Nov. 28 (p. 657) Dr. Attlee pointed out the way in which sick-club rules interfere with rehabilitation by forbidding any activity to the patient during convalescence on pain of losing benefit. It now seems that a greater danger is in store for the doctor. During the last session of the GMC a case was considered of a policeman certified as unfit for work, who, against the

advice of his doctor, went to sing in the choir at St. Paul's at Christmas. For that the doctor had to appear before the GMC and undergo a considerable amount of publicity, not to speak of the personal inconvenience and anxiety the case must have caused. In a police-court the magistrate would probably have rebuked the police for bringing such a case. With the GMC "The council found the charges not proved to its satisfaction"—and that is all.

I do not altogether trust our professional Court of Star Chamber not to bear malice against me next time one of my patients sings in a choir while certified as unfit for work. I must therefore ask you, Mr. Editor, to allow me to subscribe myself

Essex.

N.

\* \* \* Comment on this letter appears under the heading Medicine and Law. It may be fair to recall here the reply of the Attorney-General to a supplementary question.

"Anyone familiar with criminal proceedings will realise that the laws of evidence, the laws of corroboration and the fact that the accused, unless he desires to give evidence, cannot be questioned in any way, make an inquiry before a criminal court a different matter from an inquiry before a committee, and there may well be cases where an investigating body may arrive, on evidence and on grounds perfectly proper to be put before it, at a conclusion that it would be impossible to establish in a criminal court, having regard to the rules of evidence and the principles governing a criminal trial."

ED. L.

### DERMATITIS AND KOILONYCHIA DUE TO CHEMICAL GLUES

SIR.—Synthetic glues or cements have been used in industry for some time. They are derived from the plastic industry and for certain uses, such as the manufacture of plywood, have advantages over animal glues, for they often dry more quickly and set hard in a few hours. My attention was first drawn to these glues by two severe cases of eczematoid dermatitis in a works where the operatives handled a urea-formaldehyde cement. Both men had an extensive rash on the hands, forearms and face, the nails being unaffected. The smell of formaldehyde in the workshop was intensified as the glue has to be used at high room-temperature. Both men had been at work for some months and had only just developed the rash, and in spite of treatment had to leave work. Both were new at the work and the more experienced operatives were unaffected. While I was investigating these cases I was asked to inspect another larger workshop where a different synthetic cement, described by the vendors as a lactic-alkaline cement, was used. It is a cold water glue strongly smelling of ammonia. Of the 60 men and women handling it 8 men had developed obvious koilonychia of the fingers and even of the thumb. Others had flattening of the nails which everyone agreed preceded the spooning. Soreness and cracking of the finger-tips also was a general complaint, and the nails were softened and had lost resilience. Apart from these symptoms the men affected were healthy and had no signs of anæmia or other disease. All complained bitterly that the irritating cement penetrated underneath their everted nails.

Koilonychia is best known for its association with microcytic anæmia, and even this association is more likely to occur in women who have their hands in water a great deal (see *Lancet*, 1942, ii, 626), especially if alkaline washing material is used, and Pardo-Castello (*Diseases of the Nails*, London, 1942) quoting Cipollaro states that many cases of koilonychia are due to occupation particularly in those who handle strong acids and alkalis or whose work is sweeping chimneys. Koilonychia can thus be an occupational disease, a manifestation of microcytic anæmia, or these two factors may be combined. Cases have also been reported where it seems to be familial and hereditary (*Arch. Derm. Syph.*, N.Y. 1935, 31, 122).

The prevention of dermatitis due to urea-formaldehyde by protective creams is being investigated. In the meantime fingerstalls are being tried where alkaline cement is causing spoon nails or sore finger-tips.

Solihull.

G. P. B. WHITWELL.

### ÆTIOLOGY OF ERYTHEMA NODOSUM

SIR,—Your annotation states that Jersild and Iversen have described 9 cases of a lesion indistinguishable from erythema nodosum in 307 patients under treatment with sulphathiazole; and prophesies that the proportion of cases associated with drugs will increase as the range of chemotherapeutic agents extends. Long and his colleagues<sup>1</sup> report that while sulphaniilamide and sulphapyridine in their experience each produced skin reactions of various types in 2% of their patients, sulphathiazole produced reactions in 5%, the nodular type being especially common with its use.

Though the number of patients in the local isolation hospital here has been unusually small for several months, 3 patients have developed erythema nodosum after chemotherapy. The first child with secondary tonsillitis and cervical adenitis during diphtheria convalescence, developed typical lesions on the legs and arms on the fifth day of treatment with a total of 13 g. of sulphaniilamide. The second child, with axillary adenitis and scabies, developed typical lesions on the legs on the sixth day of treatment; during the first three days he had had a total of 8 g. sulphaniilamide and during the next three a total of 7 g. sulphathiazole given after staphylococci had been found in the resultant axillary abscess. The third child, with late adenitis after scarlet fever, developed typical lesions on legs, arms and slightly on the face on the fourth day after a total of 10 g.

1. *J. Amer. med. Ass.* 1940, 115, 364.

sulphathiazole. In each case the temperature and lesions subsided within three days of the withdrawal of the drug. It seems that these lesions are much more common than would be expected from references to their incidence in work so far published, and that the reactions do not only follow sulphathiazole.

Southport.

F. E. CRAWLEY.

### THE BRITISH STANDARD HÆMOGLOBINOMETER

SIR,—The up-to-date standardisation of the Haldane hæmoglobinometer (*Lancet*, 1942, ii, 732) suggests that the Sahli type should be seen to next. As you point out, the Sahli is the next most popular type because the method is easier to carry out. But with the present Sahli type one must use the awkward technique of adding water drop by drop and, after stirring, of matching the colour to the standard. This method therefore depends on the graduated dilution. With another type—the Neoplan—a specific dilution is put in and compared with a graduated scale shown in a coloured plate. The Sahli has other disadvantages apart from the tedious droplet dilution as the stirrer carries out with it a certain amount of acid hæmatin. I think many find the Neoplan type much easier to manipulate, but it is not available nowadays because it is of foreign make. I wish the British Standard Institution would consider the design and supply of this type or one of a similar nature.

General Hospital,  
Ebbw Vale.

S. MUNTARBHORN.

## Obituary

### DAN ARTHUR POWELL

M D LOND.

Dr. Dan Powell, principal medical officer of the Welsh National Memorial Association, died on Dec. 21 at the age of 58 after an illness which, though full of trials, never damped the warmth of his heart or his interest in the prevention of tuberculosis. He was educated at



Pengam School, University College, Cardiff, and Charing Cross Hospital. He qualified in 1908 and took his London MB with honours the following year. After he joined the Welsh National Memorial team in 1912 the study of tuberculosis became almost his sole object until May, 1915, when he was released to serve for a time with the RAMC. He returned to resume his duties with the North Wales unit of the association, and his former chief, Colonel Lyle Cummins (to whom we are indebted for the material for this notice) writes that he met Powell for

the first time when, with the late Sir David Evans, he visited the Brynsyont Hospital, Caernarvon, the Anglesea hospital and the little pre-tuberculosis rest station at Penheskyn. Everywhere the staff had to make the best of buildings intended for another purpose, but the visitors were struck by the happiness and contentment of the patients and nurses. Later when Powell was transferred to the North Wales Sanatorium at Llangwyfan he had old cottages altered and new cottages built for women who had reached the final grades of sanatorium training. Under skilled supervision they were allowed to buy their own food and taught how to cook and serve it. This early experiment in nutrition and housecraft was a great success and the girls were eager to reach the standard when they were allowed to live in the cottages. Powell adopted Marcus Paterson's theory of graduated labour, but he was alive to surgical advances and worked in unison with Sir Robert Jones.

When in 1926 it became clear that the duties of the professorship should be separated from the administrative work of the association, Powell was chosen as deputy PMO and within a year became chief. He gave up the charge of the North Wales Sanatorium rather unwillingly, but he proved himself a master of administration. He

engaged and harmonised the work of the association and his reports were those of a wise and alert man who cared little for his own glory, but gave generous credit to his staff. One of his colleagues writes: "He was a grand chief, who in spite of the hurlyburly of administrative duties never lost his sense of humour. Although he was a Welsh-speaking Welshman and loved his country, his motto was never 'Wales for the Welsh' and he thought as much of his English, Scottish and Irish colleagues as he did of his Welsh ones." The establishment of the Sully Tuberculosis Hospital was the most notable addition to equipment during Powell's tenure of office, but there was much besides, and he managed tactfully and well his large team, which included 18 sanatoria and hospitals with some 2000 beds, 15 central clinics, 80 visiting stations and departments of bacteriology and education, and he got his own way in most things without fuss or worry. He was a member of the executive council of the Prince of Wales Hospital, Cardiff, of the Welsh National School of Medicine, of the National Library of Wales, of the Minister of Health's standing advisory committee on tuberculosis, of the MRC industrial pulmonary diseases committee, and of the RCP Prophit committee. At the time of his death he was chairman of the Joint Tuberculosis Council, and he also held the office of honorary clinical lecturer in the department of tuberculosis in the Welsh National School.

His friend P. E. provides the fitting epitaph: "Powell's wit was as keen as his candour, his kindness as great as his wisdom, his happiness as profound as his sympathy. He rests from his labours, but his work follows after him. Our hopes are not wholly with the dead. Let not all this wealth of love be wasted."

Colonel WILLIAM BRUCE, OBE, RAMC, who died during December while on active service in North Africa, was the third son of the late James Bruce, WS, of Edinburgh. He graduated from the University of Edinburgh in 1911 and during the last war served in Egypt and France with the New Zealand Army Medical Corps, transferring to the RAMC in 1920. He was promoted major in 1927 and lieutenant-colonel in 1941, and at the time of his death held the rank of temporary colonel. He was 55 years of age.

Therapeutic Research Corporation of Great Britain. The following officers have been appointed for 1943: chairman and deputy chairman of the board of directors, Dr. T. B. Maxwell (May and Baker) and Mr. Harry Jephcott; chairman and deputy chairman of the research panel, Dr. F. L. Pyman (Boots) and Dr. J. W. Trevan (Wellcome Foundation).



## Notes and News

## MEDICAL WAR RELIEF FUND

DURING its second year this fund received over £13,000 in donations, and now has a balance of some £30,000 in hand, but the committee hopes that the steady flow of subscriptions will continue, for the demands on the fund will probably increase as the offensive phase of the war develops. Subscriptions have come from doctors in every continent, from doctors confined in enemy prison camps, from doctors serving on the high seas, but despite their own anxieties especially generous help has been given by Australia and Canada. A final contribution brings Australia's contribution to about £A4500, and nearly £1400 has come through the Canadian Medical Association.

Less has been distributed than during the first year, for the number and severity of air attacks on the home front has decreased. Of the 36 awards made during the year, 2 were to applicants who had already been helped by the fund. Nearly £5000 was distributed as gifts, varying between £550 and £30, and about £1000 as loans of from £220 to £22. Since the inauguration of the fund and Aug. 31 over £13,000 has been distributed.

The following case summaries show where need has arisen during the year:

Dr. N., serving in the RNVR, lost valuable medical equipment, when his ship was bombed. On being invalided out of the Service he received a gift to re-establish himself in his considerably reduced practice, and later a loan for the purchase of new apparatus.

Dr. O., a widower, was killed during an air-raid while on duty at a first-aid post, leaving two orphan children. His small practice realised a very modest sum. The children are being cared for by relatives whose income, supplemented by the small government pension, is insufficient to provide suitably for their maintenance and education. Help has been given in the form of a gift, payable in instalments over a period of years.

Mrs. Q. sailed under Japanese bombs from Singapore, where her husband was in civil practice. She had decided to remain with him, but she was ordered to leave and could take few possessions with her. On arrival in England she lost no time in securing employment, but she was in need of a small loan, which was readily granted.

Cheques payable to the fund should be sent to the hon. treasurer at BMA House, Tavistock Square, London, WC1.

## ABOUT IT AND ABOUT

JUST now the stirring of medical and scientific thought shows the same hunger for a synthesis, the same desire to find in philosophy a way of life, as moved the ancients. Professor Wood Jones brings his wide reading and active mind to the task in a book,<sup>1</sup> based on his Purser lecture at Trinity College, Dublin, in 1941 and whether his readers agree with him or not he will set them thinking. Looking at the universe about him he seeks in it for evidence of design; and feeling he has found it, argues from design to purpose. He might have stopped short at design, which the Oxford English Dictionary defines as "a plan or scheme, conceived in the mind, of something to be done"—thus postulating not only purpose, but the mind to conceive it. But it is not his argument so much as his gift for sweeping his glass round a wide horizon which is enthralling. Thus he takes us from the doubts of Richard Jefferies to the confidence of Paley's *Evidences*; from the broad conceptions of the classical philosophers, and of Lao-Tzu and Buddha to the more cramping dogmas of some forms of monotheism, before swinging us back to the holism of Smuts. He spends some interesting pages on the treatises prepared by scientists on the direction of the Earl of Bridgewater at the beginning of the nineteenth century to illustrate Paley's *Natural Theology*, and to prove that our world seems planned to maintain us. They were published in 1833, but lost their hold on public attention in 1858 when Darwin read his paper on the origin of species to the Linnean Society. In 1913 Lawrence Henderson at Harvard went over the ground again and concluded

that carbon, hydrogen and oxygen are "uniquely fitted" to be the stuff of which life is formed, and that in particular the aptness of carbon dioxide to the purposes of life depends on alternating light and darkness, and thus on a spinning world. Wood Jones does not glance at the alternative view that life had to subsist on what it could get and thus had a strong incentive to find water and carbon and such things "uniquely" suited to its needs. But he carries us forward from this point with persuasive vigour, reminding us that the old distinction between living and non-living is lost since virus protein proved to be crystalline not colloid, and drawing a picture of the evolution of the inorganic world in some degree comparable to the evolution of living things. The atom, built on the pattern which serves also for the solar system and the most distant nebulae, is the unit from which all more complex molecules derive; and the atom, as we think today, is made only of energy. So that, restating the aphorism of Democritus, Wood Jones can say: "There is nothing but energy and space." This leaves out mind, which no-one so far has managed to fit into the space-energy concept; but Wood Jones cannot have his design and purpose without a mind to conceive them; and grants as much in his conclusion, where he finds in the idea of Cosmic Mind "something that gave energy its birth, its purposive character and its apparent immortality."

## Diphtheria Immunisation

In circular 2753 the Minister of Health states that every effort should be made to discover the children in each district who have not yet been immunised. He suggests help from health visitors and local food officers, and any child unable to attend a centre should be treated at home by his family doctor. Local authorities are again urged to invite practitioners to cooperate in this work, informing them that the prophylactic will be provided free and setting out the fees they are prepared to pay.

## Control of Quinine

Under a new order which came into force on Jan. 5 no-one may acquire, treat, use or consume supplies of cinchona, cinchona products or synthetic substitutes, except under licence from the Ministry of Supply. The order also prohibits the prescribing of quinine and its salts and any other controlled material except as an antimalarial drug. Another exception is made for quinidine, which may still be prescribed for cardiac arrhythmia. Anyone who suffers, or who has suffered, from malaria can obtain quinine or other controlled material by providing documentary evidence. Merchant vessels can obtain supplies to satisfy the Board of Trade requirements.

Those who hold stocks equivalent to more than 16 oz. of quinine must notify the Director of Medical Supplies, Portland House, Tothill Street, London, S.W.1, before Jan. 23 of the quantities they hold and the places where it is stored.

## Royal Society of Medicine

A general meeting of the fellows of this society will be held on Tuesday, Jan. 19, at 4 p.m. On Jan. 21 cases will be shown at a meeting of the section of dermatology at 2 p.m. On Jan. 22 at 2.30 p.m. Dr. E. H. R. Harries, Dr. A. W. Downie and Dr. E. Smith will open a discussion at the section of disease in children on the prophylaxis of the acute specific fevers. The section of epidemiology will meet at the same hour, when Dr. Ian Sutherland will read a paper on some aspects of the epidemiology of smallpox in Scotland in 1942. There will be a meeting of the section of neurology at 10 a.m. on Jan. 23 at the National Hospital, Queen Square, WC1.

## Nutrition Society

At 11 a.m. on Saturday, Feb. 6, at the London School of Hygiene, Keppel Street, WC1, this society is to hold a conference on nutrition in pregnancy. Papers will be read by Mr. Aleck Bourne on foetal development, by Mr. John Hammond, FRS, on physiological factors influencing birth-weight, by Sir Joseph Barcroft, FRS, on nutritional functions of the placenta, by Prof. A. St. G. Huggett and Dr. Margaret Balfour on the diet of the pregnant woman, and by Mr. R. M. Titmuss on stillbirth and neonatal mortality. A meeting is also to be held later on nutrition in infancy. Further particulars can be had from the hon. secretary of the society, Mr. Leslie Harris, DSc, Nutrition Laboratory, Milton Road, Cambridge.

1. *Design and Purpose*. Frederic Wood Jones, DSc, FRCS, FRS, professor of anatomy in the University of Manchester. London: Kegan Paul. Pp. 84. 5s.

**University of London**

As Easter Sunday falls on April 25 this year the MB, BS examination will start on Tuesday, April 27 instead of on Monday, April 19.

**Medical Society of London**

At 4 PM on Monday, Jan. 18, at 11, Chandos Street, W1, this society will hold a discussion on nutritional deficiencies during pregnancy and lactation, and the influence on the mother and child. The opening speakers will be Prof. James Young and Dr. T. Izod Bennett.

**Health in the Factory**

A week-end course on this subject for medical practitioners will be held at the London School of Hygiene, Keppel Street, WC1, on Feb. 27 and 28. The speakers will include Dr. A. J. Amor, Dr. W. D. Jenkins, Dr. M. W. Goldblatt, Dr. H. B. Trumper, Dr. A. H. Bennett, and Mr. A. R. Martin, PhD. Further particulars may be had from the secretary of the school.

**Middlesex County Medical Society**

A meeting of this society will be held at 3 PM on Thursday, Jan. 21 at the Central Middlesex County Hospital, Acton Lane, N.W.10, when Mr. T. G. Illtyd James will speak on methods in the diagnosis of cerebral tumours and Dr. J. Sakula on a recent outbreak of gastro-enteritis in the newborn. Members of the American and Canadian Forces will be welcome.

This society has formed a committee to initiate, encourage and facilitate medical research. Seven big general hospitals (7064 beds), two sanatoria (1408 beds), one mental hospital (1997 beds), as well as the tuberculosis and school medical officers and the central administrative staff are represented on the committee. It is hoped to arrange teams to study the common yet controversial problems of hospital medicine.

**Benzyl Benzoate**

Benzyl benzoate is available for the preparation of the aqueous emulsions required for the treatment of scabies and supplies may be obtained by hospitals, local authorities, medical practitioners and retail chemists through the usual trade channels. Where difficulties are experienced application should be made to the Director of Medical Supplies (D.M.S. 2.B.1), Portland House, Tothill Street, London, S.W.1, giving the following particulars: quantity required monthly for supply on prescription or for other sales; quantity now being received monthly; name of supplier.

**Medicated Soaps Coupon Free**

The Ministry of Food, after consultation with the Ministry of Health, has exempted the following preparations from the rationing provisions of the Soap Order if supplied against the prescription of a registered medical practitioner:—

(a) The official British Pharmacopœia or British Pharmaceutical Codex soaps and spirit soaps:—sapo animalis BP, sapo durus BP, sapo mollis BP, sapo kalius BPC, sp. saponatus BPC, sp. saponis kali BPC, liq. saponis æthereus BPC, liq. saponis antisepticus BPC, and liq. saponis olei cocœis BPC.

(b) Medicated soaps containing any one or more of the following ingredients:—mercuric iodide not less than 1%; ichthylol not less than 4%; salicylic acid not less than 2%; resorcinol not less than 2%; or sulphur not less than 5%.

**Order of St. John of Jerusalem**

The King has sanctioned the following promotions in, and appointments to, this order:

*As Knight*—William Henry Kauntze, CMG, MBE, MD.  
*As Commander*—Colonel John Livingston Hamilton, MC, MD.  
*As Officers*—Colonel Gordon Colfox Kenning, MD, RCAMC, Colonel James Bennett Hance, CIE, OBE, IMS, James Pirie, MD, James Lamberton, MB, Lieut.-Colonel Charles William Eames, DSO, MD, Eric Hemingway Shaw, MD, Major Frederick Tucker Deatker, OBE, IMS, Edgar Scott Bowes, MRCS, Brigadier Henry Edward Shortt, CIE, OBE, IMS, Colonel William Collis Spackman IMS, Colonel John Patrick Huban, OBE, IMS, and Lieut.-Colonel John Clark Pyper, OBE, IMS.

**Postgraduate Lectures at Edinburgh**

The following Honyman Gillespie lectures will be given during the spring at Edinburgh Royal Infirmary: Prof. Charles McNeil, the first month of life—scope and significance of its clinical problems (Jan. 28); Prof. J. R. Learmonth, reflex vasodilatation in surgery (Feb. 4); Dr. Harry Stalker, social psychiatry (Feb. 18); Dr. C. W. Clayton, modern trends in the prevention and treatment of tuberculosis (Feb. 25); Dr. Robert McWhirter, the value of postoperative radiotherapy in carcinoma of the breast (March 4); and Dr. A. F. Hewat, spontaneous pneumothorax (March 11). The lectures which are open to graduates and senior students will take place at 4.30 PM.

**Problem of Hospital Management at Swansea**

Last August the management of the Swansea General Hospital decided to alter its constitution so that representation of the medical staff on its board and committees would cease. The management also decided about that time to increase the visiting staff. The ostensible reason for removing the medical staff from committees was that a substantial sum of money out of payments from contributory schemes is given to the staff and that they, being in a sense paid employees, are not entitled to representation on the board and committees. The British Medical Association took up the case for the staff on the principle that they should be adequately represented on the governing bodies, and it appeared to be implied that additions to the staff would not be proceeded with until the governors of the hospital had restored the adequate representation of the medical staff which they promised. That promise has not been definitely implemented, but in the meantime certain new appointments have been made without consultation with the medical staff. The latter regard this as a breach of faith, and have informed the management that their services as visiting staff will cease as from Feb. 1, except in so far as emergencies and EMS cases require attention. The Welsh Board of Health has declined to interfere and there the situation rests for the moment.

**Rubber Hot-water Bottles**

These bottles may now only be obtained by hospitals, nursing-homes and residential institutes for the mentally deficient and the aged. Authorities needing rubber bottles should ask their usual supplier for form MS 126, which can be obtained from the director of medical supplies at the Ministry of Supply, MS, Portland House, Tothill Street, London, SW1. The completed form should be returned to the supplier for submission to the director.

FOR the relief of functional dysmenorrhœa Messrs. H. R. NAPP have introduced 'Dyspamol' tablets each containing ephedrine hydrochloride gr.  $\frac{1}{4}$  and extract of hyoscyamus gr.  $\frac{1}{4}$  as antispasmodics, with potassium bromide gr. 3 to offset the side-effects sometimes produced by ephedrine.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

**Births, Marriages and Deaths****BIRTHS**

BOSTON.—On Jan. 3, at Oxford, the wife of Dr. F. Kenneth Boston—a son.  
 CATTERALL.—On Jan. 8, at Leatherhead, the wife of Mr. R. C. F. Catterall, FRCS—a son.  
 HARRIS.—On Dec. 26, in London, the wife of the late Dr. J. R. G. Harris—a daughter.  
 NICHOLSON.—On Jan. 2, at Hitchin, the wife of Squadron-Leader B. Clive Nicholson, MD, RAFVR—a daughter.  
 O'CONNOR.—On Dec. 31, at Southborough, the wife of Mr. Donald O'Connor, FRCSI—a son.  
 ROBINSON.—On Jan. 6, the wife of Dr. H. D. Robinson—a son.  
 ROSS.—On Jan. 5, at Emsworth, the wife of Major K. M. Ross, RAMC, of Farnham—a daughter.  
 TEASDALE.—On Jan. 7, at Sheffield, the wife of Dr. J. C. Teasdale, of Retford—a son.  
 THOMPSON.—On Jan. 5, the wife of Dr. B. C. Thompson, of Marchwood Crescent, W.5—a daughter.  
 TIBBITS.—On Jan. 1, the wife of Dr. Stephen Tibbits, of Jury Street, Warwick—a daughter.  
 WHITTAKER.—On Jan. 3, the wife of Dr. Duncan Whittaker, of Bethlem Royal Hospital, Beckenham, Kent—a daughter.

**MARRIAGES**

CAMPBELL—ADDERLEY.—On Jan. 5, in London, Alexander Colin Patton Campbell, FRCP, squadron-leader, RAFVR, of Edinburgh, to Elisabeth Joan Adderley.  
 EVANS—JORDAN.—On Jan. 5, at Hereford, Robert Morris Evans, MRCP, to Mary Jordan, MB.  
 GILCHRIST—STOCKTON.—On Jan. 2, at Dulwich, Norman Stephen Gilchrist, OBE, MD, to Elizabeth Stockton.  
 JAGO—CARR.—On Dec. 29, at Paul, Maurice Edwin MacDowall Jago, MD, lieutenant RAMC, to Christina Margaret Carr.  
 WARD-MCQUAID—CONWAY.—On Jan. 1, at Formby, John Neil Ward-McQuaid, MB, lieutenant RAMC, to Betty Conway, subaltern ATS.

**DEATHS**

FLEW.—On Jan. 5, Robert Flew, MRCS, of Forest Hill, aged 29.  
 FRASER.—On Jan. 7, at Leedbridge Wells, Alexander Fraser, MB LOND, aged 68.  
 GARDINER.—On Jan. 5, at Leeds, Douglas Clark Gardiner, MD EDIN., of Ingram Avenue, London, N.W.11.  
 MANNING.—On Jan. 1, Thomas Davys Manning, MB, aged 74.  
 O'FLANAGAN.—On Jan. 2, at Booterstown, co. Dublin, Martin Joseph O'Flanagan, MB LOND., B SC MANC and LOND., of Alexandra Park, Manchester.

## TRAUMATIC HÆMOTHORAX

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WOUNDS and injuries of the thorax are varied and most of them are accompanied by hæmorrhage into the pleural space. In many cases, with considerable laceration of the chest wall and injuries to intrathoracic structures, the effusion of blood into the pleura may be no more than an incident in the more complicated injury; whereas in others the hæmorrhage may be the outstanding feature and the wounds both of chest wall and of intrathoracic structures relatively innocuous. Such injuries may be penetrating, perforating or due to crush injuries, which are relatively common as a result of the bombing of towns and the burial of victims beneath ruins.

This paper refers only to cases in which the hæmorrhage formed a predominant part; those in which septic complications may have resulted from a secondary spread into the pleura from infection of the chest wall have been excluded. In most cases with septic complications the infection was undoubtedly carried in by a perforating or retained missile; all cases in which the missile was retained and was of larger size than a pea or required removal itself have been omitted. The series thus comprises the group of chest casualties which on the whole offer the best chance of complete recovery and a return to active service or civil life.

All cases included in the series eventually reached a special EMS chest centre, but most were transferred there some days, and many of them some weeks, after injury; this accounts for the variation in the treatment during the early days after wounding or injury. A small number of casualties resulted from crush injury due to motor accidents but almost all were due to battle injury at the time of the Dunkirk evacuation and from the results of bombing in this country.

The causes of death in such a group are hæmorrhage and infection. Though there may have been some deaths from hæmorrhage, there are no records of such deaths in any chest centre; probably many resulted from severe crush injuries of the chest before admission to hospital. Thus the most important question in hospital is the prevention of sepsis with its morbidity and occasionally fatal issue. The 204 cases in the series can be classified as follows:—

	Penetrating or perforating	Non- Penetrating
Uninfected .. .. .	125	39
Infected .. .. .	35	5

Thus in penetrating or perforating wounds caused by small missiles the percentage of septic infection of the resulting hæmorrhage was 21.9%, whereas in non-penetrating injuries the incidence of septic infection was 11.3%.

## FACTORS RESPONSIBLE FOR INFECTION

Though the resistance of the pleura to infection is probably not so high as that of the peritoneum it can undoubtedly deal with minor degrees of infection without proceeding to the effusion of large quantities of fluid or to suppuration. In the penetration of the pleura by foreign bodies, the amount of infection carried in by the foreign body will vary according to: its size; its shape; and surrounding conditions.

The larger and more irregular foreign bodies cause much laceration of tissue and tend to carry in portions of clothing, which the smaller and smoother foreign bodies are less liable to do. Thus in the 1914-18 campaign, penetration of the pleura by bullets was shown to result in pleural sepsis in only a little more than a third of the number of cases in which shell fragments were responsible for the injury. The terrain over which fighting is taking place is also of considerable importance; thus in the South African campaign the incidence of pleural sepsis was negligible as compared with that in France in 1914-18; and in the Libyan Desert the incidence of pleural sepsis is infinitely smaller (Littlejohn<sup>1</sup> quotes 6% in 32 cases followed at the base) than in the cases with which this paper is concerned.

That infection can and does spread from the lung or blood-stream is obvious from the incidence of pleural sepsis in crush injuries, where it is as high as 11.3%. This is a factor which was not formerly considered of much moment.

**Aspiration.**—Retention of effused blood in the pleura has a definite bearing on the incidence of sepsis. This is not as widely realised as it should be, and if sepsis is to be prevented rather than treated when established, control of effusion assumes considerable importance.

The effusion consists of two parts: the actual blood effused from damaged vessels of the lung or chest wall; and fluid secreted by the pleura as a result of irritation caused by the effused blood. The fluid provides the best possible culture medium for the growth of organisms, and on this account alone should be removed as soon as this can be safely done. Some have feared that too early removal of the pleural blood will cause fresh bleeding because it allows the lung to expand too rapidly, but no incontrovertible evidence of this has yet been put forward. The more extensive hæmorrhages arise from damaged vessels—intercostal or mammary—in the chest wall; but bleeding may arise from damage to larger vessels in the hilum of the lung, though in such cases the probability of long survival is small. Two such cases have been reported by French authors both of which were treated by lobectomy.<sup>2</sup>

Where the lung itself has been damaged and is the chief source of the bleeding, a hæmatoma forms in the lung tissue itself and rapidly seals the bleeding vessel in which (unless they are branches of the bronchial arteries) the pressure is low. In such cases there appears to be no particular object in allowing blood to remain in the pleural cavity. If hæmorrhage is arising from the chest wall early evacuation of the hæmorrhage should not cause bleeding to recur, and in these cases retention of the blood in the pleura can serve no useful purpose. In fact there are many disadvantages in leaving blood in the pleura, not least the increased chance of infection.

Further analysis of infection in this group shows that: of 24 cases aspirated within 48 hours, 3 (12.5%) became infected; of 41 aspirated between 48 hours and 6 days, 9 (21.8%) became infected; and of 139 aspirated from 6 days onwards, 28 (20.1%) became infected. Most of the cases aspirated early probably included patients with large effusions giving rise to respiratory and cardiac embarrassment which, had they not been aspirated early, would probably have become infected.

A suggestion has been made in the past that aspiration increases the risk of infection, but this is no criticism of early aspiration but of neglect of aseptic precautions. In only one case did infection apparently result from aspiration.

**CASE 1.**—The hæmorrhage was aspirated on the 20th day when the patient was afebrile. She was admitted to a chest centre on the 24th day with a high temperature and a pure culture of *Bacillus pyocyaneus* was grown from the effusion.

Another patient provided an interesting observation on the apparent value of aspiration even if carried out after several days.

**CASE 2.**—The patient was admitted to a chest centre 8 days after injury, with a small bomb fragment in the lung; aspiration was carried out on 3 occasions until the pleura was apparently dry. A slight pyrexia persisted and eventually a small pocket of pus was discovered which had become shut off from the main hæmorrhage cavity and had therefore not been aspirated. There are reasonable grounds for the assumption that had aspiration been initiated in the first 2 days—i.e., before loculation had taken place—infection with its subsequent delayed resolution would have been avoided.

Aspiration on alternate days should be continued until the pleura is dry, that is until no further fluid is obtainable and radiological examination fails to disclose evidence of fluid either encapsulated or free. This will necessitate a variable number of aspirations, and it will be found that the amount withdrawn at each aspiration will likewise vary in quantity. Throughout the series it was found that the average number of aspirations performed per patient was between 3 and 4. The largest number of aspirations performed on a single patient was

1. Littlejohn, C. W. B. *Aust. N.Z. J. Surg.* 1942, 11, 3.2. Monod, O. W. F. *J. thorac. Surg.* 1941, 10, 474.

29 with a total quantity of fluid withdrawn of 11,767 c.cm. No infection resulted in this patient.

The appearance of the fluid changes from that of almost pure blood to a clear yellow serous fluid during the course of aspirations and early aspirations may show a hæmoglobin percentage as high as 70%. In view of this it is important to examine at regular intervals the patient's Hb. and red-cell count in order to initiate blood transfusion when these fall below a reasonable level. When large quantities of fluid have been withdrawn over a period the loss of plasma proteins may be sufficient to cause symptoms, such as œdema of the feet, and will necessitate the administration of intravenous plasma. Extensive clotting is rare in the pleura though it is common to see smaller clots in the costophrenic angle. No adequate explanation has yet been put forward to account for this. In the cases in which aspiration has been delayed, fibrin may clot in the pleura so that aspiration through a needle is impossible; open thoracotomy through a small intercostal incision may be required to evacuate the clot. There is some doubt as to whether this is caused by a mild degree of infection or not; but when definite infection is established the fibrin clot often forms a solid mass which has been likened to a piece of "pile-carpet" and which certainly requires removal. In some cases the fluid withdrawn clots rapidly, in others it does not.

To prevent expansion of the lung and yet permit aspiration of all fluid in the pleura, the introduction of air to replace a portion of the fluid withdrawn has been advocated. This measure has been carried out in a large proportion of the present series without complication. Several points should, I think, be borne in mind with regard to the value and dangers of replacement. In the first place it is rarely advisable to replace with air after the first or second aspiration since the introduction of air keeps open a large pleural pocket—a grave disadvantage if infection supervenes. Secondly, the advantage of preventing lung expansion diminishes with every hour after wounding because the vessels in the bleeding lung become sealed off. Thirdly, introduction of some air at the first aspiration will permit the evacuation of the whole of the effusion without discomfort to the patient. The advantage of air replacement up to 36 hours is the theoretical one of preventing recurrence of hæmorrhage from the lung and the practical one of diminishing discomfort. The disadvantage of air replacement at subsequent aspirations is the maintenance of a large pleural pocket. It should, therefore, be limited to the first or at most the first two aspirations.

**Hæmatoma of lung.**—Most cases due to missiles and crush injuries show hæmorrhage into the pulmonary tissue. After aspiration this will be easily demonstrable by X rays since it gives a shadow in the lung of varying size and shape fading off into the translucent surrounding area. In most cases absorption of the hæmatoma is rapid and continuous, but occasionally it becomes infected, the centre breaks down and the patient begins to cough pus. At this stage radiological examination will show a translucent central area with fluid level. Most of these clear up without operation, which should not in any case be undertaken until postural drainage has been given an adequate trial.

**Retention of small foreign bodies.**—In spite of the fact that we are here concerned only with small foreign bodies (none larger than a pea on radiological examination) it appeared advisable to consider whether the retention of such foreign body or bodies in the lung, the pleura, the mediastinum or the chest wall increased the liability to pleural infection.

	Cases	Hæmothorax became infected
Retained FB .. .. .	113	26 (23%)
Perforating wounds .. .	47	9 (19%)
Crush injuries .. .. .	44	5 (11%)

The small difference in the incidence of infection between those with small retained foreign bodies and those in whom the missile had passed through the chest is thus seen to be 4%, a difference insufficient to warrant or to justify the early operative removal of missiles of such small size.

**Value of sulphonamides.**—Large numbers of cases were primarily admitted to hospitals of many types and widely scattered through the country. In many cases, hospitals

were working under conditions of considerable stress, when notes were difficult to record or were incomplete. From the somewhat scanty material available on this point the following points emerge.

	Cases	Sulphonamides	No sulphonamides	No information
No infection .. .	122	50	72	42
Pleural infection .. .	40	26	5	9

Of the 26 infected cases, 9 were given sulphonamides early and 17 when infection was first suspected.

Little or no useful information is given by these figures, but it seems from the value of sulphonamides, particularly sulphathiazole, in the preoperative and postoperative treatment of patients liable to pleural suppuration (for example, cases of bronchiectasis in which lobectomy is done) that infection in many cases of traumatic hæmothorax might have been prevented by their early use.

**Infecting organisms.**—The fifth was the earliest day on which infection was established, as shown by the presence of organisms in the pleural exudate. In most cases it was established between the sixth and tenth days, but in many was considerably delayed. Thus in 3 cases infection was not apparent until 60–70 days after injury. The predominant organisms in the infected cases were as follows: *Staphylococcus aureus* and *albus*, 8 cases; streptococcus, 7; *Strep. hæmolyticus*, 6; *Bacillus coli*, 3; *Clostridium welchii*, 5; pneumococcus, 5; *B. Friedländer*, 1; unknown, 5. The type of organism did not appear to have any particular effect upon the prognosis provided the correct treatment was employed and the presence of anaerobic organisms did not appear to have any peculiar significance.

Where *Cl. welchii* was present in pure culture in the pleural exudate of a patient in whom aspiration had not been carried out until after the lapse of several days after injury the temperature and pulse were almost normal. Some days later the condition rapidly deteriorated and it was then found that the exudate contained pneumococci in addition to *Cl. welchii*. In some cases general symptoms of infection occur before organisms are found either by smear or culture of the aspirated fluid. In such cases infection is probably present in fibrin masses before it involves the fluid portion.

TREATMENT

The most common cause of invaliding after chest wounds in the 1914–18 war was chronic empyema. In most such cases, the condition resulted from what is now termed "total empyema"—that is, one in which the lung is collapsed against the mediastinum and the empyema cavity consists of almost the whole hemithorax. The chest wall rapidly contracts and becomes immobile, the parietal and visceral pleuræ become grossly thickened, the ribs become triangular in shape instead of showing the normal flattened surfaces, the intercostal spaces are narrowed, the diaphragm raised and immobile and spinal curvatures result. Once these structural changes have developed a full functional result is out of the question and the most that can be expected is the obliteration of the infected space by plastic procedures.

Owing to the difficulties of adequate treatment of the chronic case every effort should be made to treat the acute case early and on correct lines. Treatment of acute empyema consists of much more than resection of a portion of rib and the insertion of a tube. Despite all advances in thoracic surgery and the certainty that many lives will be saved by the larger operations, pleural infection will remain the most potent cause of morbidity and mortality in chest injuries after survival for 48 hours from the time of wounding.

Sulphonamides, preferably sulphathiazole, should be administered as soon as possible after wounding; the hæmothorax should be aspirated and replaced by a much smaller quantity of air at the end of 24 hours, if possible, but certainly before 48 hours; simple aspiration without air replacement should be continued at regular intervals until the pleura remains dry; should the Hb. and blood-count show a substantial fall (i.e., to Hb. 75% and 4,600,000 red cells) blood-transfusion should be undertaken. Should infection supervene during the period of aspirations it can be immediately recognised and the dose of sulphonamides should then be increased. The infecting organism can be identified and the subse-

quent course of treatment determined. In all cases, in the absence of anaerobes, aspiration should be continued at the necessary intervals until the formation of definite pus. A simple procedure is to fill a test-tube at each aspiration with the pleural exudate and let it stand for 24 hours; when the deposit amounts to  $\frac{1}{2}$  of the contents of the tube, drainage should be established by rib resection at or near the angle of the ninth rib, unless the empyema is encapsulated elsewhere. Anaerobes have no such grave significance in the exudate as they have elsewhere in the body; but if they are found, repeated aspiration may result in escape of infected fluid along the needle track into the tissues of the chest wall, causing a virulent cellulitis there. This may be prevented by making a 3 in. vertical incision in the chest wall over the area of aspiration, deepening the incision to the ribs and intercostal muscles and packing firmly with gauze soaked in flavine emulsion. A barrier of granulation tissue is formed as a result, and subsequent aspiration is carried out through the shut-off area, which is repacked at its conclusion. Drainage by rib resection is carried out when definite pus forms as mentioned above. The disadvantage of drainage by an intercostal tube in the early stages is that the track becomes infected so that there is a tendency for air to leak into the pleura, and if the lung is still unattached to the chest wall it is liable to collapse against the mediastinum, with the result that total empyema develops. Lung expansion can be controlled to some degree by connecting the intercostal tube to a negative-pressure apparatus and maintaining continuous suction, but on the whole it is doubtful whether intercostal drainage should replace repeated aspiration except in rare instances.

**Drainage by rib resection.**—There is still some debate about the relative value of attempting airtight drainage after rib resection or whether healing by open drainage at this stage is equally efficient. If the former method is used, negative pressure should be deferred for several days after drainage, owing to the tendency to uneven expansion of the lung with subsequent pocketing. At operation, all infected clots or fibrin should be removed by forceps.

Irrigation of the empyema cavity is advisable and entirely safe if proper precautions are taken. The presence or absence of a bronchopleural fistula should be determined by introducing a small quantity of eusol or Carrel-Dakin fluid carefully into the pleural cavity and allowing it to flow over the visceral surface of the pleura by posture; the patient is asked to cough, and if he detects the taste of the solution the existence of fistula is established. In the presence of a fistula irrigation should either be discontinued or used with the greatest caution to prevent the fluid entering the lung. The other danger of irrigation arises in the later stages when the cavity walls are thick and resistant to expansion. At this time the utmost care must be taken that the fluid returns freely, in order to avoid air embolism which has been responsible for a number of sudden deaths, temporary hemiplegias or so-called vagal attacks.

**Respiratory exercises** should be begun within 48 hours of drainage if the general condition of the patient permits. Masseuses specially trained in the modern respiratory exercises are now employed at all chest centres throughout the country, and this work is of special importance in the rapid rehabilitation of patients and their return to the Service or to civil life. Lastly, and perhaps most important of all for the patient's future, no empyema can be considered as healed until the cavity is obliterated by complete approximation of the pleural layers; and drainage must be continued until this object is attained. Removal of the tube too early is responsible for most of the persistent sinuses and recurrent empyemas so commonly encountered. The size of the pleural cavity is estimated by the introduction of opaque oil or barium emulsion followed by radiological examination in antero-posterior and lateral positions; this should be done at regular intervals until it shows obliteration to be complete.

#### MORTALITY AND MORBIDITY

The *Medical History of the War, 1914-18*, stated: "The mortality of empyema was always high—on the average nearly 50% despite drainage—though with skilled care it could be reduced to 20%." We know today

3. Official Medical History of the War. Surgery, vol. II, p. 383.

that such mortality was unnecessary and was to a considerable extent caused by open drainage at too early a period. It was not until the influenza epidemic at the end of the war, when the mortality from pleural infection reached even higher percentages, that changes in treatment—from early drainage to repeated aspiration followed by late drainage—caused a rapid fall in mortality.

In the whole series recorded here, 3 patients died, but in only 1 was the cause of death attributable to pleural infection. In this case the chest was opened in the presence of an anaerobic infection. In the second case, death resulted from a crushed chest in which the hæmothorax aspirated was small and did not become infected; and in the third, death resulted from secondary hæmorrhage from a wound of the buttock. Thus of a total of 202 patients with hæmothorax in 40 of whom the effusion became infected there was 1 death, a mortality of 0.5% in the whole series, and of 2.5% in the group of those with infection.

The chest casualties in this series are such as offer the most favourable chance of a return of full physical capacity either in the Army or civil life. The review of their final condition is, therefore, of some importance; but only the chest condition is here taken into consideration, and associated injuries—e.g., fractures of long bones—when present, are ignored in this assessment.

	Penetrating or perforating		Non-penetrating	
	Uninfected	Infected	Uninfected	Infected
No disability	109 (18)	15 (2)	25 (2)	—
Slight disability	12	15	14 (1)	3 (1)
Severe disability	2	1	—	—
Chronic empyema	—	3	—	2
Died	—	1	—	—

The figures in parentheses are the numbers of cases aspirated within 48 hours, and show that there was no residual disability in 91%. As far as their chest condition was concerned, 149 patients were fit to return to full activity in either service or civilian life. Those with slight disability included patients with slight pleural thickening and a minimum of chest rigidity or residual pain sufficient to require de-grading if in the Services. Severe disability is indicated by considerable contraction of the chest, usually with mediastinal displacement, and considerable pleural thickening with associated symptoms such as dyspnoea. In Service cases it implies discharge from the Service and in civilian life inability to carry on any active occupation. It will be noted that it occurs apart from the incidence of pleural sepsis, an experience confirmed in cases of non-aspirated uninfected hæmothorax cases from the last war as well as those in the early stages of this war. Organisation of the fibrin deposited on the walls of the encysted hæmothorax which has not been aspirated may be followed by calcification and the formation of the so-called "cholesterin cyst"; if this eventually becomes infected from the blood-stream it is most difficult to cure. Cases recorded as chronic empyema are those in which at the time of reporting the pleural pocket or residual track had not healed.

#### SUMMARY

Results in 204 cases of chest wounds or crush injuries are recorded with particular regard to infection in the associated hæmothorax.

Early administration of sulphonamides and early and repeated pleural aspiration are important in preventing pleural infection. Open drainage in the early stages of pleural infection should be avoided.

Modern respiratory exercises are essential to restore full pulmonary function at as early a stage as possible.

The value of chest centres, where trained surgical, nursing and ancillary services are available, appears to be well warranted by the results obtained in the series recorded.

I wish to thank colleagues in all chest centres throughout the country for supplying me with the details essential to this paper.

METALS IN A TABLE JELLY.—The sample submitted to the public analyst (*Lancet*, Dec. 12, p. 714) was found to contain 2.2 (not 0.2) parts per million of arsenic.

## LOCAL CHEMOTHERAPY IN EXPERIMENTAL LESIONS OF THE EYE PRODUCED BY STAPH. AUREUS

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The introduction of modern antibacterial agents has made it possible to control infections produced by a variety of organisms, but staphylococci have proved relatively unsusceptible to the action of these drugs. Moreover, experimental work has been hampered by the fact that the production of standard staphylococcal lesions suitable for testing the effect of various treatments has presented considerable difficulty. Infective lesions of the eye show certain features which make them very suitable for the investigation of various forms of treatment. The development of the lesion can be readily followed and accurately assessed. Furthermore, if local treatment is applied to one eye, the other receiving a similar initial lesion can be used as a control; this to a great extent eliminates the difficulties produced by individual variations.

This technique was successfully used in the investigation of the local action of a sulphonamide in the treatment of *Bacillus pyocyaneus* lesions of the cornea (Robson and Scott 1942). It seemed that a similar method might be of value in the investigation of staphylococcal lesions of the cornea. It was found, however, that the infection of a corneal abrasion with *Staphylococcus aureus*—i.e., the method used in the above work with *B. pyocyaneus*—was unsatisfactory, since the abrasion healed without development of ulceration. Brown and Pugh (1936) had succeeded in producing a fairly satisfactory ulcer of the cornea in rabbits by injecting into the cornea a strain of *Staph. aureus* found after many trials, and in the present investigation a method was developed for the production of standard corneal lesions with *Staph. aureus*. The effect of a number of chemotherapeutic substances on the development of these lesions was then determined.

### METHODS

All experiments were performed on mature rabbits of both sexes and of various breeds. In preliminary experiments a search was made for a suitable strain of the *Staph. aureus*. Eight coagulase-positive strains of the organism, obtained from human lesions of various types, were used to produce lesions in the eyes of rabbits. Of these one strain was found to be highly virulent and consistently produced severe lesions. This strain was therefore used in all the subsequent experiments. When an undiluted 24-hour culture of this strain was injected into the cornea it produced a very acute lesion which was rapidly destructive to the eye, and which was thus unsuitable for determining the effect of treatment; it was ultimately found that a suitable lesion could be produced by the injection of a dilution containing 1500 organisms per c.cm. The technique therefore adopted was as follows.

Immediately before the experiment a 24-hour culture of the organism was diluted with saline to contain the required number of organisms. The rabbits were deeply anaesthetised with ether, and the injection was performed with a no. 20 hypodermic needle. The standard needle, which has a fairly long bevelled end, was unsuitable, since a considerable portion of the needle had to be inserted under the anterior epithelium of the cornea before the whole of the bevelled opening was in the cornea. This meant that "button-holing" of the epithelium was liable to occur with a consequent leakage of the injection material. Needles were therefore specially bevelled so that the opening was confined to about the last millimetre (or less) of the needle.

The culture was injected to form a small bleb under the corneal epithelium, the eye being held in position by fixative forceps applied outside the limbus. Before injection care was taken to make sure that no air was present in the needle. A sterile technique was observed. Great care was taken to ensure that the lesions were as equal as possible in both eyes, and when any difference was thought to exist the eye with the smaller lesion was used as the control.

The lesions produced were amazingly equal in severity in both eyes of any one animal. Thus in one experiment treatment was not started until 24 hours after production of the lesions. At this stage definite ulceration was already commencing; and it was found that there was considerable variation from animal to animal, the lesions ranging from an infected area (with desquamation of epithelium) 2 mm. in diameter to a lesion involving about a third of the cornea. On the other hand, the lesions were remarkably similar in the two eyes of any one animal; in 3 animals the lesions were identical, in 7 the difference was extremely slight, and in only 2 animals (which showed large lesions) was there a really appreciable difference: in both these cases the difference was, however, less than 1 mm. in the diameter of the lesions. In 6 of these animals, which were treated with a sulphonamide 24 hours after the initial lesion, and in which treatment was therefore not effective, the ultimate lesions which developed in both eyes of any one animal were identical.

In all experiments but one the first treatment was applied an hour after the production of the lesion, and was continued at hourly intervals for at least the first 48 hours. Frequent treatment was thought advisable in order to maintain an adequate concentration of the chemotherapeutic substance in the tissues of the eye and particularly in the cornea (see Robson and Tebrich 1942). Thereafter, treatment was given hourly during the day until the lesions were either healed or quiescent. Whenever treatment was applied to an eye a similar quantity of normal saline was applied to the other eye—i.e., the control.

The chemotherapeutic agents used were:

(1) *Penicillin*.—In the great majority of the experiments a crude preparation made by Mrs. MacNaughton of the Department of Bacteriology was used. It was prepared by extracting fluid cultures of penicillium with amyl acetate and re-extracting into water. When tested against *Staph. aureus* by the method of Florey et al. (1941) it produced an area of bacteriostasis about 21–23 mm. in diameter. In one experiment a preparation supplied by Dr. Trevan of the Wellcome Research Institute was used in a 1 in 5 dilution. The diluted solution produced an area of bacteriostasis of 26 mm.

(2) *Sodium sulphacetamide* was supplied as a 30% solution and was diluted with saline when lower concentrations were used.

(3) *Solubilised sulphathiazole* was supplied as a 15% solution of sulphathiazole sodium formaldehyde sulphoxylate in sealed ampoules.

(4) *Tyrothricin* was supplied as a powder which was suspended in saline (1 mg. per c.cm.). This suspension was vigorously shaken before every treatment.

With the exception of the solubilised sulphathiazole, all the chemotherapeutic preparations used were stored in the refrigerator.

In one experiment cultures were taken from the conjunctival sac in order to determine whether treatment had any effect on the growth of organisms. Material for cultures was taken from the lower fornix of each eye by means of a metal loop and transferred to blood-agar plates which were then incubated. All the plates were read by Dr. Oag, of the Department of Bacteriology. The eyes were examined daily during the first few days, and thereafter at longer intervals. Detailed records were kept of the condition of the eyes, as described in a previous report (Robson and Scott 1942). The eyes were usually photographed at 48 hours and at intervals throughout the progress of the lesion.

### DEVELOPMENT OF CONTROL LESIONS

In the control eyes—those treated with saline only—there was at the end of 24 hours moderately severe congestion and quite evident oedema of the conjunctiva with slight mucopurulent discharge. Iritis was moderately severe and was associated with well-marked ciliary injection. The cornea showed moderately severe oedema and stained with fluorescein over an area slightly larger than the original "bleb." There was commencing subepithelial infiltration around the margin of the stained area.

At 48 hours after production of the lesion the discharge was more copious and the congestion and oedema of the conjunctiva were considerably more marked. Iritis was more severe than at 24 hours and was usually

associated with plastic exudation. The cornea now showed a well-developed central ulcer at the site of the original lesion and in some 90% of cases a fairly large hypopyon was present.

The subsequent course of the lesion varied a good deal in the various animals, as can be seen in the tables of results. For purposes of description the lesions ultimately developing have been divided into four groups—slight, moderate, severe and very severe. The "slight" lesions left small and localised scars which would not seriously have interfered with vision, whereas the "moderate" and of course the more severe lesions produced more extensive and dense scarring which would have seriously interfered with the function of the eye. In the tables the main subdivision has therefore been drawn between slight and moderate.

The progress of the lesions in these various grades of severity may be summarised as follows:

(1) *Slight*.—In these lesions no spread of the ulceration occurs. The hypopyon rapidly disappears and at the end of a week the eye is practically normal apart from the ulcer which although epithelialised is as yet incompletely healed. The scar which ultimately forms is thin, without vascularisation, and is always smaller than the initial "bleb."

(2) *Moderate*.—In these there is some spread of ulceration both in surface area and into the depth of the cornea. The

TABLE I—EFFECTS OF TREATMENT, STARTED 1 HOUR AFTER INOCULATION, ON EXPERIMENTAL STAPHYLOCOCCAL LESIONS

Treatment	No. of animals	Lesions produced				
		None or trace	Slight	Moderate	Severe	Very severe
Control ..	17	0	1	9	5	2
Penicillin ..		4	10	2	1	0
Control ..	27	0	6	9	5	7
10% or 30% sod. sulphacetamide ..		3	17	5	1	1
Control ..	9	0	3	3	2	1
Solubilised sulphathiazole		1	4	3	1	0

hypopyon persists for a week or more. The scar ultimately left is dense and around 4 × 5 mm. in area, and there is in most cases some degree of vascularisation of the cornea. As in the slight lesion, the lids and conjunctiva ultimately return to normal.

(3) *Severe*.—These lesions show very deep or extensive ulceration of the cornea, with longer persistence of severe hypopyon. The end-result in such cases involves extensive scarring of the cornea with luxuriant vascularisation. In addition, there is often some ectropion of the lower lid.

(4) *Very severe*.—In such cases the lesion is grossly destructive and causes extensive necrosis of the cornea with or without perforation. Ectropion is also noted fairly frequently in lesions of this severity.

EFFECTS OF TREATMENT

The results of various treatments started an hour after production of the lesion are summarised in table I. Penicillin produced a markedly beneficial effect on the development of the lesion; thus, while only 1 out of 17 of the control eyes developed a lesion which was less than moderately severe, 14 out of the 17 treated eyes showed only slight residual scarring. A typical difference between two eyes of one animal at the third day is illustrated in fig. 1.

Sodium sulphacetamide also produced quite definite benefit, though less than that obtained with penicillin. The results shown in the table are for 16 animals in which one eye was treated with 30% sodium sulphacetamide and 11 animals treated with 10% of this sulphonamide. The results with these two concentrations were put together, since the 10% solution was as effective as the 30% solution. In a few animals one eye was treated

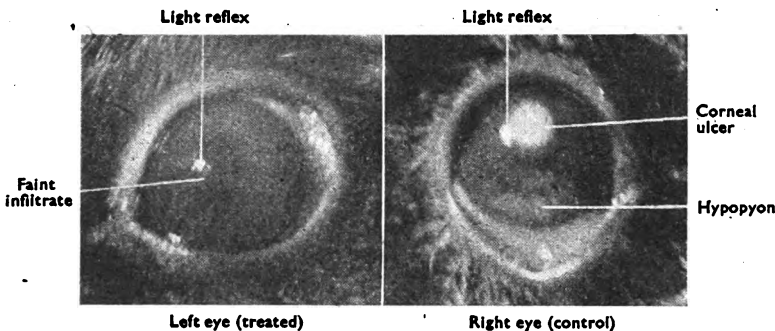


Fig. 1—Condition of eyes of rabbit (495) on third day after inoculation. Left eye, treated with penicillin. Right eye, control. The faint infiltrate in the left eye ultimately healed, leaving a faint superficial scar.

with a 2.5% solution of sodium sulphacetamide, but little or no beneficial effect was produced. It therefore seems that a higher concentration than 2.5% is required in the treatment of such acute infective lesions of the cornea. Treatment with solubilised sulphathiazole gave disappointing results.

Since tyrothricin can, in contrast to penicillin, be produced easily and in large quantities, its effect was tried in a small series of animals, but this preparation produced only slight benefit. This was not unexpected since tyrothricin is not highly effective against staphylococci in vitro (Heilman and Herrell 1942).

Experiments were also performed to determine whether the treatment with penicillin and with 10% sodium sulphacetamide would be effective when the first application was made 24 hours after production of the lesion. The results are given in table II. It is obvious that the sulphonamide did not produce any benefit when applied at that stage, while penicillin produced an effect in only 1 out of 6 animals, even though the preparation of penicillin used (supplied by Dr. Trevan) was more potent than that used in the previous experiments.

CULTURES

In one experiment on 12 rabbits, cultures were taken daily from the conjunctival sac. In 6 of these animals (648-653) one eye was treated with 10% sodium sulphacetamide, while the other eye was treated with saline; in the other 6 animals (654-659) the treated eye received penicillin and the control eye saline.

The first treatment was given an hour after production of the lesion and then continued, at hourly intervals, for 58 hours; thereafter, treatment was given hourly between 9 AM and 5 PM. Hence on the first two days the cultures were taken within an hour of the last treatment. The culture on the third day was taken at 9 AM—i.e., some 16 hours after the last treatment on the previous day. Treatment was stopped at 1 PM on the fourth day and the subsequent cultures were therefore taken at increasing intervals after the last treatment. The results of the treatment are shown in fig. 2. Only

TABLE II—EFFECTS OF TREATMENT, STARTED 24 HOURS AFTER INOCULATION, ON EXPERIMENTAL STAPHYLOCOCCAL LESIONS

Control ..	6	0	0	0	1	5
10% sod. sulphacetamide		0	0	0	1	5
Control ..	6	0	0	0	2	4
Penicillin ..		0	1	0	1	4

the presence of *Staph. aureus* in the cultures has been recorded. These organisms were on several occasions tested for pathogenicity, and were always found to be coagulase positive. Non-pathogenic organisms (*Staph. albus* and diphtheroids), which were also occasionally present in small numbers, have not been included. Fig. 2 also shows the development of the corneal lesions and the amount of conjunctival discharge. Each curve represents the average for 6 eyes.

It is evident that the application of penicillin rendered the conjunctival sac completely sterile (in so far as *Staph. aureus* is concerned) during the period of treatment

and for several days after its cessation. This was accompanied by a striking decrease in the amount of the conjunctival discharge, and by a very beneficial effect on the course of the corneal lesion.

On the other hand, the application of 10% sodium sulphacetamide (under exactly similar conditions) did not produce any very appreciable effect on the number of staphylococci recovered from the conjunctival sac. There was some reduction in the conjunctival discharge. The really surprising feature of the results, however, is that, although the effect on the cultures was negligible, the beneficial effect on the progress of the corneal lesion was almost as good as in eyes treated with penicillin. These results emphasise the fact that it is possible for a treatment to be producing a beneficial effect on an infective lesion of the cornea even though the drug has no appreciable effect on the conjunctival flora.

DISCUSSION

The first point arising from these experiments is that a technique is available for the production of standard lesions with *Staph. aureus*. Such lesions should be eminently suitable for estimating experimentally the efficacy of chemotherapeutic substances in the prevention and treatment of staphylococcal infections. The fact that, with due care, remarkably equal lesions can be produced in the two eyes of any one animal makes the method of particular value in testing substances applied locally, since individual variation is to a large extent eliminated. Nevertheless, the method could also be used in determining the value of oral or parenteral

methods of treatment; under such conditions, of course, larger groups of animals would usually be required to eliminate the effects of individual variation.

The experiments have definitely shown that the local application of a solution of penicillin, and of sodium sulphacetamide, to such experimental lesions within a short time of infection will produce a beneficial effect on the course of the lesion. That penicillin should have such an action is not surprising, since we know that it is highly active against the causative organism, *Staph. aureus*, and that its action is not interfered with by the presence of organic matter. The solution of penicillin used was very dilute, and an even greater effect might possibly have been obtained with a more concentrated solution. In this connexion, Florey and his co-workers have reported favourably on the local use of penicillin in a small series of cases of infection involving the human eye (see Abraham et al., Florey et al. 1942). Our own experimental results certainly suggest that the use of local applications of penicillin is worthy of extensive and thorough clinical trials.

In contrast to penicillin, sulphonamides have, on the whole, proved relatively ineffective against staphylococcal infections, although favourable results have been reported with a few of these compounds—e.g., sulphathiazole. The results obtained with sodium sulphacetamide were therefore rather unexpected. These satisfactory results were probably obtained because high concentrations of this sulphonamide can be used, since it is highly soluble.

The results obtained when treatment was delayed until 24 hours after inoculation are in well-marked contrast to those obtained with early treatment. This applies both to penicillin and to sodium sulphacetamide. The ineffectiveness of the sulphonamide therapy when applied at this stage caused us no surprise, since it is well known that this group of substances is of much greater value in the prophylaxis than in the treatment of infection. Moreover, the present results with sodium sulphacetamide agree with those previously reported in the treatment of experimental *B. pyocyaneus* corneal infections. In the latter experiments a delay of 12 hours after inoculation much reduced the effectiveness of the sulphonamide therapy (Robson and Scott 1942).

The ineffectiveness of penicillin at 24 hours, however, is not in agreement with the fact that this substance produces its action even in the presence of pus. But the lesions were relatively acute in their development, and penicillin might be effective, even at 24 hours, in controlling a more slowly developing lesion. It is also possible that highly concentrated solutions of penicillin might be effective in acute lesions even when their application was delayed.

The relative ineffectiveness of the solubilised sulphathiazole was disappointing. It is possible that the drug did not penetrate into the cornea sufficiently rapidly to produce an effective concentration at the site of the lesion. We have no data as to the rate of diffusion of this preparation of sulphathiazole, but Chinn and Bellows (1942) have shown that sulphathiazole itself, applied as a powder, penetrates only very slowly into the cornea. A second possibility is that the solubilised compound is itself inactive and that it does not, in the cornea, dissociate sufficiently rapidly to produce an adequate concentration of sulphathiazole. Lastly, sulphathiazole may, of course, not possess sufficient chemotherapeutic activity to control effectively these rapidly developing experimental lesions. It is worthy of note that in preliminary experiments we failed to influence the development of the lesions appreciably by the early and repeated application of sulphathiazole powder to the conjunctival sac.

A striking feature of the results is the complete elimination of *Staph. aureus* from the flora of the conjunctival sac after the application of penicillin; this effect was in good agreement with the actions of the drug both on the formation of pus and on the development of the corneal lesion. Less easy to explain, however, is the almost complete failure of sodium sulphacetamide to influence the growth of *Staph. aureus* in the conjunctival sac, even though there was a well-marked effect on the corneal lesion and the amount of conjunctival discharge. An examination of the conjunctival flora in infective lesions of the cornea which are being subjected to treat-

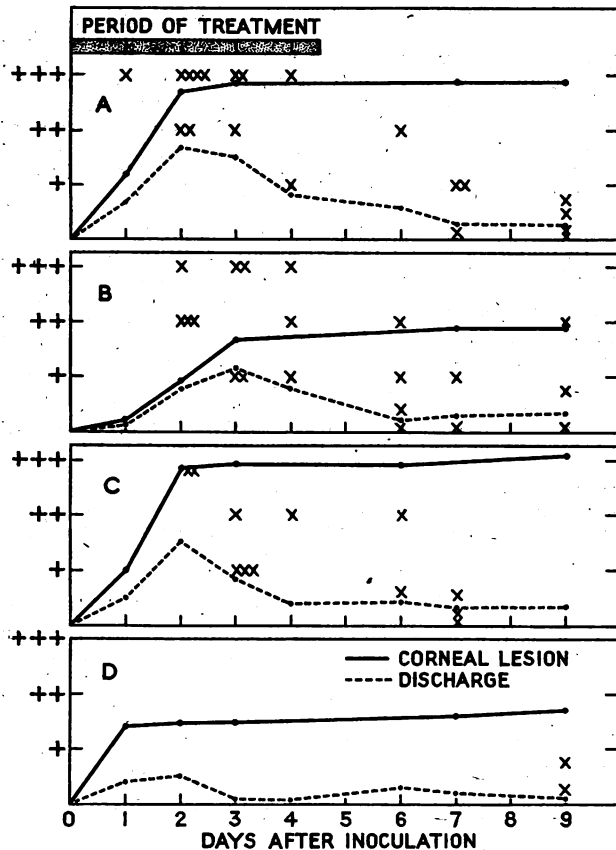


Fig. 2—Effect of treatment with sodium sulphacetamide or penicillin on the conjunctival flora, conjunctival discharge and development of corneal lesions in eyes inoculated with *Staph. aureus*. Average results for (A) 6 control eyes (right eyes of rabbits 648-653), (B) 6 eyes treated with sodium sulphacetamide (left eyes of rabbits 648-653), (C) 6 control eyes (right eyes of rabbits 654-659), and (D) 6 eyes treated with penicillin (left eyes of rabbits 654-659). See text for further description of figures.

Each X represents the finding of *Staph. aureus* in a culture, according to the following arbitrary scale. +++ = confluent growth; ++ = almost confluent growth; + = discrete colonies (about 20-50 in area of inoculation). An X below the + level indicates that less than 20 colonies were present, the actual number being proportional to the distance of X above the abscissa.

The severity of both corneal lesions and discharge is also expressed in an arbitrary manner, +, ++ and +++ representing slight, moderate and severe lesions or exudate.



ment is obviously not necessarily a reliable guide to the value of the treatment.

The results obtained with the different concentrations of sodium sulphacetamide are important in connexion with the clinical use of the drug. It seems that chemotherapeutically active concentrations effective against this type of infection are produced in the cornea only when the solution of sodium sulphacetamide applied as drops contains some 10% or more of the drug. Not only is it important to apply a sufficiently concentrated solution, but it is essential to maintain an adequate level at the site of the lesion for a reasonable period. For this reason we applied the treatment hourly for the first 48 hours, and we obtained evidence that less thorough treatment was definitely less effective.

Regarding the possible clinical uses of these drugs, the most important point which arises from the results obtained with sodium sulphacetamide is that its essential value is in the prevention, rather than in the treatment, of acute infections. One of its most important applications is likely to be in the first-aid treatment of industrial injuries of the cornea, where abrasions, in the absence of effective prophylaxis, are liable to develop into septic and destructive lesions. An investigation into such a use of the drug has been in progress for nearly a year, under the auspices of the W. H. Ross Foundation, in some 30 of the larger coalmines in Scotland.

The results also suggest that the early application of a suitable sulphonamide is likely to be of value in the prophylaxis of infected wounds, burns and other injuries. The investigation has emphasised, moreover, that not only must treatment be begun as early as possible but that the frequency and concentration of the applications must be adjusted so as to maintain high local concentrations over long periods. In acute infections it seems desirable to maintain these concentrations for at least the first 48 hours. In the case of infections of the cornea this means that frequent applications must be made day and night in the early stages of the treatment. In the case of wounds the same result would probably be produced by applying the sulphonamide in the form of a powder or a suitable paste. In low-grade or chronic infections less thorough treatment would possibly suffice, and the sulphonamide might well be applied as an ointment or paste. There is in fact evidence that a glycerin sulphonamide paste (as described by Robson and Wallace 1941) is of definite value in the treatment of ulcerative blepharitis.

The experiments emphasise that with penicillin also repeated applications are necessary, and that it is more effective in the prevention than in the treatment of infection. For the present the question of supply will limit its therapeutic use.

#### SUMMARY

A method is described which allows of the production of *Staph. aureus* lesions of the cornea in rabbits. Ulceration of the cornea, usually with hypopyon, results. Equal lesions can be produced in both eyes of any one animal. A technique is thus available for testing the value of chemotherapeutic drugs in the treatment of localised lesions. When the drug is applied locally one eye (in each animal) is used as control, thus largely eliminating the difficulties due to individual variation.

Definite beneficial effects on the development of the lesions were produced by the local application of (a) penicillin and (b) 30% and 10% solutions of sodium sulphacetamide. A 15% solution of solubilised sulphathiazole (sulphathiazole sodium formaldehyde sulphoxylate) was less effective; tyrotricin and 2.5% sodium sulphacetamide were of little or no value. In all these experiments treatment was begun an hour after inoculation.

When the treatment was begun 24 hours after inoculation little or no benefit was produced by the application of penicillin or 10% sodium sulphacetamide.

The application of penicillin eliminated the *Staph. aureus* from the flora of the conjunctival sac, but this was not achieved when 10% sodium sulphacetamide was used.

The importance of early and adequate treatment (especially during the first 48 hours) in the clinical use of these drugs is emphasised.

We are grateful to Dr. Oag and Dr. Ludlam of the Department of Bacteriology, University of Edinburgh, for their help

in this work; to Mrs. MacNaughtan for the preparation and supply of most of the penicillin used; to the W. H. Ross Foundation (Scotland) for the Prevention of Blindness, who have defrayed the expenses of this investigation; to Sir Henry Dale, who gave us some of his supply of tyrothricin; to Dr. Trevan and Dr. Prescott of the Wellcome Research Foundation, who supplied us with penicillin and with the solubilised sulphathiazole; and to Mr. Edwards, of British Schering Ltd., who supplied us with sodium sulphacetamide ('Albucid Soluble').

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## TROPICAL EOSINOPHILIA

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SINCE 1934, a complex of symptoms has frequently been seen which constitutes a new disease entity, apparently peculiar to certain parts of India.

#### SYMPTOMS AND PHYSICAL SIGNS

The disease begins with lassitude, fever rising as a rule to 100° F. or 101° F. in the evening, loss of appetite, and usually appreciable loss of weight within a short time. After about a week of these symptoms, a dry, hacking, ineffective cough develops with exacerbation at night. The patient's sleep is interrupted by paroxysms of coughing, and these are often accompanied by wheezing sounds audible at a distance. Gradually he develops expiratory dyspnoea which even persists during the intervals between attacks of coughing, and this stage lasts many weeks. In some cases, however, severe attacks of typical bronchial asthma occur regularly every night, usually between 1 and 5 AM; but the restlessness, sense of suffocation and anxiety are not so alarming as in genuine asthma. In the day-time the patient is comparatively free from coughing and breathlessness. After some weeks the temperature becomes subfebrile, and there is no further loss of weight. General weakness decreases to some extent, but more or less violent paroxysms of coughing, and in many cases asthmatic attacks, persist at night and if no treatment is given become chronic.

Physical signs, during the more typical attacks, resemble those of bronchial asthma; in milder cases there is only slight hyper-resonance of the chest, with prolonged expiration over both lungs; sibilant and sonorous rhonchi are invariably present with occasional non-resonant râles over the bases. If there is any expectoration, the sputum is scanty, tenacious and glassy. On microscopic examination, Charcot-Leyden crystals or Curschmann spirals are rarely seen but clumps of eosinophils are often found.\* The sputum is mucopurulent and contains the common bacteria only in those cases with bronchitis and moist râles.

During the febrile period the spleen is moderately enlarged extending 3-5 cm. below the costal margin; it is hard, smooth and not tender. The most striking feature is massive eosinophilia, responsible for considerable leucocytosis; the percentage of eosinophils (in one case as much as 88%) is higher than that of any other disease except eosinophil leukaemia. Absolute numbers of neutrophil granulocytes and lymphocytes remain unchanged. All eosinophils are of normal size and shape, fully mature, and judged by the differentiation of their nuclei, are rather on the "right side" of Arneith's classification. The red cells are normal in number, shape or size; occasionally, mild secondary anaemia is present. The sedimentation-rate is moderately accelerated; chemical constituents of the blood are normal. The urine and faeces show nothing unusual.

The X-ray picture of the lungs during the febrile period shows a distinctive disseminate mottling of both lungs, the average single focus being about the size of

a split pea with moderate intensity of its central shadow and ill-defined, blurred outlines. The diameters of these foci vary between 0.2 and 0.5 cm.; they are more numerous and usually slightly larger in and near the hilar regions, and commoner in the bases than in the apices; the foci are not confluent. Both lungs are equally affected and the similar distribution of the mottling is striking, as is the arrangement of the foci, which seem to follow the branches of the bronchial tree; they obviously represent bronchopneumonic infiltration of smaller and larger groups of alveoli. It is difficult to say whether the lesions begin as an inflammation of the bronchioles with swelling of their epithelial membranes leading to occlusion of the lumen, collapse of the depending alveoli and subsequent exudation, or as a primary alveolar infiltration which spreads through the peribronchial lymphatics; the anatomical distribution suggests the latter. Very few cases came under observation during the acute stage, but in those which did the infiltrations appeared at the end of the second week of the disease, when fever and hacking cough were well marked, and lassitude and loss of appetite at their most pronounced stage; the mottling rarely lasts more than 4 weeks. Radiography in patients in whom symptoms become chronic shows only prominent bronchial markings identical with those found in chronic catarrhal bronchitis.

ETIOLOGY

In every case careful search with dark-ground illumination was made for filaria in the blood (day and night specimens), urine, faeces and sputum. No relation of the disease to age, or mode of life could be established. The youngest patient was 7 years and the oldest 52; but out of the total series of 81, 61 were between the ages of 25 and 45. There were 72 males and 9 females. This does not necessarily signify a greater incidence among men, since in India men often leave their families up-country while carrying on business in the big cities; the

greater seclusion of women may also contribute to the predominance of men in this series. The proportion of male to female cases in private practice in Bombay was much the same as noted in this series. Strict vegetarians and meat-eaters, smokers and non-smokers, teetotalers and those who take alcohol are apparently equally vulnerable. All races are affected, including Europeans, among whom 4 cases have been observed. No familial or constitutional susceptibility exists; not more than one case has ever been observed in one family, however large. All classes of society are equally affected. No particular seasonal incidence could be established. In the table I have not quoted detailed histories because, apart from small individual variations, all cases conformed to the description already given. Data for the remaining cases, omitted for reasons of space, are similar.

DISCUSSION

At first an allergic state was thought the most likely explanation; but as more cases were examined this interpretation could not be accepted. The long and characteristic course of the disease, sometimes extending over many years, the X-ray findings in the lungs, the enlargement of the spleen, the complete absence in all cases of any skin or gastro-intestinal symptoms or signs, and the response to treatment, were not compatible with this hypothesis; also the constant and high leucocytosis with its remarkable eosinophilia argues against allergy. It is worth noting, however, that all the cases (except 3) which I saw during 5 years of consultant practice in Bombay were living near the sea, on the Bombay, Gujerat and Kathiawar coast and the Malabar and Coromandel coasts; the 3 exceptions lived in Hyderabad, Allahabad and Cawnpore, but they, too, often used to stay near the sea. During the last 3 years in Bikaner (North-West Rajputana), although I have been seeing far larger numbers of patients, I have not come across a single case of the disease among the stationary population of this part of India, which has a dry climate with extremes in summer and winter. The 17 cases collected in this region (cases 65-81 of the series) occurred in the merchant community (Marwari) residing in or near Calcutta or Bombay, and there can be no doubt that their disease originated in those places. All except one had come back to Rajputana, their native land, for a change of climate on the recommendation of their medical advisers. The exception was a young girl who lived for some years in a swampy area in the United Provinces. The influence of environment as an aetiological factor is therefore unquestionable.

Though in many cases it lasts for years, the disease is benign, and no opportunity arose to study autopsy findings. Most of the cases had been previously diagnosed and treated either as pulmonary tuberculosis or chronic bronchial asthma. Many had been in hospitals and sanatoriums. In Bikaner, despite the fact that the doctors of the state medical service are familiar with the complex of symptoms, 2 cases had been admitted to the tuberculosis hospital; actually no case in the series showed any clinical or X-ray signs of tuberculosis.

Only a white-cell and a differential count can easily confirm or exclude this disease, and they should always be done when there are suggestive symptoms. There is no connexion between the disease and those pulmonary infiltrations with moderate leucocytosis and eosinophilia first described by Loeffler, where there is a temporary localised infiltration of lungs without much disturbance of general health. Most of Loeffler's cases were found on routine mass X-ray examination of factory workers, students, &c.; here in India no such case has ever come to my notice.

Treatment was, for a long time, purely symptomatic. Adrenaline alone or combined with liquid extract of pituitary gives prompt relief during an attack of asthma. Ephedrine along with suitable doses of potassium iodide, ammonium chloride and codeine were efficacious in relieving paroxysms of coughing. If treatment was interrupted the symptoms soon returned with the same intensity as before; even a long course gave no permanent benefit. Various pure and mixed vitamin preparations were of some value in promoting appetite and

Case	Age (yr.)	Sex	Sect or race	Duration of illness	Date	White-cell count				
						Total per c.mm.	Eos. %	Polys %	Lymph. %	Monos %
1	16	M	Mh	5 dy.	Aug. 2, 1934	19,200	48	35	17	..
					Aug. 25, 1934	41,500	70	13	17	..
7	32	M	H	3 mth.	Sept. 21, 1934	74,400	72	10	17	i
					June 3, 1935	33,600	86	4	7	3
9	39	M	P	9 mth.	Aug. 20, 1935	49,000	89	1	10	..
					June 24, 1935	41,400	67	25	8	..
13	38	F	P	2 mth.	Aug. 21, 1935	25,800	80	7	13	..
					Nov. 4, 1935	31,900	68	13	18	i
24	45	M	H	Few mth.	Feb. 27, 1936	29,300	84	3	11	2
					Apr. 20, 1936	23,600	69	16	14	1
*40	9	M	P	3 mth.	May 25, 1936	19,200	76	13	10	1
					Oct. 13, 1936	20,300	82	9	9	..
45	34	M	H	3 mth.	Oct. 31, 1936	64,200	17	16	11	3
					Dec. 4, 1936	7,800	16	62	16	6
49	25	M	H	4 mth.	Sept. 17, 1937	34,800	65	15	18	2
					Apr. 26, 1938	7,800	10	44	44	2
*52	25	M	A	2 yr.	Feb. 7, 1938	28,600	76	13	10	1
					Mar. 1, 1938	11,200	31	46	20	3
*61	36	M	H	8 mth.	July 27, 1938	18,300	51	28	17	4
					Aug. 17, 1938	21,900	53	18	27	1
*64	35	M	P	8 mth.	Sept. 23, 1938	11,400	15	56	22	7
					May 15, 1939	17,200	52	19	24	5
71	37	M	H	2 yr.	Jan. 18, 1940	5,100	15	40	41	4
					Oct. 11, 1940	22,200	80	12	6	2
74	11	M	H	5 yr.	Jan. 25, 1941	5,400	5	61	30	4
					Jan. 10, 1941	32,500	78	15	5	2
75	26	M	H	5 yr.	Feb. 12, 1941	7,800	12	58	25	5
					Feb. 3, 1941	23,300	72	15	10	3
77	11	M	H	5 yr.	Mar. 19, 1941	19,200	60	22	18	..
					May 11, 1941	41,600	71	16	12	i
79	10	F	Mh	6 mth.	June 5, 1941	25,600	51	14	37	1
					June 11, 1941	12,200	61	7	31	1
80	28	M	H	8 mth.	July 4, 1941	11,200	40	22	37	1
					July 11, 1941	16,800	43	13	43	1
..	..	..	..	..	July 21, 1941	29,000	60	25	10	5
					Aug. 3, 1941	16,900	47	20	33	..
..	..	..	..	..	Aug. 13, 1941	10,200	14	46	38	2
					May 19, 1941	27,000	52	15	30	3
..	..	..	..	..	July 25, 1941	35,000	61	8	42	..
					Aug. 15, 1941	12,000	16	30	52	2
..	..	..	..	..	Oct. 31, 1941	19,000	70	11	17	2
					Nov. 17, 1941	45,000	65	15	20	..
..	..	..	..	..	Nov. 24, 1941	19,400	61	20	15	3
					Dec. 5, 1941	11,600	28	45	23	4

Some examples of the findings in 81 cases.

\* Observed by Dr. F. W. Berger, of Bombay.

H = Hindu, Mh = Mohammedan, P = Parsee, C = Indian Christian, E = European, A = Arab, and S = Sikh.

i. See Fround, R. and Samuelson, S. Arch. intern. Med. 1940, 66, 1215.

general strength. Any other treatment including non-specific protein-shock therapy (milk injections and auto-hæmotherapy) was useless, even to relieve symptoms.

At the end of 1936, one patient (case 24) already under observation contracted syphilis, and neoarsphenamine was given. When his white cells were counted after four injections (0.15 g., 0.3 g., 0.45 g. twice) it had fallen from 64,200 to 7800 and the eosinophils had decreased from 71% to 16%. His subjective symptoms had also vanished. But it was not until 1938 that I realised this was no coincidence; since then, cases have been systematically treated with neoarsphenamine, which proved to be a quickly acting specific. Injections were given every fourth day usually in a course of six: 0.15 g., 0.3 g., 0.45 g. twice or thrice; the drug was dissolved in a 10% solution of calcium gluconate to which 'Redoxon' (Roche), 2 c.cm. (= 200 mg. ascorbic acid) was added.<sup>2</sup> No untoward reactions were noticed. After the first two or three injections there is a tendency for a further slight increase in the total leucocyte count as well as in the percentage of eosinophils; later they abruptly diminish, sometimes even before five or six injections have been given, in other cases only after the end of the course. Clinical symptoms rapidly and completely disappear, usually after the third injection. My colleague Dr. F. W. Berger obtained equally good results with 'Acetylarsan' (M&B), not more than eight injections being required, starting with 1 c.cm., 2 c.cm. and continuing with 3 c.cm. at the usual intervals. One patient ran a high temperature with rigor after the second injection, without other signs. The blood-count revealed a sudden drop in leucocytes from 30,000 to 8000 and eosinophils had almost disappeared from the capillary blood.

It is likely that other aromatic arsenic compounds would act equally well, even if given by mouth, but since the results with the technique employed were satisfactory, only one patient (case 80) was treated with any other preparation. He was given 'Stovarsol' (M&B), gr. 2 twice a day and the rise of white cells at the beginning of the course was pronounced. After a week's interval he was given another 10-day course of stovarsol, gr. 4 twice a day, and a remarkable fall of eosinophils followed. The clinical signs disappeared about a week before he finished the second course. This case is still under observation.

The peculiar conditions of consulting practice in India, where patients do not continue to attend when they are relieved, made it impossible to follow up these cases at all closely. Since the beginning of 1938 all patients have been treated with neoarsphenamine; detailed instructions were usually given to their family doctors, whose coöperation in ascertaining the final result was also unfortunately lacking. Cases treated either as inpatients or outpatients in hospital usually left to return to work after the completion of the course of treatment. But the fact that not one patient treated with neoarsphenamine for acetylarsan ever returned for advice seems a proof that no relapse occurred. Wherever possible, information was obtained from the family doctors which showed that patients treated in this way kept in good health.

#### SUMMARY

A new disease entity is described, characterised mainly by severe spasmodic bronchitis, leucocytosis and very high eosinophilia.

The disease is common in India and affects people living near the sea.

It has no relation to any other disease, particularly not to tuberculosis.

Arsenicals are a specific and quickly acting remedy.

I wish to thank my former partner in Bombay, Dr. F. W. Berger, for his coöperation and for permission to include his cases; also Dr. S. D. Sahasrabudhe, for laboratory work on the cases seen in Bikaner.

<sup>2</sup> Dainow, T. *Pr. méd.* 1937, 45, 670.

**DEFECT OF SMELL AFTER HEAD INJURY.**—Major A. D. Leigh's work on this subject (*Lancet*, Jan. 9, p. 38) was based upon material collected with the aid of a grant from the Medical Research Council.

## HEPATOSPLENOMEGALY WITH OTHER CLINICAL REACTIONS TO SULPHAPYRIDINE

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MAJOR RAMO

In a series of over 1000 cases of gonorrhœa in soldiers the routine adopted has been to give 4 grammes of sulphapyridine daily up to a maximum of 10 days; second courses were given only after an interval of at least 6 days. In this series rashes were noted in 7% of cases. After finding well-marked hepatic and splenic enlargement in one case particular attention was paid to this aspect of the reaction in the next 11 cases showing intolerance.

#### ILLUSTRATIVE CASES

**CASE 1.**—Urethritis (first attack). Received 40 g. sulphapyridine between July 12 and 22, with no signs of intolerance. Second course begun on July 29. On Aug. 6, when 32 g. had been given, developed malar flush, mild infraorbital œdema, conjunctivitis and rash beginning as erythema on chest and becoming morbilliform, with enlargement of lymph-nodes in axilla, neck and groin. Sulphapyridine was stopped and fluid intake increased. On Aug. 8 rash was more definite and generalised. Temperature 99.2° F. Headache. Confined to bed. On the 10th rash was fading. On the 12th rash and other signs noted on Aug. 8 were more marked. Aug. 13–15 rash scarlatiniform. Temperature 100.2° F. in morning, rising to 102° F. in evening. Sordes at angles of mouth. Dysphagia. Oral mucous membrane glazed and dry; no membrane. All superficial lymph-nodes enlarged. Face and feet slightly œdematous. Respiration-rate up to 30 per min.; fine râles at bases only.

On Aug. 16 there was a dramatic change. Eyes almost closed because of facial œdema. Rash now dusky and confluent over most of body, with thickening of skin. Some purpuric spots below knees. Feet more œdematous, with bullæ on dorsal surface and on some toes. Loose, non-productive cough. Respirations 40 per min., laboured, with expiratory wheezing. Only physical signs scattered fine râles and prolonged expiration. Temperature 102.6° F. in morning, 104° F. in evening. Blood-count showed 16% eosinophils. Urine scanty and some dysuria; trace of albumin. Liver edge two finger-breadths below costal margin and spleen three finger-breadths below. Patient looked and felt gravely ill; lips and speech tremulous; bowed, nodding head and shaking hands. Some of the hand movements seemed definitely athetotic. Mentally clear. On Aug. 17 transferred to medical division under Capt. H. Parry Williams. Generalised exfoliative dermatitis. Temperature 104.6° F., pulse-rate 128 and respirations 56 per min. On 19th condition was a little better; spleen still two finger-breadths down and liver edge palpable. By the 21st was much improved; icteric index 4. On 23rd spleen smaller, exfoliative dermatitis and lymph-node enlargement resolving. On 28th liver and spleen not palpable and all signs and symptoms clearing. On the 30th some recurrence of rash. After this skin desquamated freely. Convalescence uneventful; discharged to convalescent home on Sept. 24.

A sample of urine examined spectroscopically for coproporphyrin during the height of the attack was negative.

Treatment given included free fluids, ephedrine gr. 1 four-hourly, pot. cit. and sod. bic.  $\bar{a}\bar{a}$  gr. 20 three-hourly, nicotinic acid 100 mg. b.d.s. increasing to t.d.s., calamine lotion, &c. to skin.

When seen on Nov. 12 the patient seemed normal except that his hair was rapidly thinning.

**CASE 2.**—Fresh gonorrhœa (first attack). Received 40 g. sulphapyridine between Aug. 4 and 14, with no signs of intolerance. Second course begun on Aug. 21. On the 22nd, when 4 g. of sulphapyridine had been given, developed facial flush, infraorbital œdema, conjunctivitis, cough with fine râles at bases, fever and morbilliform rash. General enlargement of lymph-nodes. Spleen and liver both one finger-breadth below costal margin. On 24th felt better, spleen and liver not palpable, lymph-nodes smaller, eyes clear, rash fading, no cough and chest clear, temperature normal. On 25th still slight enlargement of lymph-nodes; otherwise normal.

**CASE 3.**—Fresh gonorrhœa (first attack). Sulphapyridine given from Nov. 8 to 17; total dosage 36 g. Then developed slight malar flush, infraorbital puffiness, mild conjunctivitis, slight cough with fine râles at bases, slight general enlargement

SUMMARY OF CLINICAL AND HÆMATOLOGICAL FINDINGS

Case	1	2	3	4	5	6	7	8	9	10	11	12
Day of onset	9	2	10	10	8	9	11	9	6	9	8	10
Total sulphapyridine (g.) given	32	4	36	36	28	32	40	24*	20	32	28	36
Course	2nd	2nd	1st	1st	2nd	1st	1st	1st	1st	2nd	1st	1st
Facial flush	+	+	+	+	+	+	+	+	+	+	+	+
Infraorbital œdema	+	+	+	+	+	+	+	+	+	+	+	+
Conjunctivitis	+	+	+	+	+	+	+	+	+	+	+	+
Rash	+	+	+	+	0	+	+	+	+	+	+	+
Pyrexia	+	+	+	+	0	0	+	+	+	+	+	+
Adenitis	+	+	+	+	+	+	+	+	+	+	+	+
Splenomegaly	+++	+	+	+	+	+	++	++	++	0	0	0
Hepatomegaly	+++	+	+	±	+	+	++	++	++	++	0	0
Jaundice	0	0	0	0	Slight	Slight	Slight	0	0	++	0	0
Bronchitis	+	Mild	Mild	Mild	0	0	0	Mild	+	0	0	0
Purpura	+	0	0	0	0	0	0	0	0	0	0	0
Exfoliative dermatitis	+	0	0	0	0	0	0	0	Very mild	0	0	0
Glazed oral muc. memb.	+	0	0	0	0	0	0	0	+	0	0	0
<i>White-cell Counts</i>												
Total white cells	35,000	4300	9300	8000	5300	..	6900	10,350	3600	..	..	..
Lymphocytes	..	7%	29%	20%	..	14%	..	23%	56%	36%	..	..
Polymorphs	..	87%	68%	73%	..	77%	..	67%	36%	56%	..	..
Eosinophils	16%	4%	2%	4%	..	2%	..	8%	4%	4%	..	..
Mononuclears	..	2%	1%	4%	..	7%	..	2%	4%	4%	..	..

\* Received 3 g. instead of usual 4 g. daily.

of lymph-nodes, scattered morbilliform rash on front of chest, slight fever; tip of spleen could be felt. On 19th eyes were clear and rash paler; spleen and liver both one finger-breadth down; felt well. By 21st rash gone, liver and spleen not palpable, adenitis resolving. On 24th no symptoms or abnormal signs.

DETAILS OF REACTIONS

The clinical findings in 12 cases which showed intolerance to sulphapyridine, with the blood-counts, are set out in the table. The manifestations of intolerance appeared during the first course in 8 cases and during the second in 4. None of the latter had shown any intolerance during the first course. Except in one case symptoms appeared between the sixth and tenth days of therapy; in case 2 they appeared on the second day of the second course.

The earliest sign of intolerance appears to be enlargement of superficial lymph-nodes, which preceded by some hours or days the visible skin changes. Cervical, axillary, epitrochlear and inguinal nodes are all enlarged, the axillary being the most prominent and slowest to resolve. The glands are smooth, discrete, mobile and rubbery; they show no tendency to break down and give rise to no symptoms. They take about 10 days to resolve after cessation of chemotherapy.

Fever is usual at the onset of symptoms of intolerance; in this series 9 cases had pyrexia, ranging from 98.8° F. to 104.6° F. The rise of temperature is accompanied by a shiny malar flush and sometimes facial cyanosis, with puffiness and pallor under the eyes. The conjunctiva is injected to any degree from a few dilated vessels to frank pink eye. At the same time, or within a very few hours, an erythematous, macular, morbilliform or scarlatiniform rash appears on the chest and soon spreads to the rest of the trunk. In case 1 the rash began as a patchy erythema on the chest and passed through macular, morbilliform and scarlatiniform stages while becoming more general; after that it became a dusky erythema with œdema and thickening of the skin, with the formation of bullæ and purpura and finally an exfoliative dermatitis like that produced by arsenic. The rash may progress in spite of the cessation of chemotherapy, but usually defervescence begins within 24-48 hours of stopping the drug.

Splenic and hepatic enlargement was noted in 9 cases concurrently with the rash. Its degree ranged from one to three finger-breadths. The liver was tender but the spleen was not. The enlargement lasted from 2 to 14 days, the usual time being 3-5 days; the liver was palpable first and its enlargement lasted longer than the splenomegaly.

Obvious jaundice was present in one case for a fortnight; van den Bergh's test gave a delayed direct response (red colour in 90 sec.), the quantitative reading being 10; urobilin was present in the urine. In 3 other cases icteric tinging of the conjunctiva appeared 38-48 hours after the onset of skin and other manifestations

and the consequent cessation of chemotherapy; it lasted 4-7 days.

Pulmonary symptoms—cough with scattered moist sounds in the chest—were mild and appeared when the rash had become morbilliform or later; they were probably due to capillary bronchial spasm and œdema. Except in case 1 the chest cleared within 2-3 days.

Case 1 developed a dry glazed oral mucous membrane with severe dysphagia 8 days after the cessation of chemotherapy; no ulceration was present; the condition lasted 5 days. Case 9 also had a dry mouth for 2 days, beginning 2 days after the cessation of sulphapyridine therapy.

There was a definite diminution of urinary output for 3 days in case 1 and a trace of albuminuria but no hæmaturia. This case also showed muscular incoördination and tremor with athetoid movements; a similar reaction I am told has been noted in the treatment of lupus erythematosus even with small doses of sulphapyridine.

White-cell counts were done in 8 cases; case 1 showed a leucocytosis, case 9 a slight lymphocytosis, case 10 a slight degree of leucopenia, and cases 1 and 8 an eosinophilia.

COMMENT

Most of the reactions reported here occurred in November when there was very little sunshine. At midsummer, when patients constantly sunbathed in spite of orders to the contrary, the incidence of skin reactions was no higher than in the winter, and there was no evidence that photosensitivity was the cause of any of the rashes.

Other venereologists will have noted the periodicity of sulphapyridine rashes. Every 4-6 weeks there seems to be a "rash cycle," in which rashes get more frequent. Coinciding with this is a period of enhanced therapeutic efficiency of chemotherapy, in which most cases of gonorrhœa (including the rash-free) clear up 3-4 days quicker than usual, discharges from hospital being 25-50% per week higher than during rash-free periods. Whether the drug undergoes changes if not used immediately or whether there are small variations in different batches of the drug I cannot say.

SUMMARY

In 1000 cases of gonorrhœa treated with sulphapyridine the incidence of rashes was 7%.

Enlargement of the axillary lymph-nodes commonly precedes other signs of intolerance, and routine examination of these glands may give useful warning of intolerance.

Enlargement of liver and spleen is a common and early sign of intolerance.

Cessation of sulphapyridine on the seventh day of therapy (with dosage of 4 g. daily) would lessen the incidence of severe reactions.

Photosensitivity plays little part in the production of rashes in sulphapyridine therapy.

## RED-CELL SUSPENSION TRANSFUSIONS

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RED-CELL suspension transfusions have been favourably reported on by Robertson (1918), Castellanos (1937), Castellanos and Riera (1937), Beumer and Schwartz (1939), MacQuaide and Mollinson (1940), Whitby (1941), Vaughan (1941), Davidson and Stewart (1941), and Williams and Davie (1941). With the exception of Robertson, who transfused suspensions having the same red-cell concentration as whole blood, the workers quoted employed red-cell suspensions containing a greater concentration of red cells than is found in whole normal blood—concentrated red-cell suspensions. The administration of blood plasma has become an established practice. To obtain plasma, human blood is procured from the blood bank and the plasma is removed, the remaining blood-cells forming a by-product which is normally discarded. This by-product may be of high therapeutic value, and the investigations herein reported were carried out to determine the usefulness of transfusions of red-cell suspensions prepared from it.

## METHODS

The red-cell suspensions were prepared from stored blood of group O. Blood was drawn from the donor into a bottle containing sodium citrate solution, each bottle finally containing about 100 ml. of 3% sodium citrate solution, and 440 ml. of blood. The mixture was then stored at 4° C., and after about 7 days (the actual period varied from 3 to 12 days depending on the local demand for blood and plasma) the supernatant plasma was drawn off. The remaining mass was filtered through a gas mantle, and the red cells from several bottles were

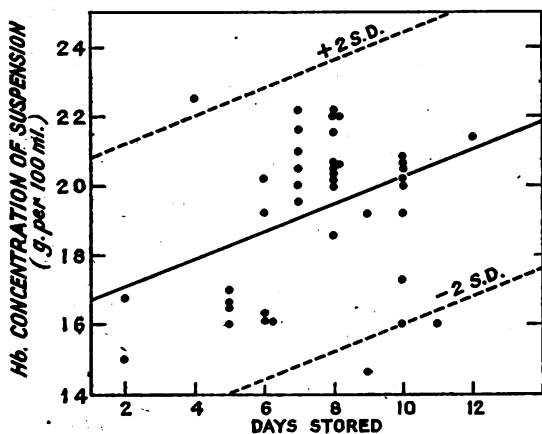


Fig. 1

bulk and stored at 4° C. until required. The time elapsing between removal of the blood from the refrigerator for processing and the return of the red-cell suspension for storage was under 2 hours; the suspensions were stored for 1–48 hours before transfusion.

A bottle of red-cell suspension would contain about 290 ml. of packed red cells, 157 ml. of plasma, and 75 ml. of citrate solution; this would furnish a suspension containing about 18 g. of haemoglobin per 100 ml. suspension. The longer the period of sedimentation, the more concentrated the red-cell suspension became (fig. 1), but as will be seen the relationship is not very close.

Red-cell counts and haemoglobin estimations were performed before and immediately after transfusion in most cases, and at intervals thereafter. Estimations before transfusion were made on oxalated venous blood, while subsequent estimations were made on capillary blood. For the red-cell counts the same haemocytometer and various BSS diluting pipettes were used; in all cases at least 900 cells were counted; the coefficient of variation was 7.3%. Haemoglobin estimations were made with a Newcomer disc, the accuracy of which was checked by oxygen capacity determinations in the Van Slyke manometric apparatus; the coefficient of variation of haemoglobin estimations, as determined by 8 haemoglobin

estimations on the same sample of blood, which contained 11.6 g. of Hb. per 100 ml., was 1.8%. Since the coefficient of variation of haemoglobin estimations is less than that of red-cell counting, the former values have been used in drawing conclusions about the effects of transfusion. For the purpose of calculating the colour-index, 14.5 g. of Hb. per 100 ml. has been taken to represent 100% haemoglobin.

Before transfusion, major and minor cross-matching of donor's and recipient's blood was carried out; in no instance was incompatibility encountered, but in one case cold agglutinins developed during a course of transfusions. For the cross-matching about 1 ml. of suspension was removed from the bottle of cell suspension with a sterile Wright's pipette; serum and red cells were obtained from the recipient by means of a small puncture in the lobe of the ear, blood for its serum content being collected into a Wright's tube, and red cells being collected into a small quantity of citrate-saline—the danger of injuring a valuable vein during collection of the recipient's blood being thus avoided. With the exception of one transfusion, where cold agglutinins were present, the suspensions were administered without warming; the transfusions were usually begun within an hour of removal of the suspension from the refrigerator.

Transfusions were administered with the Medical Research Council (1940) blood-transfusion apparatus, in all cases by venepuncture without exposing the vein by dissection. When the red-cell suspension contained more than 20 g. of Hb. per 100 ml. transfusions could be begun without difficulty, but the rate of flow became irregular after about 30 min., and was apt to stop completely within an hour or so owing to the high viscosity of such suspensions. An attempt was made to force the blood into the vein under pressure by increasing the height of the blood container from the normal 4 ft. to 12 ft. above the vein; this resulted in a slight improvement, but was not entirely satisfactory. A device was designed to place the suspension in the container under a pressure of about 120 mm. Hg; this was a decided improvement, but stoppages were still too frequent, and there was the ever-present danger of a bottle emptying rapidly, and air under pressure entering the vein. A Riddell's (1939) pump incorporated in the delivery tube of the administration set was found the most satisfactory method of transfusing concentrated red-cell suspensions (i.e., suspensions containing more than 18 g. of Hb. per 100 ml.). It was found advisable to pump about 20 ml. of suspension fairly rapidly into the vein every half hour or so, allowing the flow to continue by gravity in the interval. Very small veins could be employed if necessary, and the flow could be maintained by slow pumping where the combination of a small vein and a viscous suspension would otherwise have resulted in an inadequate flow.

## RESULTS

In all, 46 transfusions of red-cell suspensions have been administered to 22 adult patients suffering from the following ailments: anaemia after haemorrhage, 13 (cases 1, 2, 4, 6, 7, 10, 11, 12, 16, 19, 20, 21 and 22); chronic anaemia, 5 (cases 8, 13, 14, 15 and 17); miscellaneous, 4 (cases 3, 5, 9 and 18). Eighteen of the transfusions were administered to outpatients; transfusions were begun about 9.30 AM, and the patient returned home about 7 PM the same day. The remainder of the transfusions were administered to inpatients. After a red-cell suspension transfusion, the patient usually reported that he felt better all round, that he had more energy, and took greater interest in his surroundings. In general, the patients appeared to derive as much benefit (as judged clinically) from a transfusion of red-cell suspension as from a whole-blood transfusion.

*Anaemia after haemorrhage.*—A series of 7 patients anemic as the result of bleeding into the gastro-intestinal tract (cases 4, 6, 10, 12, 16, 20 and 21) were transfused with red-cell suspension, and a satisfactory haemoglobin level was attained immediately after transfusion in all cases. Subsequent changes in haemoglobin are shown in table I. Where a single transfusion was administered (cases 2, 7, 10, 16 and 21), the second column shows the number of days elapsing between transfusion and the final Hb. determination; the third column shows the difference between the Hb. immediately after transfusion and the final Hb. Where two transfusions were administered (cases 6 and 12), the second column shows the

number of days elapsing between the first transfusion and the last Hb. determined before the second transfusion; the third column shows the difference between the Hb. immediately after the first transfusion, and the last Hb. determination before the second transfusion. The fourth column shows the

TABLE I—CHANGE IN HÆMOGLOBIN AFTER TRANSFUSION OF RED-CELL SUSPENSION IN CASES OF GASTRO-INTESTINAL HÆMORRHAGE

Patient	Days after 1st transfusion	Change in Hb. (g./100 ml.)	Days after 2nd transfusion	Change in Hb. (g./100 ml.)
2	42	0.3 rise	..	..
6	12	1.0 rise	9	0.5 fall
7	30	0.2 rise	..	..
10	18	0.4 rise	..	..
12	7	0.8 fall	4	0.5 fall
21	8	1.8 rise	..	..
16	7	0.9 rise	..	..

number of days elapsing between the second transfusion and the final Hb. determination; the last column shows the difference between the Hb. immediately after the second transfusion and the final Hb.

*Chronic anæmias.*—A group of 5 patients (cases, 8, 13, 14, 15 and 17) had been under treatment as outpatients for 4, 4, 6, 11 and 5 years respectively. All suffered from chronic hypochromic anæmia (case 15 had a liver-factor deficiency in addition), and all had received more than average amounts of iron, liver by injection, and vitamins; special attention was also paid to the diet. This treatment had not produced a satisfactory hæmatological response. Repeated red-cell suspension transfusions (see table II) have resulted, in 4 out of 5 cases, in a significant and sustained rise in the colour-index, increased hæmoglobinisation of the red cell as judged from an inspection of stained blood films, and a rise in Hb. which persisted for longer than was to be expected in view of the supposed life-span of the red cell in the circulation of the recipient. All the patients could be regarded as chronic invalids unable to work on account of their illness; 4 have benefited to such an extent that they can now do a day's work without undue exhaustion; the remaining patient (case 14) showed transient improvement lasting some 6 months, and has now asked for further transfusions.

RISE IN HÆMOGLOBIN AFTER TRANSFUSION

It is misleading to say that a bottle of blood will raise the Hb. in the recipient by so much per cent. The rise in Hb. after transfusion depends on many factors, among which are the blood-volume of the patient, the degree of anæmia, the blood-volume when the final Hb. is determined (this depends to some extent on the time allowed to elapse between the end of the transfusion and the Hb. determination), and the composition of the transfusion fluid. Thus the rise in Hb. concentration for each litre of transfused blood of constant composition will be greater in an infant than in an adult, and greater when the Hb. before transfusion is low than when it is high. Furthermore, when a blood-citrate mixture is transfused the blood-volume is temporarily increased and the normal blood-volume is eventually restored by shift of salt solution and plasma from blood to tissue spaces. If the final Hb. is estimated immediately after transfusion (when the blood-volume is greater than normal), the rise in Hb. will appear lower than it is when equilibrium has been achieved.

From an analysis of the data contained in table IIA, it is apparent that there is a close correlation between the amount of Hb. transfused, and the rise in Hb. in the recipient.

An assumption was made that all the Hb. transfused is present in the circulation at the end of the transfusion, but a similar assumption in regard to the added volume of fluid may not be justified, as it is known that many fluids, when given intravenously, leave the circulation in a very short time. Assuming that the final blood-volume is increased by the volume of the red cells transfused, plus the plasma transfused, the correlation coefficient between the rise in Hb. and the amount of Hb. transfused, when the regression line is forced through the origin (this is justifiable, for if no Hb. is transfused, there will be no rise in Hb.), is 0.9645; the slope of the regression line is 0.28570, and this slope corresponds to a blood-volume of 3500 ml., which is unlikely. When the regression line is calculated about the mean, the line passes

far from the origin ( $b = 5.579$ ). If it is assumed that the final blood-volume is increased by the volume of the transfused red cells only, then the correlation coefficient calculated about the origin is 0.9771, the slope is 0.21759, and the corresponding blood-volume is 4596 ml. The last assumption has been accepted as it gives a higher correlation coefficient, a blood-volume which approximates to that known to obtain in the average adult, and a regression line calculated about the mean which goes nearly through the origin ( $b = 0.2022$ ), as it should.

In fig. 2 the rise in Hb. in the recipient after transfusion has been plotted against the amount of Hb. transfused multiplied by a factor allowing for the increase in blood-volume due to the presence of the transfused red cells in the circulation; this factor has been calculated as follows.

*Let:* percentage of packed red cells in normal blood = 45; normal Hb.-content of blood = 14.5 g. per 100 ml.; *i* = initial Hb. in g. per ml.; *f* = final Hb. in g. per ml.; *A* = total Hb. in the body before transfusion, in g.; *B* = amount of Hb.

TABLE II—RESULTS IN 46 RED-CELL TRANSFUSIONS

Case *	Hb. (g. per 100 ml.)		Red cells (millions per c.mm.)		Red-cell suspension			Reaction grade	Condition	
	Before	After	Before	After	Vol. given (ml.)	Hb. (g./100 ml.)	Age (days)			
A	1/1	7.5	10	2.90	3.62	1000	16	10	II	Postoperative anæmia
	1/2	10.7	12.8	3.61	4.31	1000	16	11	..	
	1/3	11	13	4.06	4.70	800	20.5	8	..	
	2/1	8.6	12	3.60	4.31	1000	22.5	4	II	Postop. anæmia. Renal calculus: preop. transfusion
	3/1	6.3	8.6	3.42	4.07	500	19.2	6	..	
	4/1	9	10.4	4.27	4.47	500	16.3	6	..	Duodenal ulcer; melæna
	5/1	9.3	10.8	3.14	3.62	300	16.1	6	I	Pernicious anæmia Duodenal ulcer; melæna
	6/2	12	13.5	4.04	4.80	1000	20.5	10	..	
	7/1	9.5	12.8	3.56	4.60	1000	20.5	10	..	Postop. anæmia Idiopathic steatorrhœa; hypochromic anæmia
	8/1	5.5	7	3.47	..	700	20.5	7	..	
	8/2	6.8	10.8	3.96	4.86	1300	20.8	10	..	Aplastic anæmia Peptic ulcer; hamatemesis
	8/3	9.1	11.8	3.12	4.23	1200	22	8	II	
	8/5	10	11.7	3.02	3.91	900	16.6	5	II	Carc. of rectum Duodenal ulcer; melæna
	9/6	6.6	11.3	2.22	3.64	1450	21.4	12	I	
	10/1	6.9	13.6	2.25	4.77	2500	22.2	7	..	
	11/1	12.3	15.2	4.32	5.06	1000	22.2	8	..	Chronic hypochromic anæmia
	12/2	11	14.5	3.80	4.90	1300	19.2	10	..	
13/1	7.7	11.1	4.35	5.06	1200	21.6	7	II	Chronic hypochromic anæmia	
13/2	11.2	12	4.49	4.81	500	20	7	II		
13/3	11	13	4.15	4.89	900	20	8	II		
13/4	11	12	3.30	3.78	500	16.1	6	II		
14/1	5.3	9.5	3.44	5.00	1200	19.2	9	II		
14/2	10.5	13	4.59	5.25	940	20.4	8	II		
14/3	9.7	10.9	3.85	4.24	540	16.8	2	..		
15/1	6.4	9	3.43	4.16	1000	22	8	I		Chronic anæmia due to deficiency of PA factor and iron
15/2	8.3	10.3	3.89	4.64	1200	14.6	9	II		
15/3	10.3	13.1	4.06	4.86	1000	18.6	8	II		Gastric ulcer; melæna
15/4	11.3	12.7	3.62	4.10	900	17	5	I		
16/1	7.4	12.3	2.32	3.92	1500	20.2	6	I	Chronic hypochromic microcytic anæmia	
17/1	7.2	11.3	4.65	6.61	1000	16	5	I		
17/2	11.6	12.7	4.44	4.65	500	16.5	5	..		
B	6/1	5.2	11	1.85	3.82	2000	15	2	..	Acute hæmolytic anæmia Postop. anæmia Peptic ulcer; melæna
	9/1	4.3	5.1	..	300	18.9	7	..		
	9/5	5.46	10.6	1.78	3.46	1300	20.6	8	II	
	12/1	8.3	11.8	2.93	3.05	1000	21	7	I	
	18/2	7.2	12.4	2.46	4.44	1000	19.5	7	..	
	19/1	6.8	13.6	2.23	4.41	2100	21.1	10	..	
	20/1	10	11.3	3.60	3.80	500	20.2	8	II	
	21/1	5.3	11.6	1.52	3.80	2000	20.6	8	II	
22/1	6.3	9.1	2.39	3.42	750	21.5	8	II	Carc. of sigmoid	
C	8/4	10.2	..	3.61	..	200	19	8	III	..
	9/2	5	..	1.51	..	300	18.9	3	III	
	9/3	..	..	..	..	300	18.9	2	..	
	9/4	..	10.4	3.10	..	500	21	5	II	
	9/7	6.1	..	1.76	..	450	20.2	8	II	
	18/1	3.2	..	1.13	..	450	20.2	10	..	

\* The first figure indicates the number of the case, the second the number of the transfusion; thus 1/3 = the third transfusion given to case 1.

A = Complete records. Final Hb. estimated immediately after transfusion.  
 B = Final Hb. estimated several hours after transfusion.  
 C = Incomplete records.

added during transfusion, in g.; V = initial blood-volume of the patient; v = additional blood-volume (i.e., due to the added red cells).

Then  $f = A + B/V + v$   
 Since  $A = iV$   
 Therefore  $fv + fV = iV + B$   
 $fV - iV = B - fv$   
 $V(f - i) = B - fv$   
 $f - i = 1/V (B - fv) = \text{the rise in Hb.}$

Since 100 ml. of blood contains 14.5 g. Hb., 45 ml. of packed red cells contains 14.5 g. Hb.

Therefore  $B = (14.5/45 \times v) \text{ ml.}$   
 $v = \text{volume of added red cells} = B (45/14.5) \text{ ml.}$   
 $f - i = 1/V (B - f \times B \times 45/14.5)$   
 $= 1/V (B) (1 - f \times 45/14.5)$

If the rise in Hb. is plotted on the y axis, and the Hb. added multiplied by  $1 - f \times 45/14.5$  is plotted on the x axis, then the slope will be  $1/V$ , and the initial blood-volume at which this relationship holds is V ml.

It has been noted that the Hb. after transfusion depends partly on the quantity of red cells transfused and the increase in blood-volume resulting from transfusion. After an exceedingly rapid transfusion of large volume and low red-cell concentration, a decided increase in blood-volume, and hence a low Hb. immediately after transfusion, might be anticipated. To determine the effect of these and other variables, the effect of rate of transfusion, reciprocal of rate of transfusion, volume transfused, age of the red cells before transfusion, and the concentration of the red-cell suspen-

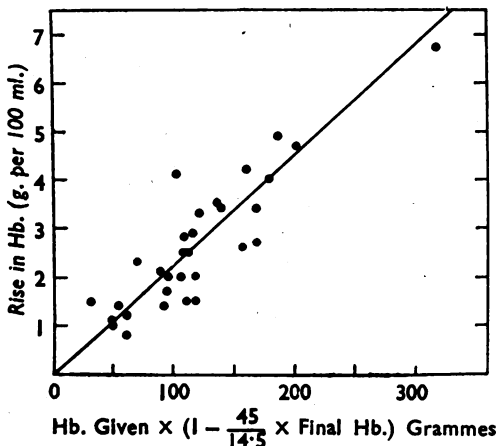


Fig. 2

sion on the rise of Hb. has been examined by calculating the correlation coefficients of deviations from the regression line about the origin. None of these variables has a significant effect on the rise of Hb (table III).

TABLE III

	r	P	DF
Rate of transfusion	- 0.160	> 0.1	29
Reciprocal of rate of transfusion	+ 0.229	> 0.1	29
Volume transfused	- 0.0015	> 0.1	29
Reciprocal of volume transfused	- 0.115	> 0.1	29
Age of red cells transfused	- 0.01052	> 0.1	29
Concentration of suspension	+ 0.001161	> 0.1	29

A "t" test has been performed on the rise in Hb. after transfusion, between transfusions accompanied by a reaction, and between reaction-free transfusions, and no significant difference between the rises has been found ( $t = 1.52$ ,  $DF = 29$ ,  $P$  lies between 0.2 and 0.1).

LIFE OF THE TRANSFUSED RED CELL IN THE RECIPIENT'S CIRCULATION

No effort was made to determine the life of the red-cell suspension in the circulation of the recipient, but there is no reason to believe that a red cell transfused as a suspension should have a shorter life than one transfused in the more usual citrated blood mixture. It is of interest,

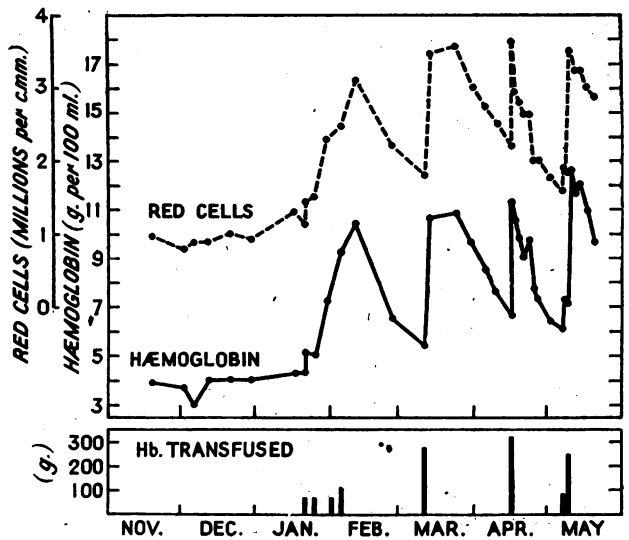


Fig. 3

however, to examine the record of a case of aplastic anaemia (case 9). For two months the red-cell count and haemoglobin had remained constant, and it appeared that the patient's blood-forming tissue could produce sufficient red cells to maintain a blood-count of about 1,000,000 red cells per c.mm., and 4 g. of Hb. per 100 ml. A series of red-cell suspension transfusions were administered (table II). It was found (fig. 3) that after the transfusions in February and March the red-cell count and Hb. content fell gradually to the pre-transfusion level in approximately forty days. This period seems to represent the maximum life of the transfused cell, the red cells being stored for six to ten days before transfusion. The transfusions in April were of suspensions twelve or thirteen days old, and the red cells appeared to survive about fourteen days only. It should be noted that no glucose was added to the anticoagulant mixture. Further investigations could not be carried out because the patient was discharged home at her own request.

REACTIONS

No types of reaction were encountered that do not occur with transfusions of whole or citrated blood. The reactions are arranged according to Riddell's (1939) classification.

Cases	
Grade I.	Rise of temperature to 100° F. with no other objective changes ... .. 8
Grade II.	Similar or greater rise of temperature; cold shivery feeling without actual rigor ... 17
Grade III.	With a definite rigor ... .. 2
No reaction	... .. 19

Half-hourly temperature charts were kept during and for some hours after transfusion. From Dec. 7, 1940, to Feb. 26, 1941, 19 transfusions were administered, 5 of which were associated with reactions. From March 5, 1941, to Sept. 11, 1941, 20 transfusions were administered, 18 of which were associated with reactions. The average period of storage of the blood before transfusion was about the same in the two periods, and it seems likely that some factor other than the period of storage was responsible for the reactions. Since this factor may mask any real influence of the period of storage on the reaction incidence no conclusions can be drawn from the data on this point. It has been noted already that a reaction had no significant effect on the rise of Hb.

DISCUSSION

Uses of red-cell suspension.—When a patient is anæmic as a result of external blood loss, the bone-marrow is normally quite able to restore the lost cells, and blood-transfusion is required to keep the patient alive during the period of red-cell regeneration or to improve the clinical condition. In the present series of 7 cases of

uncomplicated anæmia due to blood loss, a satisfactory Hb. level was attained in all. In these patients, none of whom showed evidence of continued blood loss immediately before or after transfusion, it seemed that blood regeneration proceeded as rapidly as the transfused cells were removed from the circulation, and that when a satisfactory Hb. level had been attained the functional activity of the erythropoietic tissue was sufficient to maintain that level. Since a satisfactory Hb. level can be attained by the transfusion of red-cell suspensions, and since the post-transfusion level remains more or less constant while red-cell regeneration is occurring; it is suggested that the transfusion of whole blood could well be replaced by red-cell suspension transfusions in these cases. The red-cell suspension is a by-product of the plasma preparation process, and thus makes no call on blood-donors, whose blood can be reserved for those cases requiring fresh blood, or for conversion into plasma. Since most transfusions administered in a general hospital are called for on account of external blood loss, the use of red-cell suspensions for these cases would result in a substantial economy in whole blood—an important consideration at a time when large calls are liable to be made on the blood-donors' services.

The indiscriminate transfusion of group O blood may not be without risk, especially when the isoagglutinin titre of the donor's plasma is high. This risk may be accentuated when large volume transfusions are administered to extremely anæmic patients of other than group O. The use of group O red-cell suspensions results in a lower volume of plasma being transfused; the risk of reactions due to the isoagglutinin is reduced accordingly if the red-cell suspension is employed and hence fewer heterogeneous agglutinins transfused.

When large volume transfusions are contemplated (e.g., where it is desired to increase the Hb. of the patient by say 8 g. per 100 ml.) about 3400 ml. of stored blood, which contains about 11.8 g. of Hb. per 100 ml. will be required, whereas 1820 ml. of red-cell suspension containing 22.0 g. of Hb. per 100 ml. will produce the same rise in Hb. The use of the smaller volume transfusion is desirable, as the alteration in the recipient's blood-volume is kept relatively low.

The property of the red-cell suspension of producing a maximum rise in Hb. with a minimum transfusion volume is of advantage where there is a special danger of circulatory failure due to overloading—for example, in chronic anæmias with low Hb. levels, or where it is desired to administer transfusions to outpatients. Outpatient transfusions present several new problems. Patients likely to benefit from this form of treatment are usually suffering from chronic anæmias requiring a series of transfusions; it is desirable therefore to make a special effort to cause the patient the minimum of discomfort and to avoid untoward events during or after transfusion. Special care should be taken to prevent the contamination of the suspension with pyrogens, for should a reaction occur it is unlikely that the temperature will have returned to normal by the time the patient is ready to be taken home.

In all transfusions administered for chronic anæmia, there is a danger of overloading the circulation; this danger is increased if the anæmia is complicated by a waning cardiac reserve due to the anæmia or any other cause. When a transfusion is given to an inpatient, provided there are no symptoms of overloading during the transfusion, and provided no pyrogen reaction develops which might, through the extra load on the circulatory system, precipitate circulatory failure after the transfusion is ended, it is unlikely that the circulation will fail later on, since the patient is kept under supervision at complete rest in bed. When outpatients are transfused circumstances are different: it is always possible for the patient's circulation to be on the verge of failure, warning signs and symptoms being absent; and provided there was no post-transfusion reaction, there would be no ill effect as long as the patient remained at complete rest. Any exertion, however, might precipitate failure, and this is most likely to happen when the patient has arrived home, out of sight of the doctor (who will have warned him to avoid any form of exertion until the next day) and out of reach of immediate medical help. Realising the danger of incipient overloading, the operator can plan his transfusion so as to leave a reason-

able margin of safety, and it is in this form of transfusion that the red-cell suspension finds a valuable application, since it provides a means of raising the Hb. with a transfusion volume about half that required when citrated but otherwise unmodified blood is used.

*Dosage.*—No simple relationship holds between the concentration of the red-cell suspension and the expected rise of Hb. in the recipient, but where the aim of the transfusion is to increase the oxygen-carrying power of the blood the benefit derived from transfusion, in any one case, is directly related to the red-cell content of the fluid transfused. Concentrated red-cell suspensions are the medium of choice because they contain more red cells per unit volume than whole or citrated blood. If the pretransfusion Hb., the body-weight of the recipient, and the desired rise of Hb. are known, the transfusion volume can be accurately prescribed:—

Initial Hb.: 5 g. per 100 ml. Body-weight: 55 kg.  
Desired Hb. after transfusion: 15 g./100 ml. Hb. concentration of red-cell suspension: 20 g./100 ml.

Then, blood-volume is approximately  $55/11 = 5$  litres.

Total Hb. in body before transfusion is

$$5000 \times 5/100 = 250 \text{ g.}$$

Total Hb. in body after transfusion is

$$5000 \times 15/100 = 750 \text{ g.}$$

Therefore the amount of Hb. to be added is

$$750 - 250 = 500 \text{ g.}$$

500 g. Hb. is contained in 2500 ml. of the suspension.

This method of calculating dosage is especially valuable where children are concerned. That the final Hb. as estimated immediately after transfusion is a little lower than the figure anticipated need cause no concern. The patient has the desired additional red cells circulating in his blood-stream, and the aim of the transfusion has been fulfilled. As the temporarily increased blood-volume returns to normal, the Hb. per 100 ml. will rise accordingly.

*Recommendations.*—Concentrated red-cell suspensions are the transfusions of choice where the aim is to restore a reduced oxygen-carrying power of the blood.

Fresh blood should be used in preparing the suspensions, which should be administered after the shortest possible period of storage. Where the transfusion is used to replace blood lost by hæmorrhage, stored blood is satisfactory, especially if glucose is added at the time of collection of the blood from the donor.

Group O blood should be used for making the suspensions, especially when such red cells are available as a by-product of blood plasma separation.

Suspensions should not be warmed before administration.

A Riddell's pump should be incorporated in the administration apparatus when concentrated suspensions are transfused.

The transfusion volume should be calculated in terms of Hb.

Patients suffering from refractory anæmia should be given the benefit of repeated red-cell suspension transfusions, in the outpatient department if beds are not available. The maximum volume transfused to an outpatient should not exceed 1000 ml. on any one occasion.

#### SUMMARY

A series of 46 transfusions of red-cell suspensions have been administered to 23 patients; 18 of the transfusions were administered to outpatients, who returned home a few hours after transfusion.

The suspensions, which were prepared from a by-product available through the steady demand for blood plasma, contained about 18 g. of hæmoglobin per 100 ml. Transfusions were administered with the MRC blood-transfusion apparatus; a Riddell's pump was useful in maintaining a satisfactory flow when the Hb. concentration exceeded 18 g. per 100 ml.

Red-cell suspension transfusions were found to be a satisfactory substitute for whole-blood transfusions when the aim is to increase the oxygen-carrying capacity of the patient's blood. These transfusions are especially valuable when it is desired to obtain the maximum rise in Hb. with the minimum transfusion volume (e.g., in outpatient transfusions, or where there is a waning cardiac reserve, or where the pretransfusion Hb. is very low). When large volume group O transfusions are



administered to patients of other than group O, the use of the suspension reduces the risk of a reaction due to the transfusion of large quantities of iso-agglutinin. A group of 5 outpatients, who suffered from refractory chronic hypochromic anæmia, received a small series of transfusions, and 4 of these patients derived great benefit which has persisted, so far, for 8-9 months.

The rise in Hb. following transfusion of red-cell suspensions is considered, and a relationship is shown to exist between the amount of Hb. transfused, and the rise in Hb. in the recipient. The rate of transfusion, the reciprocal of the rate of transfusion, the volume transfused, the reciprocal of the volume transfused, the age of the red cells, the concentration of the suspension, and the presence or absence of a transfusion reaction have been shown to exert no influence on the rise in Hb. in the recipient.

As the Hb.-raising power of any transfusion medium cannot be expressed accurately (or even helpfully) in terms of "so much % rise in Hb. per pint transfused," a simple method of calculating the transfusion volume is suggested; this method is especially valuable in transfusing the young.

The utilisation of red-cell suspensions, which are prepared from a discarded by-product, reduces the calls made on the blood-donor panel.

I wish to thank the honorary staff of the Leeds General Infirmary and the Leeds Public Dispensary and Hospital for giving me access to cases under their care, Dr. W. S. Stanbury for the supply of the red-cell suspensions, and Mr. R. C. Palmer for assistance with the statistical analysis.

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## PENTOTHAL SODIUM ANÆSTHESIA FOR CYSTOSCOPY

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THE purpose of this article is to suggest a method by which cystoscopy may be carried out with comfort both to the patient and the operator. The use of intravenous anæsthesia for cystoscopy is well known, but as used up to date it has been inconvenient for outpatient purposes on account of the long recovery period. Although only 55 cystoscopies have so far been performed, using the method of anæsthesia described here, success of the method in all cases seems to warrant publication at this stage. The investigation was primarily conducted with a view to finding a method of anæsthesia suitable for outpatient cystoscopy.

**Method.**—In 6 c.cm. of distilled water 0.5 g. of 'Pentothal Sodium' (Abbott) is dissolved. The patient and instruments are prepared so that the cystoscope can be passed as soon as anæsthesia is obtained, and 4 c.cm. of the solution (0.3 g. of pentothal) is injected intravenously as rapidly as possible through a no. 14 SWG needle. Needle and syringe are left in situ and the patient is asked to count; when consciousness is lost a few seconds are allowed to elapse before the cystoscope is passed. The average time taken to lose consciousness was 18 sec. from the beginning of the injection. If the patient was not completely unconscious by this time we administered the remaining 2 c.cm. of the solution, but this was rarely necessary for simple cystoscopy. Where retrograde catheterisation of the ureters was to be carried out 0.3 g. was given, the cystoscope was passed and a further 0.2 g. was injected two minutes later, as rapidly as before.

Rapid injection is essential to ensure complete loss of consciousness with the small dose of anæsthetic used, and also to bring about rapid recovery. Though the

patient recovers consciousness quickly, the cystoscopy may still be continued satisfactorily, since he remains sufficiently stuporous for about ten minutes longer; during this period he can respond to instructions and appears to be quite comfortable. The withdrawal of the cystoscope may cause a momentary twinge of pain, but the patient rarely remembers this afterwards. The only complaint on recovering consciousness is, as a rule, a pressing desire to micturate. Delirium and excitement are absent. Unless the injection is made rapidly, the patient will be incompletely anæsthetised, and without supplementary anæsthesia cystoscopy will be difficult; moreover, complete return to consciousness will be delayed. There is on an average three minutes complete anæsthesia during which the bladder neck and trigone may be examined comfortably. After this time any but gentle movements of the cystoscope will tend to wake the patient and result in some reaction on his part, but he is easily controlled by a few encouraging words. At the beginning of anæsthesia there was in nearly every case cessation of breathing for varying periods up to half a minute. None of the patients became cyanosed, no anxiety was ever felt, and there was never any need for restorative measures.

Ureteric catheterisation was carried out on 11 patients satisfactorily. In all these 0.3 g. was followed by 0.2 g. The patients remained deeply unconscious for an average of three minutes, the average time of operation being ten minutes. The completely anæsthetised period was almost the same as when only 0.3 g. was used; the post-anæsthetic stupor was deeper and enabled the catheterisation to be carried out without any trouble. In all cases the patient recovered sufficiently to coöperate fully with the radiographer in the X-ray room adjoining the theatre by the time he was taken there.

The ages of patients ranged from 19 to 44 years and there appeared to be no appreciable difference in reaction to the anæsthetic on this score. All patients were able to get off the table with assistance and to walk to their wheeled chairs, although at this time their behaviour and gait were drunken in character; this was 10-15 minutes after the first injection. Full recovery was invariable within an hour, although at the end of this time some patients still complained of slight muzziness; they were, however, considered to be fully capable of going home. Except for one patient who complained of violent nausea, there were no unpleasant after effects.

In 3 cases the recovery of consciousness brought with it evacuation of the bladder alongside the cystoscope; this was probably due to the fact that the bladder had been overfilled. When this happened it was found satisfactory to stop the examination for a short period until the patient was sufficiently awake to follow instructions.

Cystoscopy, using the above technique, was carried out in a further 5 patients whose ages ranged from 59 to 77; the number of cases in this group is so small that we do not feel disposed to express any opinion except to record that results were uniformly satisfactory.

#### SUMMARY

Pentothal sodium anæsthesia has been found successful in 55 consecutive cystoscopic investigations. A dose of 0.3-0.5 g. seems to be completely safe.

It is essential to inject the anæsthetic rapidly if adequate anæsthesia is to be attained.

FOR SURGEONS' SONS.—Under the will of Mrs. Emily Wilson, Barkworth grants can be made to the sons of fellows and members of the Royal College of Surgeons of England who need financial assistance to meet the cost of their education at Winchester College. The number of candidates so far does not suggest that this limited application will lead to sufficient use being made of the income of the trust. The trustees are therefore considering whether they should apply for permission to make selections from a wider field, but before consenting to any enlargement of the field the council of the college wish to be certain that applications from fellows and members are not likely to be sufficient to ensure full use of the trust. They therefore ask if fellows and members who are anxious to take advantage of the bequest will communicate with Sir Alfred Webb-Johnson, PRCS, at their earliest convenience.

## Reviews of Books

**Chemistry and Physiology of the Vitamins**

H. R. ROSENBERG, ScD. New York: Interscience Publishers, Inc.; London: Imperia Book Company. Pp. 674. £3 12s.

VITAMINS are substances mainly of biological interest, so that the reader expects a book with such a title to give more space to the biological aspects than to the chemical. In this book, however, chemistry occupies first place not only in the title; it gets more than four times as much space as the physiology of the vitamins. Descriptions of their biological properties are thus somewhat scrappy and unbalanced, and unimportant details—for example, the discussion of deficiency of vitamin E—gets four pages while deficiency of vitamin D, about which much more is known, gets only one. The chemistry, however, is exhaustively covered, and many will be glad to have Dr. Rosenberg's comprehensive review of it. He describes methods of isolation, properties, chemical constitution, synthesis and industrial methods of preparation, with copious references to published work. His survey covers not only the less well-known vitamins such as pantothenic acid, inositol and vitamin P, but what he calls vitagens—substances such as the essential fatty acids, essential amino-acids, essential carbohydrates and choline. Here again his physiology is rather sketchy: for example, he says that animals on a completely carbohydrate-free diet do not survive. But the book is the most complete account of the chemistry of the vitamins now extant; laboratory workers will value it; and industrial chemists will welcome the index of vitamin patents issued in Europe and the USA, though others may grudge the 80 pages dedicated to this purpose in an expensive book.

**Young Offenders**

*An Enquiry into Juvenile Delinquency.* A. M. CARR SAUNDERS, HERMANN MANNHEIM, E. C. RHODES. London: Cambridge University Press. Pp. 165. 7s. 6d.

BEING composed mainly of tables compiled after careful inquiry into the varied causes of juvenile delinquency, this is a book to refer to rather than to read outright. No-one can afford to be complacent about the increase in juvenile crime. Many and complex factors have contributed to its development, and the authors are careful not to be dogmatic, or to give the impression that the answer is simple or easy to find. Published work is briefly surveyed; their compact and informative account does not seek to replace personal and individualistic studies of delinquency, but to convey the setting and background of juveniles charged with offences. The scrupulous freedom from bias prevents the book from being exciting, but the facts are there, set out in a way which makes them easy to follow.

**Neuro-anatomy**

WALTER R. SPOFFORD, PhD, instructor in anatomy, Vanderbilt University, Nashville, Tennessee. London: Humphrey Milford, Oxford University Press. Pp. 110. 12s. 6d.

To write an outline of the nervous system, to condense it within the narrow compass of 110 pages and to make it intelligible without the aid of any illustrations is a task from which most anatomists would shrink. Dr. Spofford is to be congratulated on having achieved this feat with judgment and skill; though it is to be doubted if any "general practitioner" or "advanced student" could take full advantage of the mass of catalogued facts unless he used the outline in conjunction with a good anatomical atlas. Probably those who avail themselves of this summary of neuro-anatomy will use the interleaved blank pages for drawing their own diagrams of the structures described in the text. Used in this way it should constitute a useful discipline; and for those whose visual memory of the structure of the central nervous system is already well established it will provide a summary by which they can refresh their memory of the intricate interconnexions of the various elements. The book is provided with an adequate index and a brief, but well chosen, bibliography.

**Athletic Injuries**

(2nd ed.) AUGUSTUS THORNDIKE, MD. London: Henry Kimpton. Pp. 216. 15s.

IN this little work Dr. Thorndike gives details of accidents seen during organised games in Harvard University from 1932 to 1941. Arguing from their frequency and severity he makes out a good case for the establishment of adequate medical organisation to deal promptly with them; but the elaborate arrangements at Harvard might not find many supporters in this country. Dr. Thorndike holds that only the fit ought to be allowed to play the more violent field games, since the unfit are so likely to sustain injury. He shows that injuries become much less common as the season advances and the players become fitter. The physical training and recreation of our armed forces results in many casualties, more than some think reasonable, and this little book shows how common such athletic injuries are. It will appeal to those concerned with men under training and their "attributable injuries."

**Midwifery**

(7th ed.) *Ten Teachers.* Editor: CLIFFORD WHITE, MD. Lond., FRCP, FRCS, FRCOG. London: Edward Arnold. Pp. 545. 18s.

THIS is the best edition so far of a well-tryed standard short textbook of obstetrics. Like its fellow volume *Diseases of Women* it has been carefully and completely revised, shortened, compressed and infused with a new vigour. The chapter on abnormal pelvis and pelvimetry is now brought up to date and thereby fulfils a need felt in former editions. In the chapter on anaesthetics in obstetric practice the authors give a comprehensive survey of the dangers of chloroform, to which they rightly draw attention; but they still recommend it because of its speedy action and simplicity of administration. The illustrations are a great improvement on previous editions. As a textbook for students it represents the standard London point of view.

**Handbook on Diseases of Children**

(3rd ed.) BRUCE WILLIAMSON, MD. Edin., FRCP. Edinburgh. E. and S. Livingstone. Pp. 364. 12s. 6d.

SINCE the second edition of this handbook appeared in 1936, the introduction of the sulphonamide group of drugs has so altered the treatment and prognosis of many pædiatric conditions that this event alone would call for a revision of existing textbooks. The author has paid suitable attention to modern chemotherapy in his revision and has also added a short section on diet in war-time. The number of illustrations, well chosen and reproduced, has been increased. Apart from such changes the book retains its original character. While it provides a useful and readable introduction to pædiatrics for students who are beginning their clerking in a children's ward or hope to revise the subject rapidly for an examination, its compass is too limited and treatment is dealt with too superficially to meet the needs of general practice.

**Allergy: Strangest of All Maladies**

WARREN T. VAUGHAN, MD. London: Hutchinson. Pp. 160. 10s. 6d.

Dr. Vaughan describes allergy in simple terms for the layman, recounting the development of the modern conception of allergic conditions, and the theories of humoral and cellular mechanism. He quotes from his experience dramatic and unusual cases to illustrate sensitivity to foods, inhalants and skin antigens; and rightly stresses the importance of the psychogenic factor and of the conditioned reflex or habit by which asthma attacks are produced by very minor stimuli, insufficient to have caused attacks when the patient first developed symptoms. He estimates allergic sufferers in the United States as 6 million each with hay-fever and skin conditions, and 3 million each with asthma, migraine, urticaria and allergic indigestion. He ascribes the cause of these large numbers to the artificial living conditions of the modern age, such as treated foods, new drugs and chemicals in industry, central heating and the motor-car—a world unfit for allergics to live in, indeed.

# THE LANCET

LONDON: SATURDAY, JANUARY 23, 1943

## THE TOMLINSON REPORT

REHABILITATION is a new field of remedial activity with great possibilities. It is perhaps not quite as new as Sir WILLIAM BEVERIDGE implied in this sentence from ¶426 of his report—no doctor is ever satisfied at heart until his job is complete—but of its latent possibilities on a grand scale no-one with vision can have the faintest doubt. To realise these possibilities—and this was part of “assumption B” of the Beveridge report—rehabilitation must be continued (¶438) through the post-medical stage till the maximum of earning capacity is restored and a service for the purpose should be available for all disabled persons who can profit by it irrespective of the cause of their disability. This, as BEVERIDGE foresaw, involves action both by the departments of health and by the Ministry of Labour and National Service. The committee under the chairmanship of Mr. G. TOMLINSON, MP, which reported<sup>1</sup> last week to the Minister of Labour and the Paymaster General, speaks with authority wider even than that, for it included also in its membership representatives of the Board of Education, the Ministry of Pensions, the Treasury and (in the person of Mrs. M. A. HAMILTON) of the offices of the War Cabinet. And the committee's terms of reference covered disablements from all causes, not only physical injury and congenital deformity but conditions resulting from disease. The scope of the recommendations can be seen at a glance in the appendix to the report, reproduced on another page; this is a sort of blue-print of things to come, ambitious no doubt, but not fanciful. The major “assumptions” are money to provide the equipment, time to train the personnel, and full recognition of remedial therapy as a branch of medicine; none of them out of reach if public opinion considers the object worth while. There are already working models of the various parts of the scheme which only need to be followed elsewhere; it is rather like the new Factory Act which simply decreed that the practice of the best factories should become the standard of all. The assumptions do not, like those of the Beveridge report, imply a change of heart but only a widening of existing well-doing.

Two proposals of a highly practical kind stand out from the rest. One is that the universities and royal colleges should consider instituting a diploma to cover the special needs of rehabilitation; there is at present little to attract a sufficient supply of qualified persons to what the report calls “medical rehabilitation.” A special diploma has proved a useful stimulus in the early development of accepted fields of medicine such as public health, tropical hygiene, radiology and so on. A diploma is also suggested for the ancillary workers (but let us protest in advance against rehabilitologists and rehabilitationists). The other is to avoid the term “disabled person” and to substitute “persons handicapped by disablement.” The factor of disablement must be considered not in its personal sense but in its relation to employability. Some disablements

prevent employment in certain occupations but constitute little or no handicap to efficiency in other occupations. The report states categorically that, granted goodwill and coöperation on both sides, ordinary occupation is practicable for the majority of the disabled: “We do not prefer cripples, but we have demonstrated that they can earn full wages,” Mr. HENRY FORD once remarked, and the committee are out to give the disabled the chance to prove their worth. Industry must accept responsibility for placing those who have been adequately trained to return to work, and legislation is proposed, in suitable occupations, restricting the engagement of whole employees until a prescribed quota of the registered disabled have been provided with jobs. The remainder will require employment under sheltered conditions, to be provided through production for public purposes. A survey of occupations suitable to particular disablements is to be made by the Ministry of Labour. All in all, the Tomlinson report looks rather like a charter for the handicapped.

## CHEMOTHERAPY OF EYE INFECTIONS

THE outstanding success of ocular chemotherapy so far has been the treatment of gonococcal conjunctivitis with sulphapyridine. Administration of this drug by mouth stops the conjunctival discharge in 24–48 hours, and this with no local treatment other than swabbing of the lids with moist pledgets of wool to prevent accumulation of discharge. This considerable advance will save the sight of many eyes which would otherwise have been lost through corneal scarring or perforation. The older method of silvering the conjunctiva has thus been superseded, and no-one will regret the passing of a treatment which though of great benefit had its dangers. More recently corneal ulcers have been treated with sulphanilamide and sulphapyridine in the form of eye drops or a dusting powder. Either method caused some irritation, and it was difficult to achieve a concentration high enough to be effective; but good results were claimed by LLOYD JOHNSTONE<sup>1</sup> with a 0.07% solution of sulphapyridine in saline isotonic with the tears. If a dusting powder is used the eye should first be anaesthetised with butethanol, not an easy task where the conjunctiva is inflamed and swollen. Now that a non-irritating sulphanilamide has been found in sodium sulphacetamide it is doubtful whether these earlier methods will be much used. It was inevitable that the sulphonamides would be tried in the treatment of trachoma, and some encouraging reports have been received. LOE<sup>2</sup> and SIE-BOEN-LIAN<sup>3</sup> found that the acute symptoms subsided promptly, and in many cases they considered the condition cured. Their methods were followed by GRADLE, RICHARDS and others, and many came to believe that trachoma could be cured by sulphanilamide alone. It seems likely however that while the acute inflammatory changes can be made to disappear there is less effect on the chronic conjunctival lesions, and that the papillary hypertrophy and follicles remain.

The sulphonamides being bacteriostatic rather than bactericidal, success in treatment depends on catching the infection in its early stages and maintaining a high concentration of the drug in the conjunctival sac.

1. Johnstone, I. L. *Brit. med. J.* 1941, i, 887.

2. Loe, F. J. *Amer. med. Ass.* 1938, 111, 1371.

3. Sie-Boen-Lian, *Ophthalmologica*, 1939, 98, 208.

1. Report of Inter-departmental Committee on the rehabilitation and resettlement of disabled persons. Cmd. 6415. HMSO. Pp. 51. 9d.

ROBSON and SCOTT describe on another page a series of experiments, carried out in the department of pharmacology of the University of Edinburgh, to ascertain the effects of local chemotherapy on the *Staphylococcus aureus*. This organism was chosen because it has so far proved resistant to the sulphonamides, and in spite of some good reports sulphathiazole used in the conjunctival sac had been ineffective against it. It is doubtful however whether the *Staph. aureus* is a common cause of sight-destroying eye infections; most authorities ascribe no more than 4-7% of severe corneal ulceration to this organism. ROBSON and SCOTT injected a selected strain of *Staph. aureus* beneath the corneal epithelium of each of a rabbit's eyes. Since the quantity of the suspension used was very small, the exact diameter of the blebs raised (rather than the quantity injected) was measured, and equality of the lesions was thus ensured. If untreated the lesions showed ulceration in 24 hours and hypopyon in 48 hours, ending in severe corneal scarring with loss of useful vision in the eye. When such lesions were treated with penicillin drops, begun an hour after the infection and continued hourly, definite benefit was seen and scarring was prevented or was merely trivial; moreover, no staphylococci could be grown from the conjunctival sac either during the treatment or for some days after it had been stopped.

Penicillin is not easily obtainable and sodium sulphacetamide ('Albucid Soluble') was therefore given a trial. This also produced good results, though penicillin did better. This sulphonamide is highly soluble and diffusible and can be used in strengths of 10-30% without causing any irritation. Treatment to be effective in this series of cases had to begin within the first hour or two of infection, which might suggest that the usefulness of the drug would be limited to prophylaxis. But the infection in these experiments was very acute, and there is some evidence that hypopyon ulcers develop more quickly in rabbits than in man; thus vigorous treatment was necessary to prevent the development of a rapidly progressive lesion. In milder infections treatment could probably be applied at intervals longer than an hour. Indeed it has been shown that treatment three or four times a day with 2.5% sodium sulphacetamide will prevent much of the secondary infection associated with mustard gas lesions of the rabbit's eye; and it has now been officially recommended that the drug should be used in the treatment of all eye casualties due to mustard gas. ROBSON and SCOTT<sup>4</sup> have shown elsewhere that, when a culture of *Bacillus pyocyaneus* is applied to the abraded cornea of the rabbit, treatment with 30% sodium sulphacetamide three or four times a day is of great benefit if started early. When really intensive treatment is needed—for an established infection, say—it might be possible to overcome the difficulty of hourly instillations by the use of an ointment, or by means of the Stannard bag or the contact funnel.<sup>5 6</sup> From the point of view of prophylaxis, sodium sulphacetamide, in the opinion of ROBSON and SCOTT, is more effective in preventing corneal ulceration than any treatment previously used for the purpose; and they suggest that it should

be placed in the eyes of newborn infants instead of the usual silver preparations.

This sulphonamide has been used in an investigation into corneal ulceration in Scottish miners which has now been carried on for more than a year by the Ross Foundation for the Prevention of Blindness; DICKSON<sup>7</sup> found that more than half the patients attending the Edinburgh Royal and Glasgow Eye Infirmaries with traumatic corneal ulcers were miners. It was decided that in thirty selected Scottish collieries the old "eye drops no. 1" (cocaine and perchloride of mercury in castor oil) should be replaced by sodium sulphacetamide, 10%. Miners were encouraged to report as soon as they received any eye injury, and instructions were given that a drop of the solution was to be placed in the conjunctival sac of all miners attending the first-aid room with such injuries. Fresh supplies were sent to the mines every two months. It was intended that the trial period should last a year, but reports were so satisfactory after six months that it seemed unjustifiable to withhold the treatment any longer from other Scottish collieries; and indeed the Department of Mines have been urged to recommend that this new treatment be adopted in mines throughout the country. Where it has been tried 96.3% of all eye injuries have been treated with no loss of working time—a remarkable record.

#### TETANY IN THE MOTHER

IN normal adults the serum calcium is kept remarkably constant at 10-11 mg. per 100 c.cm.; a fall of even 3 mg. may produce alarming symptoms. The level is controlled by the parathyroids, though ROBERTSON,<sup>8</sup> from observations on cases of thyrotoxicosis and myxoedema, thinks the thyroid may also affect it through its control of the urinary secretion of calcium. The serum calcium merely indicates the height of the calcium stream, and gives no indication of the flow out of the body or into storage. The skeleton is the body's only storehouse of calcium, and by some mechanism not clearly understood the parathyroids determine whether the bones shall take in calcium from the blood-stream or dole it out. A deficiency of calcium absorbed from the food may therefore not show itself by a fall in serum calcium until considerable inroads have been made on the skeletal store. Thus the earliest sign of calcium deficiency may be radiological evidence of osteoporosis, such as has recently been reported in South Africa,<sup>9</sup> though unfortunately demineralisation of the skeleton first affects the bone trabeculae where it may not show in X rays. A more reliable early sign is obtained from studies of the calcium balance. The normal adult needs something like 0.5 g. of calcium daily if his intake is to balance his output; a fall in this equilibrium figure is a sign that the body is trying to compensate for a habitually low intake, and may also indicate depleted stores. Such depletion may arise from defective absorption as well as insufficient intake, and absorption depends on the vitamin D, phytic acid and protein content and the calcium/phosphorus ratio of the diet, as well as on the subject's gastric acidity. The clinical effects of slight deficiencies of calcium have yet to be established, though

4. Robson, J. M. and Scott, G. I. *Brit. med. J.* 1942, 1, 5.  
5. Robson, J. M. and Scott, G. I. *Trans. ophthalm. Soc. U.K.* (in the press).  
6. Robson, J. M. and Tebrich, W. *Brit. med. J.* 1942, 1, 687.

7. Dickson, R. M. *Brit. J. Ophthalm.* 1942, 26, 529. See also *Lancet*, 1942, ii, 325.

8. Robertson, J. D. *Nature, Lond.* 1941, 148, 724.

9. Meyer, A. A., Oosthuizen, S. F. and Shapiro, H. A. *Lancet*, 1942, ii, 639.

it has been suggested that maternal dental caries and pelvic contraction may be two of them. The first symptoms of gross deficiencies will be those of osteomalacia or tetany, the former from a gross drain on the skeleton store and the latter from a fall in the serum calcium below about 7.5 mg. per 100 c.cm. Hypocalcaemia is always evidence of a failure in parathyroid control, but it seems that an inadequate intake alone will affect parathyroid function in time.

In pregnancy the mother loses calcium to the foetus, and in lactation she loses it in her milk. The full-term foetus has an average calcium content of about 25 grammes. During its first four months the foetal mineral requirements are insignificant, and probably two-thirds of the foetal calcium is deposited in the last three months. LRU and his colleagues<sup>10</sup> estimate that at least 200 mg. of calcium and 100 mg. of phosphorus must be retained by the mother daily during the last three months of pregnancy if she is to avoid demineralisation and the baby is not to be predisposed to rickets, and this extra demand persists throughout lactation. Thus, when allowance is made for incomplete absorption, the mother needs for about a year something like twice the calcium intake of the normal adult, and to be on the safe side her intake should probably be 2 g. daily.<sup>11</sup> Hence the supreme value of the extra milk ration, which not only ensures that the mother can get the milk she needs but also acts as a constant reminder of that need. KEHRER,<sup>12</sup> and ANDERSON and MUSSELMAN<sup>13</sup> classify the types of tetany met with in pregnancy and lactation into four main groups: calcium deprivation; postoperative; thyroidic; and idiopathic or spontaneous. In the postoperative group temporary or permanent hypoparathyroidism follows an operation on the thyroid gland; before pregnancy and during its early months the patient may be symptom-free, but in the last four months a latent tetany becomes active or even fatal. McCARRISON<sup>14</sup> described 60 cases of the third group associated with goitre; he observed that tetany was particularly likely to appear in these patients in the spring and that there seemed to be a familial predisposition. The last group is an unsatisfactory one, for it contains the cases where no cause for tetany can be established, as well as the cases such as that described by LISSER and others,<sup>15</sup> in which tetany followed the loss of 1500 c.cm. of blood during labour.

The treatment of tetany in pregnancy now differs in no way from that of tetany without pregnancy, as summarised by ROBERTSON,<sup>16</sup> but not long ago therapeutic abortion was done in these cases because of the high infantile and maternal fatalities. For the last fifteen years, however, the prognosis for both mother and child has improved with the introduction of treatment with adequate doses of calcium, parathyroid hormone, low phosphorus diets, and the ergosterol derivatives D<sub>2</sub> (vitamin D or calciferol) and dihydrotachysterol (AT 10). AT 10 has no advantages over D<sub>2</sub>; their actions are similar if they are

given in comparable doses, 1 mg. of D<sub>2</sub> being equivalent to 0.1 c.cm. of AT 10 and each containing 40,000 international units. The dose of either sufficient to raise the serum calcium to normal varies from 60,000 to 200,000 units; thereafter all danger of a recurrence can be avoided throughout pregnancy and lactation by ensuring a daily calcium intake of 2 g. and continuing with maintenance doses of the ergosterol derivatives, an average dose being 100,000 IU daily. The serum calcium should be estimated from time to time during treatment to detect hypercalcaemia before it can give trouble.

## Annotations

### ELEMENT 85, AS PROMISED

THE discovery of a new element will always make an appeal to the imagination, though the blasé may murmur "I predicted it." Element no. 85 has been discovered by Professor Minder and Dr. Alice Leigh-Smith, according to reliable reports from Berne, where Minder is director of the Radium Institute. The discoverers very properly propose the name "Anglo-Helvetium," but they may consent to a briefer name when the infant becomes adopted by the main brotherhood of science. The existence of this element has been predicted since 1931, and in Soddy's *Interpretation of the Atom* it is designated "eka-iodine" with place no. 85, a remarkable prediction when we read of the properties of the newly discovered element as being akin to chlorine, bromine and iodine. Though the methods which led to the discovery appear to have been physical rather than chemical, which was also the case for hafnium, yet in the main the credit for the discovery of these goes to the chemists. When the search had taken them a long way the systematists got to work, saw periodicities when others only saw properties, and brought in the era of prediction. One notable contribution during this phase, however, was made by Moseley, a physicist whose brilliant prediction of new elements on the basis of characteristic X-ray emission was verified to the full. No less successful has been the displacement law of Soddy and Fajans as applied to radio-active elements; this latest and perhaps last discovery of an element is of a radio-active one. All the elements from hydrogen to uranium—nos. 1 to 92—have now been discovered, and the question inevitably comes, are there ultra-uranium and infra-hydrogen atoms? Time will show, but from the wide choice now existing a chemist could build up a world almost as we know it with no more elements than ten. Yet the others are amazing ingredients and the discovery of the rare gases and radio-active bodies bid us pause before we reject the minute as insignificant. In this spirit we may well salute the new element and congratulate the discoverers.

### TRANSPLANTED TEETH

TRANSPLANTATION and replantation of teeth has been practised from the earliest times. In *Les Misérables* Victor Hugo describes how La Fontaine in the last stages of her poverty sells her front teeth to the surgeon dentist for transplantation into the mouth of a wealthy lady, thus in her extremity sacrificing her capital in order to exist, for a prostitute without front teeth would have very little lure. The prognosis in such a case would be good, and if an abscess did in time develop the process could be repeated. All experienced dentists can relate instances of teeth having been accidentally knocked out and immediately replaced, and these teeth have become firmly set and remained serviceable for many years. In a certain proportion the pulp will eventually die and an abscess will form, entailing extraction, or the saving of the tooth by root filling or crowning. In this transplantation and implantation one factor has always been

10. Liu, S. H., Chu, H. I., Hsu, H. C., Chao, H. C. and Chen, S. H. *J. clin. Invest.* 1941, 20, 255.
11. *Quart. Bull. Hlth. Org. L.O.N.* 1938, 7, 460.
12. Kehrler, E. *Arch. Gynäk.* 1913, 99, 372.
13. Anderson, G. W. and Musselman, L. *Amer. J. Obstet. Gynec.* 1942, 43, 547.
14. McCarrison, R. *Lancet*, 1911, i, 1575.
15. Lissner, H., Smith, R. K. and Shephardson, H. C. *J. Amer. med. Ass.* 1927, 88, 461.
16. Robertson, J. D. *Lancet*, 1941, ii, 795.

considered essential to success—a healthy and undamaged periodontal membrane—and great care has been taken to protect the membrane and keep it sterile. Pleasant<sup>1</sup> has adopted a technique in which this factor is ignored. The abscessed tooth is extracted and the socket curetted to promote bleeding and remove the abscess sac. The socket is treated with hydrogen peroxide and the tooth placed in peroxide until effervescence has ceased. The root canal is then opened up and the pulp removed; then all traces of the periodontal membrane are also removed, the root is roughened with a fissure burr and again placed in peroxide, dried, and the root canal filled with soft cement. The socket is again swabbed with peroxide and the tooth is promptly replanted and a splint cemented on and left for a month. In some cases the tooth is not replaced for several days. Pleasant contends that if the treatment is successful even for a few years it is justified, but many will disagree. With a healthy periodontal membrane there is a good chance of a healthy union between it and the lining of the tooth socket, and thus the periodontal membrane will nourish the periosteum of the tooth; but with the membrane and pulp removed the tooth is just dead bone; and the body abhors dead bone as much as nature abhors a vacuum. The end of that tooth must be gross sepsis; in the meantime it will act as a focus of infection and the patient may suffer serious remote effects for the sake of keeping one tooth, and probably a discoloured one at that, for a few years. Pleasant's radiograms, taken 6–18 months after implantation, do not show healthy surrounding bone; moreover, if the bone grows around the tooth as he contends, it will grow into the roughened groove made in the root, and extraction of the tooth later on will be extremely difficult, unless it becomes loosened by sepsis. The procedure, in fact, though dentally feasible, seems medically unwise. It behoves every dental surgeon to see that the work he does to the mouth does not become a potential source of ill health to the patient; his motto should be "So to strive that the oncoming morrow brings no vain regrets or unavailing sorrow."

#### NEURITIS FROM FAT SUBSTITUTES

A CURIOUS side-light upon the shortage of fats in Germany has just come to hand. In May, 1942, it was reported<sup>2</sup> that some cases of triorthocresyl phosphate poisoning had occurred among factory workers in Münster. This substance is used in a fat substitute and the patients, workpeople in a factory, had apparently obtained the fat substitute from their place of work. They had taken it home and because of the shortage of natural animal and vegetable fats had used it to fry potato pancakes. Naturally enough they developed severe symptoms of nausea, vomiting, abdominal cramps and diarrhoea, followed in ten days by rapidly increasing weakness of the feet, legs and then arms. There was progressive atrophy of the muscles, which showed the reaction of degeneration. As a result of this outbreak, a warning has been issued to factory medical officers in Germany who are instructed to prevent recurrences by education and propaganda. Triorthocresyl phosphate attracted notice in America during the prohibition period as an adulterant of Jamaica ginger extract, whose alcoholic content is 70% (USP). A series of outbreaks of "jake palsy" were traced to triorthocresyl phosphate; the Cincinnati General Hospital alone admitted 400 cases in 6 months in 1930, practically all of whom were men. The symptoms were identical with those encountered in the German cases, and Aring,<sup>3</sup> who has described the syndrome in detail, speaks of a severe motor and sensory neuritis with cramps and great pain, affecting the legs first; weakness of trunk muscles was present in a quarter

of the cases. Merritt and Moore<sup>4</sup> reported signs of pyramidal involvement, and Aring, in a follow-up of his cases, found that recovery, which was usually very slow, was in some instances accompanied by signs of damage to the central nervous system. A year or more after the onset the gait was spastic and there was wasting of the extremities, with glove and stocking anaesthesia. The effect of the toxin is primarily upon the smaller arteries and capillaries, which develop hyperplastic fibrosis during the latent period of 7–14 days. Ischaemia causes muscle atrophy followed by fibrosis, acute neuritis with fibrous overgrowth reminiscent of Dejerine's polyneuritis, patches of degeneration in the cord and brain stem, and fibrous changes in other organs. When death occurs it is usually due to complications, but few patients recover completely. Cases previously described have arisen as a result of shortage of alcohol, and it is a reflexion upon the state of affairs in Europe that they are now occurring through shortage of essential foods.

#### VECTOR OF INDIAN KALA-AZAR

FOR many years much painstaking work has been put into investigations on the mode of transmission of kala-azar in India. It was early established that the sandfly *Phlebotomus argentipes* occurred wherever the disease was endemic; and it was then shown experimentally that the feeding of numbers of this insect on cases of kala-azar in India resulted in the development of flagellate forms of *Leishmania donovani* in the fore- and mid-guts of some of the fed flies. The successful completion of the investigations appeared to be in sight; but it was then found that only isolated susceptible animals could be infected by the bites of infected flies, and no human volunteers were successfully infected experimentally by this means. The inquiry seemed to have reached an impasse. There were sound reasons for believing that *P. argentipes* was a natural vector—no other mode of transmission seemed probable—but the final proof of observed human infection could not be obtained, and the almost consistent failure to infect animals in large-scale experiments was disturbing. Sundry explanations were advanced; that the parasites were obtained from cases after the peak of an epidemic when the virulence of the parasite was waning was one put forward by the original workers in India. A further paper<sup>5</sup> now published in India advances the matter considerably. The successful infection of five out of five human volunteers by the bite of experimentally infected *P. argentipes* is announced, and conclusive proof of the ability of this insect to transmit the disease from man to man is at last forthcoming. A successful conclusion has thus been reached to over twenty years' arduous and careful work. How was this end achieved? In this particular experiment, the flies were sustained during the couple of weeks of development of the parasite in them on fruit juices, instead of on blood meals as had been the previous practice. This fact and the fact that the strain of parasites was obtained from Assam at a time when an epidemic of the disease is expected may explain the success. It will be interesting to await developments and see which, if either, of these factors has provided the solution of the previous difficulty.

The credit for the successful issue of the work belongs in part to each of the many who have continued the train of investigation. In 1921 L. E. Napier and R. Knowles initiated an inquiry on kala-azar at the Calcutta School of Tropical Medicine by an entomological survey of a part of the city where the disease occurred, and in 1924 they were joined by R. O. A. Smith. This inquiry was continued with Napier, and later Smith, in charge of it. In the meantime in 1924 a special Kala-azar Commission had been founded and financed by the Indian Research

1. Pleasant, S. A. *Brit. dent. J.* 1942, 73, 308.  
2. Humpe, *Münch. med. Wschr.* 1942, 20, 448.  
3. Aring, C. D. *Brain*, 1942, 65, 34.

4. Merritt, H. H. and Moore, M. *New Engl. J. Med.* 1930, 203, 4.  
5. Swaminath, O. S., Shortt, H. E. and Anderson, L. A. P. *Ind. J. med. Res.* 1942, 30, 473.

Fund Association to study the disease in the endemic areas of Assam. This commission was first directed by S. R. Christophers, with P. J. Barraud as entomologist, H. E. Shortt as protozoologist, and C. S. Swaminath as technical assistant. In 1925 Shortt became director; A. C. Craighead, R. O. A. Smith and K. V. Krishnan joined the commission at different times. The association of what has now proved to be the vector with the disease had been noted by the Calcutta workers and they also first successfully infected the flies. Their work was confirmed in Assam where large-scale investigation went on until 1931. Continuity was maintained by renewed activity of the Calcutta team until 1939 when a fresh epidemic broke out in Bihar, of which Smith assumed charge. The war brought this inquiry to an end in 1941, but some of the staff were able to carry on for a time in the Madras Presidency. A combined team was then posted to Assam where recrudescence of the disease enabled Smith to perfect a technique for the production of sandflies in a highly infected state, which in turn enabled Swaminath, Shortt and Anderson successfully to conclude the long series of experiments and to provide a fitting culmination to a fine record of sustained endeavour.

#### AN IRISH YESTERDAY

In 1934 the Hospital Commissioners for Dublin recommended as part of their development scheme that Sir Patrick Dun's Hospital should be amalgamated with some others; and it was suggested that before its identity was thus merged in a new body a record should be made of its history. This task has been fulfilled by Prof. T. C. Moorhead in a book<sup>1</sup> which has just appeared. The story was worth telling, for—thanks to its close connexion with the medical school and teaching staff of Trinity College—the hospital has helped to educate an uncommonly large number of distinguished men. Dun was an Aberdonian, born in 1642, who by the age of thirty-four had settled in Dublin as a physician on the staff of the Duke of Ormond, then Lord Lieutenant of Ireland. He had much professional success in Dublin, was elected to the Irish House of Commons, and was president of the Royal College of Physicians of Ireland on many occasions, sometimes holding office for several years at a time. By his will, made in 1711, two years before his death, he left the bulk of his property, after Lady Dun's life interest, to establish "one or two Professors of Physic" in the College of Physicians. Professors were duly appointed, and gave formal lectures, but towards the end of the eighteenth century the College was feeling keenly the need for a complete Irish medical school with opportunities for clinical teaching. With the aid of the Board of Trinity College, the College of Physicians succeeded in getting a statute passed in 1785 for the founding of such a school. New professorships were established, and the importance of bedside teaching was recognised by the ruling that clinical lectures should be given by the professors in Dublin hospitals. Attempts were made to carry this out, but the governors of the Mercer's Hospital refused to allow clinical teaching in the wards. In 1788 the College of Physicians took a house in Clarendon Street and put in 17 beds; this little hospital was only open during the six winter months, and had to be closed after two years owing to the high cost of maintenance. Then in 1791, an act was passed empowering the college to raise £1000 on Sir Patrick Dun's estate to build a hospital. In 1793 the first physician in ordinary was appointed to this new hospital of 31 beds; its maintenance was to depend in part on public subscriptions, and these unfortunately were not forthcoming, so that in 1796 it had to be closed; in any case it had scarcely fulfilled its purpose—no clinical lectures had been given there. Later, clinical wards were established by the

Sir Patrick Dun foundation in the Mercer's Hospital—an association which had its ups and downs. Finally an act was passed enabling the college to build an entirely new hospital, and by 1808 this hospital, occupying the present site, was being used for clinical instruction of students. The elegant and dignified building was completed in 1816. For over fifty years it remained a purely medical institution, and it was not until 1864 that surgical patients were admitted and regular teaching in surgery was begun. The staff was drawn from among the professors of Trinity College. Many have taken their place in medical history, the best known perhaps being Edward Hallaran Bennett, who introduced Listerian methods into Ireland, and the Smiths, Aquilla and Walter, father and son, who were professors of *materia medica* in succession.

Plans for the amalgamation of Sir Patrick Dun's with other Dublin hospitals have been held up by the war; when the time comes for them to be carried out it is to be hoped that neither the name nor the traditions of this worthy and tenacious hospital will disappear.

#### LIFE STORY OF A DIPLOMA

THE Cambridge diploma in medical radiology and electrology which has made several graceful gestures towards its death bed in the last few years has now been permitted to lie down on it and expire. It was announced in 1941 that death might be expected in October, 1942, and that the course begun in 1941 would be the last given for the diploma. It was founded soon after the last war as the result of a memorandum received on May 26, 1917, by the University Senate from leading English radiologists. They pointed out the need for a proficiency test for those taking posts in this important scientific development, then still relatively new. Chairs and lectureships in medical radiology had been established in many foreign universities and qualifying examinations offered for several years. The memo was referred, in due course, to the special board for medicine and this body favoured the establishment of a diploma, and proposed regulations. The diploma was to qualify the holder for official posts in radiology and electrology at home and in other parts of the British Commonwealth, and was to be awarded to those who had undergone a satisfactory course of training, part of which at least should have been taken in the university. The board reached this opinion after considering the medical curriculum and deciding that it was already overloaded; it would be impossible, they felt, to introduce such an important and extensive group of subjects into the fourth and fifth year of medical training. Moreover they considered that only the qualified man, relieved of the burden of finals, was in a position to derive full benefit from such a specialised course of study, suited to mature students who had already received some preliminary training in physics, anatomy, physiology and pathology. Much of the merely technical work, it is true, can be carried out by the photographic and electro-technical expert, but only the doctor can be expected to foresee the application of new developments to diagnosis and treatment, and also their limitations and dangers. With these considerations in mind the regulations for the diploma were framed. Rutherford was a warm supporter of the scheme to establish the diploma in order to raise the status of medical radiology, but there was from the start a feeling that the university was not prepared to continue it indefinitely. It was founded in the first instance for five years, and from time to time was given a new lease of life for five-year periods. Originally it was intended that all candidates should be resident in Cambridge while working for part I of the examination, but residence was impossible for many who wished to take the examination and a parallel course was arranged in London, under the direct control of Cambridge University working through the British Association for the Advancement of Radiology and Physiology (later to become the

1. *A Short History of Sir Patrick Dun's Hospital*. Dublin: Hodges and Figgis and Co. 1942. Pp. 225. 7s. 6d.

British Institute of Radiology). For students taking this London course Cambridge was simply an examining body. The first course began in the spring of 1920, and more than 500 candidates from all parts of the world have now taken the diploma, which has kept its leading place among the qualifications founded later. In 1921 Liverpool instituted a diploma, to be followed by Edinburgh in 1926, and by London University and the Conjoint Board in 1933.

Of those who worked hard to give the Cambridge diploma life and vigour Shillington Scales will be remembered as an enthusiastic secretary of the managing committee and lecturer in radiology from the time of the foundation of the diploma till his death in 1927. Much of the apparatus on which he demonstrated in Addenbrooke's Hospital he made himself. His place as university lecturer was taken with equal energy and enthusiasm by Dr. A. E. Barclay; physics was taught by Prof. J. W. Crowther until 1924 and then by Prof. G. Stead until 1941, and Professor Stead was also secretary from 1927 to 1943 of the managing committee, over which four regius professors presided in succession. The London teachers included Dr. Harrison Orton, Dr. Russell Reynolds, as well as the late Robert Knox, Stanley Melville and E. P. Cumberbatch. Prof. Sidney Russ, besides teaching throughout the whole period, was also tireless in committee. Regrets there may well be, but the DMRE Camb. has done its work and leaves an honourable record.

#### QUININE CONTROL

THE quinine order of last summer has been superseded by a second order which came into force at the new year. In several of its provisions this new order is much more drastic than the first, for at least two reasons: British practice had to be brought into line with that of the other united nations; and the spirit of the previous order was not being carried out closely enough. Doctors were evidently not sufficiently aware of the position, though the medical journals have done their best to keep them posted. It is not easy to drop the habits of years in prescribing but the war in the east depends much on antimalarial measures; the bulk of the world's cinchona is in the hands of the Japanese, and it has become a duty to conserve quinine. Yet one pharmacist was reproached last month by an eminent consultant because he could not provide a quinine tonic for a patient's hair. Wastage due to the use of quinine in proprietary medicines was adequately controlled by the first order; withdrawal of quinine except as an antimalarial should cause little difficulty. As an antipyretic quinine has been superseded by the modern synthetic drugs; and as a stomachic it has no special merit save its bitter taste. Obstetricians may find it inconvenient to do without quinine but the difficulty is not insuperable as Mayes showed in a recent article<sup>1</sup> on quinine substitutes. In malaria, however, quinine is irreplaceable despite the introduction of mepacrin and pamaquin; in any case the production of these new synthetic drugs is complicated. The new order makes it illegal to prescribe, dispense or supply cinchona and its preparations, cinchona alkaloids, their salts and preparations, mepacrin or pamaquin, except in the treatment of malaria; or quinidine except in the treatment of cardiac arrhythmia. All stocks which are equivalent to more than 16 oz. of quinine must be notified to the Ministry of Supply. When any of the controlled materials, or preparations or mixtures thereof are prescribed, the name and address of the patient and of the prescriber must both be set out. The only exceptions to these rules are granted under special licence issued by the Ministry. Such powers have not been assumed lightly. Those who have had experience in the East know how devastating the effects of a large scale malaria epidemic can be. Our armies must be protected

from this danger; once this is fully understood the spirit of the order will be carried out unquestioningly.

#### EOSINOPHILIA

MILD increases of eosinophil leucocytes above the normal of about 250 per c.mm. occur in several conditions such as asthma, urticaria and other allergic states, hydatid disease, parasites in the intestine, some skin diseases, certain infections particularly scarlet fever, and there is a rare familial form. Sustained eosinophilia with high percentages of an increased total leucocyte count are much less common. The classical example is trichiniasis, in which counts of 15,000 eosinophils per c.mm. (making up 85% of the leucocytes) have been recorded; other well-documented instances are in angioneurotic oedema, pemphigus, uncinaria infestation and Hodgkin's disease. There is also the mysterious condition called eosinophil leukaemia; mysterious because although it shows the characteristics of myeloid leukaemia—leucocytosis, enlarged liver and spleen, infiltration of eosinophils into various tissues—the eosinophil leucocytes are mostly adult forms and there is none of the immaturity that typifies leukaemia generally. Finally, there is the odd combination of transitory lung infiltrations with eosinophilia in the blood known as Löffler syndrome. In this issue Dr. Weingarten describes in detail a tropical eosinophilia that occurs in India and that seems to fit into none of the recognised categories. It is accompanied by lung symptoms—attacks of bronchial asthma and focal bronchopneumonic infiltrations affecting both lungs uniformly—but unlike asthma or Löffler syndrome the disease is accompanied by serious general symptoms, including loss of weight, and it continues for weeks at a time. The condition quickly responds to organic arsenicals, one course usually being sufficient.

#### MIND WHAT YOU'RE DOING

THERE is something affronting in the idea of lives lost through personal carelessness. The fact that 8000 people die yearly from accidents which have nothing to do with either the roads or industry suggests that we are a fumbling ham-fisted lot; and some might say these fatal accidents served the victims right. An analysis by the Royal Society for the Prevention of Accidents of 1153 such cases, however, shows that the victim is not necessarily the careless fellow; he may be some perfectly innocent second party, often a child. Thus nearly a fifth of the deaths were due to burns and scalds, and 80% of the scalds were received by children under four who had been left near teapots and kettles, and had pulled them over on themselves; of the 142 deaths from burns, 44 were of children playing near unguarded fires or lighted candles, or left alone in the house. Of 73 children under 15 who were drowned 20 were under school age and had strayed unaccompanied near water. Apart from children, old people are common victims of accidents. Thus 395 of the 582 victims of falls were over the age of 65. Other causes of accidents were explosions—12 due to tampering with live munitions and 31 from carelessness with firearms—and electrocution, sometimes due to a combination of faulty apparatus and wet (achieved for example, when a woman uses a defective iron while standing on a wet floor). The moral is clear, but difficult to press home. The association does its best by reminding us: to allow for the weakness of old people; to light stairs properly; to leave fires guarded; and to keep an eye on the young.

Dr. JOHN RYLE, regius professor of physic in the University of Cambridge, has been appointed to the new chair of social medicine recently created in the University of Oxford by the Nuffield Provincial Hospitals Trust.

Sir WM. ARBUTHNOT LANE, consulting surgeon to Guy's Hospital, died on Jan. 16 at his London home in his eighty-seventh year.

1. Mayes, B. *Med. J. Aust.* 1942, ii, 408.



**REHABILITATION SCHEME FOR VARIOUS TYPES OF DISABLEMENT**  
(BEING THE APPENDIX TO THE TOMLINSON REPORT)

I—Type of disablement.	II—Type of institution in which treated.	III—Remedial treatment.	IV—Resulting medical condition.	V—Further provision needed.	VI—Type of centre or institution.
1. Fracture or other physical injury.	Orthopaedic centre. Fracture unit. General hospital.	Surgical or orthopaedic. Occupational therapy. Remedial exercises and physiotherapy. Hospital workshops.	(a) Complete restoration. (b) Partial restoration—but allowing return to ordinary employment in previous or similar occupation. (c) Permanent disability preventing return to previous occupation, but permitting employment in a new occupation—after training if necessary. (d) Permanent and serious disability causing a grave handicap to employment and, in some cases, preventing employment under ordinary conditions.	(a) In some cases reconditioning course. (b) Ditto. (c) Vocational training—preceded in some cases by a reconditioning course. (d) Specialised vocational training or sheltered employment. <i>Note.</i> —Artificial limbs may be required for some cases under (c) and (d).	(a) Reconditioning centre. (b) Ditto. (c) Vocational training centre—after (for some cases) a preliminary course at a reconditioning centre. (d) Special training centre for ordinary employment. Institution providing sheltered employment.
2. Othersurgical conditions and the general group of medical cases.	As a rule in a general hospital. <i>(Note.</i> —The present provision for proper rehabilitation treatment is inadequate and should be developed.)	If illness is prolonged, and especially if associated with sepsis, gradual restoration of bodily strength by physiotherapy, exercises, &c., would be essential—with special attention to the feet to prevent dropping of the arches.	(a) The majority should have complete restoration of function. (b) In some cases there might be some residual weakness—e.g., of the abdominal wall.	(a) In some cases a reconditioning course. (b) Convalescent treatment—followed in some cases by a reconditioning course—under medical supervision. <i>Note.</i> —Artificial limbs may be required for some cases.	(a) Reconditioning centre. (b) Reconditioning centre—with medical supervision.
3. Cardiac cases.	General hospital. <i>(Note.</i> —Special hospitals are required for the further treatment of some of the cases in this group.)	If the valves are badly affected, little chance of restoration. Where the heart muscle only is involved, restoration to fair, if not full, working capacity can be achieved—by rest over a long period and then graduated exercises.	(a) Residual disability preventing heavy physical activity but permitting light and sedentary work. (b) Serious disability preventing employment under ordinary conditions.	(a) Special care in selecting employment—with vocational training as required. (b) Sheltered employment.	(a) Vocational training centre as necessary. (b) Institution providing sheltered employment. <i>Note.</i> —Medical supervision will be necessary under both (a) and (b).
4. Pulmonary tuberculosis.	Sanatorium. Tuberculosis hospital. Sanatorium-cum-hospital. Home for advanced cases.	Rest, hygiene, diet. Collapse therapy (including major surgery). Chemotherapy. Occupational therapy.	(a) Restoration—permitting employment under ordinary conditions. (b) Quiescence—requiring part-time or modified employment to prevent relapse. (c) Unfit for employment under ordinary conditions.	(a) Care in selecting employment. (b) Special provision for part-time or modified work. (c) Sheltered employment.	(a) — (b) For some cases—special institution providing sheltered employment. (c) Special institution providing sheltered employment.
5. Blindness.	Special eye hospital. Special department of general hospital. General hospital—for treatment of underlying medical condition.	Surgical (e.g., cataract removal). Optical appliances, including recent "contact lenses." General medical treatment.	(a) Restoration of good sight. (b) Restoration of limited but useful sight. (c) Blindness or its near equivalent.	(a) In some cases a reconditioning course. (b) Care in selecting employment and, for some cases, vocational training. (c) Carefully selected employment in ordinary industry, or sheltered employment.	(a) Reconditioning centre. (b) Vocational training centre as required. (c) Blind workshop or organised home worker scheme.
6. Deafness.	Special department of general hospital. General hospital for treatment of underlying medical condition.	Surgical. General medical treatment. Appliances.	(a) Improvement of hearing. (b) Defective hearing. (c) Total deafness.	(a) — (b) Training in lip reading or provision of artificial aid. (c) Training in lip reading and, for some cases, vocational training.	(a) — (b) Vocational training centre as necessary. (c) Schools or evening institutes, and, for some cases, vocational training centre.
7. Neurosis.	Neurosis centre (under E.H. scheme). Special O.P. departments of general hospitals. A few special clinics for outpatients.	Psychotherapy, with occupational therapy, physical training and workshops.	(a) Restoration—permitting return to ordinary employment. (b) Minority remain as problem cases and misfits, and require individual consideration, but are capable of selected employment.	(a) Careful selection of employment—with a reconditioning course for some cases. (b) Selected employment and aftercare.	(a) For some cases—reconditioning centre. (b) —
8. Psychosis.	Mental hospital—as certified or voluntary patients	Medical and psychotherapeutic treatment, with occupational therapy.	(a) Fit for ordinary employment. (b) Fit for specially selected employment. (c) Permanent disablement and unsuitable for employment.	(a) Assistance in placing, probably preceded in some cases by a reconditioning course. (b) Carefully selected employment and aftercare. (c) —	(a) Reconditioning centre for some cases. (b) — (c) —

## Special Articles

## ASIATIC SMALLPOX

P. B. WILKINSON, M B LOND, M R C P

LATE MEDICAL OFFICER IN THE COLONIAL SERVICE AT HONG-KONG

SMALLPOX is still prevalent in the Far East, and there have often been outbreaks in Hong-Kong, but the epidemic which began in November, 1937, proved to be the most disastrous in the history of the colony. From November, 1937, to July, 1938, the disease raged throughout the cities of Victoria and Kowloon and killed about 2000 people. During this period 845 patients were admitted to the smallpox hospital, of whom 810 were actually suffering from smallpox. The epidemic increased in virulence as the winter came on and reached its peak in March, normally one of the coldest months of the year, when 317 patients were sent into the smallpox hospital. From then on it waned and finally died out in July, 1 case only being admitted in that month. Though the disease was endemic in the colony cases were sporadic only for some years before this outbreak; there were 15 in 1931, 248 in 1932, 566 in 1933, 153 in 1934, 61 in 1935, and 23 in 1936.

Of the 5 Europeans stricken with the disease in the 1937-38 epidemic 1 died of a severe attack of unmodified confluent smallpox in January, 1938. Although he said he had been vaccinated in England in October, 1937, he bore no visible vaccinal scars. Two others recovered from moderately severe semi-confluent attacks and 2 had the disease in a discrete and modified form; the 4 who recovered had all been vaccinated more than once.

Taking the hospital series as a whole it was found that 73 patients lived twelve hours or less after admission, 50 lived more than twelve but less than twenty-four hours, and 4 arrived dead. Many of these patients were so ill on admission that it was impossible to obtain a history from them.

## TOXIC CASES

One surprising feature of the epidemic was the high proportion of toxic cases—83 of the 810 patients. Of these, 40 were men and many of them well-developed young men in their twenties. It is noteworthy that 17 of the 43 women with the toxic type of disease were either pregnant or puerperal.

Smallpox is one of the finest examples of a diphasic disease, and its two phases are as different from one another as chalk from cheese. The incubation period of twelve days is followed by a sudden onset with rigor, fever, vomiting, headache and backache. These are the outstanding symptoms of the toxic phase, which usually lasts three days. If the patient survives this phase the fever abates and with its decline the focal lesions begin to appear. The secondary fever which accompanies maturation of the pustules is distinct from the fever of the toxic phase and is usually considerably lower.

As a general rule, the shorter the incubation period the severer the disease, and the more sudden the onset the more acute the toxic phase. In the gravest cases of all the temperature may be subnormal in the toxic phase. If the toxic phase is severe enough to kill, death usually occurs on or before the sixth day, and it is common to find failure of development of focal lesions in these cases. They are characterised by suddenness and severity of onset, prodromal petechial rashes or a universal erythema, agonising backaches, foetor oris, rapid enlargement of liver and spleen, rising respiration-rate, mental clearness, and hæmorrhages from every mucous membrane and into skin. A patient suffering from toxic smallpox presents an unforgettable picture—the extreme prostration, the generalised tonelessness, the expressionless face with its blood-clotted lips and intelligent eyes, and the skin, either leaden-hued from hæmorrhage or lobster-red from universal erythema, make these patients stand out in vivid contrast to their fellow victims covered with focal lesions. The mental clearness which is retained to the end is one of the most striking clinical features of this disease. (I did not meet a single patient suffering from toxic smallpox who failed to understand my Chinese, a tribute indeed to the heightening of intelligence produced by this toxæmia.)

The hæmorrhages from mucous membranes may be very profuse and are quite uncontrollable. Massive subconjunctival ecchymosis is common and towards the end it is possible to watch these hæmorrhages increasing hour by hour. But retinal hæmorrhages seem to be uncommon and none were found in these toxic cases. Bleeding from gums, palate and pharynx is almost constant and epistaxis may be uncontrollable. One elderly Chinese woman was admitted late one night suffering from the disease; she was perfectly rational and composed and sat on her bed holding a large brass bowl under her nose to catch the blood which dripped steadily from it. All she asked was to be allowed to die in peace and her wish was granted. She was not "treated." Equally profuse hæmorrhage from the lower gut is not uncommon, though hæmatemesis in this epidemic was one of the rarest of the hæmorrhages. Hæmaturia is constant in the severe types and where it is present the prognosis is always grave. Hæmoptysis is also common and may occur early, when the patient usually coughs up bloodstained pellets of mucus, or late, when pulmonary œdema often supervenes and hundreds of c.cm. of pink froth is coughed up in a single day. Uterine hæmorrhage is common in this condition and is ominous.

The skin changes seen in toxic smallpox are interesting. The toxic phase may be heralded by the appearance of a prodromal petechial rash, the petechiæ appearing usually on the axillary folds, in the flanks and in the groins, and rarely behind the neck and the knees. Or the prodromal rash may be morbilliform, scarlatini-form or even urticarial in character. One type of skin change which invariably ushered in a fatal attack in this epidemic was the universal or lobster erythema. These patients present a striking appearance, for in the distance they look superbly sunburnt and glowing with health. This universal erythema may be replaced by sheets of hæmorrhage into the deeper layers of the skin, the lobster tint giving way to a leaden hue, the variola nigra of the ancients. The superficial layers of skin are very easily abraded after such hæmorrhage, and those patients often have raw elbows and knees. One has to be careful in picking up a limb, for the lightest touch may produce extensive exfoliation. Focal lesions in these cases are inconstant and few, but they invariably show both intra- and extra-mural hæmorrhage. Bullæ often appear on the face and limbs a few hours before death. They rapidly increase in size and are filled with a reddish-brown offensive fluid from which hæmolytic streptococci in pure culture were always grown. The rarest of the skin changes seen in toxic smallpox is the peculiar parchment-like thickening of the skin of the face, forearms and feet which occurred in one case only. The woman looked almost as though she were wearing a silver mask. This thickened whitish skin desquamated freely, and as she had no focal lesions at all the diagnosis was uncertain for some time. An autopsy set these doubts at rest.

The foetor oris of the toxic cases is unforgettablely nauseating and pathognomonic of the condition. It is entirely different from the other smells associated with smallpox and there are at least four "several and well-defined stinks" to be recognised in the disease.

Rapid enlargement of the liver was seen in many of these cases. One patient who died on the sixth day of the disease had a liver weighing 81 oz. which was boxwood yellow in colour and greasy on section. Splenic enlargement was much rarer and occurred in 2 cases only. One of the strangest clinical findings is the steady rise in respiration-rate, often without any associated pulmonary lesion. Rates of 40-60 per min. were not uncommon in the final stage of the disease.

At autopsy the mucous and serous membranes throughout the body show hæmorrhages large or small; pericardial, pleural and peritoneal hæmorrhages are constant and as a rule small. One case showed an extensive recent subdural hæmatoma and had been diagnosed as a cerebral thrombosis occurring in smallpox. Speckling of the meninges with minute hæmorrhages is not uncommon. The heart muscle is usually pale and somewhat friable and may show numerous subepicardial hæmorrhages. Microscopically the myocardium shows well-marked fatty change. The lungs show no distinctive changes apart from subpleural hæmorrhage.

Signs of recent hæmorrhage may be found throughout the mucosa of the gut, and subperitoneal hæmorrhages are constant. The kidneys are usually pale and enlarged, and on several occasions the pelves were found filled with blood-clot.

#### NON-TOXIC CASES

Most of the non-toxic cases in this series were admitted to hospital when the focal phase had become well established. Their lesions had usually reached the vesicular stage and it was rare to have the opportunity of following the focal phase through the whole of its course; the early macular and papular phases developed in the homes of the patients and finally led to the diagnosis of the disease. Confluent cases were numerous and this variety of the disease had a mortality-rate of 30-40%. Many were admitted in a condition of unspeakable neglect at the height of maturation of the pustules, which tended to impair their chances of recovery. Cardiac crises were not uncommon in this type of case and were often fatal. But many post-mortem examinations failed to reveal evidence either of endocarditis or of myocarditis, terms both dear to the older writers on smallpox. The one outstanding finding was obvious agonal fragmentation of heart muscle. Signs which usually betokened a fatal issue in confluent smallpox were titubation of the head, flaking off of large patches of skin, free hæmorrhage into the exudate underlying the confluent areas, diarrhoea, subsultus and carphologia. Uncontrollable delirium and difficulty in swallowing also tended to impair the prognosis.

The discrete type of the disease is not fatal in uncomplicated cases, a fact recognised by Sydenham, who used to allow his discrete patients to sit up each day. The discrete cases rarely suffer severely from the disease and the prostration and tonelessness so characteristic of the severer types are conspicuously wanting.

The complications of the focal phase are predominantly those due to sepsis. Muscle abscesses, boils, extensive skin sloughing and cellulitis are all common, especially in the neglected cases. Otitis media and furunculosis of the external auditory meatus were commonly seen in children, and corneal ulceration was common at all ages. Panophthalmitis was fortunately rare and was only found in the neglected cases. Twice iris prolapse occurred through a ruptured untreated corneal ulcer; both these patients were admitted with prolapse and both recovered. Boils in the eyelids were common among the children.

I am uncertain that any cardiac condition is to be attributed directly to smallpox. Pericarditis, endocarditis, myocarditis have never been observed at autopsy or in sections. All that is certain is that the virus of smallpox can and does produce well-marked fatty change in the myocardium, and that the heart muscle of patients who have died of toxic smallpox is invariably grey, flabby and speckled with hæmorrhages. Pulmonary complications are commonest in children and babes and are most often secondary to blocking of the nostrils by focal lesions. Aspiration bronchopneumonia, collapse, purulent bronchitis and lung abscess were all found at autopsy. Empyema, pleurisy and lobar pneumonia were not noted.

Gastro-intestinal complications seem to be rare. The diarrhoea which sometimes complicates the course of confluent smallpox is ominous, as the older clinicians rightly observed, but no organic changes in gut were found in these cases. The genito-urinary system seemed usually to be involved as a result of blood-stream infection. The few cases of streptococcal pyelonephritis observed almost certainly occurred in this way. Orchitis was seen in 3 men with confluent smallpox; phimosis was caused in 1 case as the result of a lesion just within the lips of the penile urethra.

The nervous system was rarely involved. No case of encephalitis secondary to the disease was observed, and only 1 hemiparesis was noted during the course of the disease; autopsy showed extensive thrombosis of cortical veins in this case. Mental disturbance at the height of the disease may be profound, but it usually seems to be transient, for only one psychosis could be directly attributed to smallpox—a man who had to be treated in the mental hospital for three months.

The skeletal system was implicated in 4 cases only; 2 of these patients developed a septic arthritis, 2 a

septic periostitis and all responded well to treatment with sulphanilamide once drainage had been established.

#### DIAGNOSIS

The differential diagnosis presented the usual difficulties. Measles, chickenpox, typhus, secondary syphilis, scabies and acne were all sent in as smallpox. Smallpox was also once mistaken for acne. Attention to the history, the distribution of the rash and the presence or absence of prostration would have prevented some of these mistakes. At one time, in the early part of the epidemic, two wards in the hospital were set aside, one for children with chickenpox, the other for children with smallpox. No better way of demonstrating the tonelessness of smallpox and the absence of constitutional disturbance in chickenpox could be imagined. In most of these cases the diagnosis could be made promptly from the distribution of the rash, but in some of the cases of measles an immediate diagnosis was impossible. It was distressing to have comparatively harmless diseases like scabies, acne and chickenpox littering the wards of an infectious diseases hospital, but accommodation was strained to the uttermost and it could not be avoided. Needless to say, vaccination on admission was the routine procedure.

#### TREATMENT

I do not think there is any treatment for the toxic phase of smallpox. In the focal phase there is no doubt that painting the lesions daily with a saturated solution of potassium permanganate lessens the risk of septic complications and adds to the comfort of the patient. It is unnecessary to stress the need for scrupulous care of the eyes, ears, mouth and nostrils in all cases of smallpox. Sulphanilamide is of undoubted value in treating these septic complications and I have dealt with its use in smallpox elsewhere.<sup>1</sup> Subcutaneous injections of camphor gr. 3 in oil were given four-hourly to all confluent cases with cardiac crises. It is not certain that this treatment is of value.

Results obtained with convalescent serum were promising, and only the difficulty of keeping the serum prevented it from being used more extensively. To be effective the serum must be obtained from patients who have had smallpox for at least thirty days. Serum taken earlier than this seems to be quite ineffective; serum taken between the fourth and sixth weeks from onset certainly has some influence on the course of the disease and might conceivably be of benefit in the toxic phase. It was unfortunately not possible to decide this point, for toxic cases had ceased to appear by the time we discovered that early serum was ineffective.

#### SOVIET MEDICAL CONFERENCE

THE second war-time session of the All-Union Institute of Experimental Medicine of the USSR, held in December, discussed the practical application of work done in the institute's laboratories and special clinics. These provide the channel through which advances in theory and technique are passed into general practice, and have successfully combined their prewar lines of research with inquiries into the problems now confronting military medicine. The session was dedicated to the twenty-fifth anniversary of the revolution, and opened with reports on developments in the various branches of scientific medicine and physiology.

Extensive purulent lung wounds have been successfully treated by the use of plugs soaked in a preparation devised by Prof. Vishnevsky Parmean. Prof. N. Grashchenkov dealt with wounds of the skull and brain; he has been successful in preventing the spread of infection from frontal air-sinuses to the whole brain by the use of muscular plastic surgery. Dr. Chetvernikov discussed the healing of bedsores associated with injuries to the spine. Several laboratories have been jointly engaged in the study of peripheral nerve injuries; Prof. P. Anokhin demonstrated the physiological results of such injuries on the central nervous system. This "central component" of peripheral nerve injury may induce paradoxical paralyses in nerves not directly affected by the injury. Physiological study of the paralyses in such cases makes it possible, he believes,

1. Wilkinson, P. B. *Lancet*, 1942, ii, 67.

to select appropriate treatment for the affected nerves. Thus the uninjured nerves with functional paralyses can be treated by the injection of strychnine, presumably to restore their excitability. Professor Luria and Professor Hellerstein reported their results in restoration of function in the body and limbs after injuries to the brain or peripheral nerves by specially chosen occupational therapy.

Professor Smorodintsev has been working on the early diagnosis of typhus; he has devised a scheme for diminishing the spread of infection and has developed a new vaccine which he reports will check the course of the disease as early as the second day. Professor Petrisheva demonstrated good results with the insecticides from natural sources which she has been investigating.

### AFTER SHIPWRECK

THOSE who survive after disasters at sea find that the chances of living to be picked up by another vessel are better if discomfort is reduced as much as possible and if the frame of mind of the company is confident and cheerful. In War Memo no. 8 (*A Guide to the Preservation of Life at Sea after Shipwreck*, HMSO, 4d.) the Medical Research Council give some good reasons why such a frame of mind should and can be maintained. Ministry of War Transport statistics show that of boats adrift for more than 24 hours nearly half have reached safety within 5 days, and it is exceptional for any lifeboat not to be picked up within 3 weeks. The memo sets out routine preparations in the ship which include regular attention to water and food containers and first-aid equipment in the boats, charging of the portable wireless batteries, stowage of stores and care of the gear.

#### ENOUGH TO DRINK

Water is more important than food to the shipwrecked. Oil drums—cleaned, sterilised, painted white and half filled with water—can be left to float off or be rolled overboard to be picked up later. Men are advised to take extra water with them in any way they can. Each man can carry a water-bottle, and determined masters have found ways to stow as much as 120 gallons per boat. Men are reminded that they are unlikely to need more food than is stored in the lifeboat, and no extra food should be taken at the expense of extra water and extra clothing. As soon as the boat is away the officer in charge should take stock of his water-supply including any additional water brought in by those abandoning ship. He must plan rationing with regard to the circumstances: total stock, number of men, time likely to be adrift, and chances of rain. Rationing should begin from the start, but it seems that the customary ration of 2-8 oz. per man daily falls so far short of the body's needs that health deteriorates from the start if it is enforced. Besides it is foolish to ration water on a 60-day basis if the chances of being picked up within 10 days are good; often men are rescued in poor condition from lack of water when there are still considerable supplies in the boat. The MRC recommends that if the company is likely to be picked up more or less immediately a generous supply can be issued at once. If rescue is likely to be delayed for (say) a week, there is no need to give any water for the first 24 hours unless the men have been sweating, in which case issue should begin at once. The present water-supply in lifeboats gives each man of the boat's full complement 5½ pints. The ration recommended by the MRC is 18 oz. per man daily until there is only 1 pint (20 oz.) per man left in hand; then the ration should be reduced to 2 oz. daily. The memo emphatically condemns as harmful attempts to relieve thirst by giving sea-water by the bowel or by the drinking of urine. Sea-water of course must not be drunk, but water from pools melted by the sun on ice floes can be drunk if they have not been made brackish by spray, and rain-water should be collected in canvas gear or any vessel that will hold it. Spirits are to be kept for the wounded.

#### ENERGY TABLETS

The boat's stores contain amphetamine or 'Methedrine' (BWCo) in 5 mg. tablets. These are to be regarded as a stand-by when hardship is beginning to wear men down and cannot be remedied by encourage-

ment, rest or sleep. The officer in charge has control of them and judges when to use them, either to lessen fatigue, promote alertness, raise spirits and prolong the will to live; or to prevent sleep. In Carley floats, rafts and dinghies they may be given if conditions are severe from the outset at the rate of 2 tablets at sunrise, midday, and sunset. If conditions improve they should be stopped. In lifeboats they may be given when men seem to be getting exhausted, in single doses of 2 tablets for special purposes—for instance to keep the helmsman awake during his watch, or to buck up the whole company for a few hours hard pulling in order to make land. If the whole party becomes severely exhausted men should be given 2 tablets twice a day.

#### FROSTBITE AND IMMERSION FOOT

Among lifeboat ailments on which advice is given are swollen legs, frostbite, and immersion foot. The legs often swell for the first few days after a rescue but the condition subsides without treatment as a rule and is of no importance in itself. In frostbite the skin and sometimes the deeper tissues actually become frozen; the condition is unknown unless the temperature of the air is as low as 14° F., and at sea is very rare unless the sea water is freezing; wind encourages it. The damage is caused by minute crystals of ice forming in the skin; fingers, ears and nose are the parts most prone to freeze in that order. Frostbite may also affect any part of the skin brought into contact with a very cold substance, such as ice or cold metal. The skin becomes pale and yellowish, looks opaque and feels of wooden hardness, and this hardness is the only truly reliable sign of freezing. Men are warned to keep as warm as possible by wearing plenty of clothing, which should be wind-proof, to put on thick gloves and ear protectors, to keep the feet and socks as dry as possible and the feet moving, and to avoid cramped positions. Nothing metallic should be touched with the bare skin or the mouth and all exposed skin should be kept greased; washing should be restricted and beard and moustache should be kept clipped to prevent icicles forming in them. The company should watch each others' faces for signs of patches of frostbite, and a bare warm hand should be placed immediately on any affected part of the skin. When passing water the penis should be protected from the wind and afterwards dried carefully. If a foot gets frost-bitten it should be thawed gently by placing it inside a companion's clothes; frostbitten skin should not be rubbed with snow or anything else.

Immersion foot develops when feet or legs have been soaked for many hours in cold water or mud. Sea water cold enough to do the damage is found in the Atlantic (winter and summer) from latitude 50° northward. To prevent it men are advised to keep the feet out of water by keeping the bottom of the boat as dry as possible or by raising the feet. If they are wearing sea boots the less the water touches the boots the better, for cold penetrates them. If the socks have become wet, the boots should be emptied and the socks wrung out and put on again quickly, or dry socks from a waterproof packet should be put on instead. The feet and toes should often be moved but unless it is fairly warm the feet should not be bared and rubbed: exposure cools the feet more than rubbing warms them. Any rubbing should be done very gently, and if the skin has become numb, swollen or tender, rubbing will do more harm than good. Greasing is not much use. To keep the upper parts of the body warm helps to keep the limbs warm. It is better to keep on damp clothes under a waterproof than to strip and wring out clothes in a cold wind. No tight garters, tight boots or other tight clothing should be worn on the legs or round the wrists.

After rescue the best way of thawing a frostbitten part is to put it in cold, not warm, water, and wrap the rest of the patient up warmly; any kind of rubbing is dangerous. If pain is severe on thawing, the part should be cooled again for a time with cold water, and warming up after thawing must be very gradual. It is dangerous to apply hot water or bottles or to warm the limb in front of a fire. The affected part should be gently cleaned and dried, dusted with sulphanimide and wrapped in clean material; it should be kept at absolute rest. Blisters should not be opened by first-aiders but left to the doctor. Treatment of immersion foot must begin immediately

after rescue. As soon as the patient has been lifted on board all clothes must be removed and he must be wrapped in warm blankets. He may have hot bottles near the body but not near the affected limbs which should always be kept cool by the use of fans or even ice if necessary; the ice should not of course be brought into contact with the skin. The temperature of the skin should be kept between 70° and 80° F. as measured by a bath thermometer placed against the skin. The limbs swell up again if allowed to warm too soon, and again rubbing is harmful. Treatment must be continued until all swelling has gone and the patient can walk without pain. Feet and legs should be kept quite dry and nothing should be applied to them except sulphanilamide powder on all blisters, sores and darkened areas.

## Public Health

### USA Mortality Figures for Comparison

THE very favourable mortality experience of England and Wales in the first nine months of last year, quoted in this column last week, finds its counterpart in North America. The death-rate for the many millions of industrial policy holders of the Metropolitan Life Insurance Company in the USA and Canada was, for the first three-quarters of 1942, 2.8% below the previous minimum (recorded in 1941).<sup>1</sup> As on this side of the Atlantic influenza and pneumonia both show low mortality figures and up to date there is not only no increase in the death-rate from tuberculosis but in this particular population actually a faster rate of decline than in the preceding years. But so far, it is pointed out, there has been no food shortage, the housing shortage has been limited to the defence areas, and the absorption of medical personnel in war work had not gone very far. The suicide rate was, with one exception, the lowest on record since the last war; cancer and diabetes show no change compared with the previous year; cerebral hæmorrhage, chronic heart disease and chronic nephritis have all declined. The four principal infectious diseases of childhood recorded minimum rates, and despite a sharp rise in the birth-rate the downward trend in deaths from puerperal causes was continued. Accidents are the only item to have reacted unfavourably, although motor vehicle accidents are down by about 15%. The increase lies largely in industrial accidents and is, of course, related to the fact that there has been an increase of some 6,000,000 persons in industrial employment since the fall of France, many perhaps inexperienced and poorly trained. In most respects, therefore, the experience has been very similar to our own.

### Infectious Disease in England and Wales

WEEK ENDED JAN. 9

**Notifications.**—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1808; whooping-cough, 1302; diphtheria, 841; paratyphoid, 5; typhoid, 8; measles (excluding rubella), 14,153; pneumonia (primary or influenzal), 1091; puerperal pyrexia, 125; cerebrospinal fever, 87; poliomyelitis, 2; polio-encephalitis, 1; encephalitis lethargica, 1; dysentery, 119; ophthalmia neonatorum, 77. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Dec. 30 was 2050, including scarlet fever, 632; diphtheria, 284; measles, 440; whooping-cough, 177; enteritis, 90; chicken-pox, 84; erysipelas, 30; mumps, 33; poliomyelitis, 2; dysentery, 32; cerebrospinal fever, 11; puerperal sepsis, 13; enteric fevers, 11; german measles, 11.

**Deaths.**—In 126 great towns there were no deaths from enteric fevers, 1 (0) from scarlet fever, 23 (2) from measles, 11 (0) from whooping-cough, 36 (1) from diphtheria, 49 (5) from diarrhoea and enteritis under two years, and 65 (4) from influenza. The figures in parentheses are those for London itself.

Birmingham had 6 deaths from influenza, no other great town more than 3. Bradford reported 4 fatal cases of measles. There were 5 deaths from diarrhoea at Liverpool.

The number of stillbirths notified during the week was 266 (corresponding to a rate of 40 per thousand total births), including 25 in London.

1. Statistical Bulletin of the Metropolitan Life Insurance Company, October, 1942.

## In England Now

### A Running Commentary by Peripatetic Correspondents

IT is odd how one accepts the major discomfort and pain of illness, yet finds the minor annoyances so hard to bear. I have been in hospital fighting a losing battle with the Sister. My BMR is low and I suffer much from the cold, so I like the bed made in such a way that I can cover my shoulders and back with the blankets. This is impossible with a bed made in the standard hospital method. The demands of neatness and uniformity result in a bed so arranged that when a man of average height lies stretched out with his feet at the bottom the upper edge of the blankets just reaches his xiphisternum. The clothes are tucked in so tightly at the sides that it is difficult to pull up the fold and cover the portion of the torso exposed to the blasts which sweep the ward. Nevertheless, I attempted it. Sister descended in a flurry of rustling aprons, wrath sparkling from her like the brushes of a Wimshurst machine, and with little incoherent noises of displeasure she restored the bed to its pristine discomfort. Why are all ward sisters bitten by this terrific æsthetic urge? My bitter complaints were met by an offer of a quarter of an old blanket to wear as a shawl and the suggestion that a woolly jacket might meet the case, but I can be stubborn too, and found neither of these acceptable. The war continued till I finally retreated home, having done nothing to dispel the view common throughout the nursing profession that doctors are difficult patients. However, the "Cease Fire" has not been sounded; the battle continues. I have taken it up with my own ward sister whom I have always regarded as a perfect jewel. But one quality of precious stones is that they are hard, and I fear that this time Sister shows every sign of being adamant. But since I feel that the comfort of the patients must be one's first consideration, let the best man win!

Conscious of the honourable, but far from glamorous, darns in my stockings, I was attacked by a sudden and irresistible desire to impress somebody, and as Amanda, my five-year-old offspring, and Victoria the dachshund, were the handiest, I proceeded to work off my inferiority complex on them.

"No," I said firmly, regarding with jealous envy Amanda's plump bare legs. "I can't take you out this afternoon. I am reading for an examination, and..." I yammered on importantly. Victoria yawned and looked superciliously at Amanda, who, infected by some devilish telepathy, demanded: "What's a samination?" And added as an unkind afterthought: "You're always reading for one." "I am not," I retorted somewhat nettled. "Anyhow it's the Mastery of Midwifery, only you won't understand." Victoria yawned again as if to say, "Who wants to?" and Amanda rolled on the floor with merriment. When she had recovered her voice she carolled: "Oh, Mummy, you are funny. You can't be a master. Daddy's master, and the milkman says..." "That will do," I began firmly, but Amanda has already lost interest in the milkman's bon-mots, and demands with terrifying stolidity: "No, but why are you really?" "Oh, because of the clothes they let me wear," I answer wildly, and snatching up the neat brochure of the correspondence course that stressed the old-world courtesy that awaited the aspiring candidate, I read out: "Flat, black velvet hat; falling hood, and purple gown trimmed with budge." "What's budge?" began Amanda eagerly, but fortunately at that moment the telephone rang. Would the doctor come at once?

Victoria barked; Amanda screamed; and as the afternoon looked like being ruined I packed them both in the car and took them with me. Having attended to the ailments of Mrs. Creevy, I was just leaving the house when Miss Booth looked over the garden hedge and warbled in her retrained, quavering voice: "Hay see you've got Miss Hamanda with you. Would she care to pop in and see may budgy-gars?" Knowing Amanda's passion for seeing anything, I replied warmly that I was sure she would and went to fetch her. "What's budgy-gars?" she whispered fiercely, evidently preferring Miss Booth's pronunciation to my more pedantic one. "Birds," I replied succinctly, and led her into Honey-

suckle Villa. For twenty minutes we circled the cage, chirped and exclaimed over the sagacity and beauty of Miss Booth's feathered friend, who, she kept assuring us brightly, talked. Certainly weird, and to me quite unintelligible sounds issued from his beak; I was quite prepared to accept these pipings as conversation, but Amanda, suffering from no inhibitions, demanded bluntly: "What does he say?" Miss Booth beamed, chirped penetratingly, and then said cooly: "He says, 'Sweetheart Aunty Booth.'" He went on saying it—or appeared to—till Miss Booth informed us that he was now saying: "Arthur's gone to Blackpool." "Mind you," she continued simpering, "Sweetheart Aunty Booth's his favourite. Say it again, duck. That's a clever boy."

We tore ourselves away at last, Amanda making passionate arrangements with Miss Booth to have the next egg. ("When we've found hay nice little wifie for him. Hay, Doctor?") Amanda was strangely quiet on the way home, and it was only when the car finally came to rest in the garage that she spoke. "Mummy, when you win this samination and get the budgy gown, will it" (her voice throbbled with hope), "will it say 'Sweetheart Master Midwife?'"

A friend of mine, a corporal, was with his unit in an isolated part of England. One evening, one of the men complained of severe pain in his eye; he knew that a small fragment of steel had got into it earlier in the day, and it was quite impossible to get medical help. There was a discussion as to what should be done, and somebody suggested that it was possible to get it out by means of a snail. So a snail was found, made into a little parcel in a piece of gauze, and fixed over the eye with a piece of strapping. The following morning the snail compress was removed. The slime had oozed through the gauze, and sticking to it was the fragment of steel. Cynics may suggest that nature, in the shape of the tear stream, had washed out the steel and it had naturally stuck to the first sticky object it met. But there is at least one corporal who is firmly convinced that the struggles of the snail generated an electro-magnetic field which extracted the steel. And he ought to know, for he's in the signals.

The way blood develops antibodies to anything new or strange is very like the behaviour of human beings in developing antipathies to their fellows. Just as we have no antipathy to certain people until we have met them for some time, to substances like diphtheria toxin we develop antipathies only after meeting them. Of course we can receive antipathy which somebody else (or some horse else) has developed, and naturally this passive dislike does not last as long. One might develop an antipathy to Ruritians because one's friends had lived among them and disliked them, but this would not last nearly as long as if one had acquired the dislike from personal contact. Not that contact is essential for developing a dislike. Take this new-fangled rhesus factor for example. The fact that a rhesus negative mother's plasma develops a loathing of the strange monkeyish factor in its baby's cells is no proof that the foetal and maternal circulations mix. I like to think of the maternal plasma, glowering through the placental barrier at the ape-like trend of the alien cells on the other side, and so gradually developing a ghastly scheme for sending their owner into the world all anæmic or jaundiced or hydropsical. Even more like human behaviour than these examples is the disgraceful conduct of plasma to the A and B agglutinogens. Here our blood is behaving in the most reactionary and xenophobe manner. It seems always extraordinary to me that within a few months of birth we become armed against all strange agglutinogens although we have never met them. We call the A and B factors agglutinogens, but that's hardly fair; it is not they who stir up the trouble. Plasma of a group O person without having so much as nodded at an A or B factor in its life, becomes so entirely biased that it will without warning set on A or B corpuscles and clump them. Surely this is uniquely unreasonable. Why should nature have hardened the task of the transfusion-officer by equipping us so strongly against strangers we were never likely to meet?

Incidentally (hæmatology textbooks please copy), by remembering the simple rule: "No strange letters

admitted" all the various inter-compatibilities of the four blood groups are effortlessly remembered. It is necessary to use the sensible AB, A, B, O system, and it must be realised that AB is A and B, and that O is pronounced "nought" not "oh." For example, "nought" corpuscles can safely be given to anyone, being free from all letters; a group B person would not tolerate the admission of AB blood, for though the B factor is one of the family, the A factor is a stranger. I have found this method of explanation very useful. Even the most dim-witted nurse or student can understand it and may one day find it useful in emergency. I think many complicated subjects could be put as simply as this without detracting from their scientific accuracy. When I was a student we were told by a wise pathologist that to understand the Wassermann reaction completely we should go home and explain it to our landlady's daughter. That is surely a very sound piece of advice to follow with any tricky medical point, and would improve the conversational powers of landladies' daughters throughout the country.

Writers of nature stories often attribute human emotions to animals and in so doing are thought to be wrong. Personally I think they have much right on their side and that basically human and animal mental processes are the same. The very first stories, a throng of tales told in the early hours of human time, must have been of animals—that is why they appeal to the child mind now—and they were told by and to people who were very near the animal world. The fact is that civilisation and its fiction try to gloss over the animalism of man. The dignity of the whole male world, for instance, would suffer if it were made plain that our earliest forefathers, realising how inferior they were to women (even now the only gifts which we know the male has exclusively to give are one form of webbed toes and a skin disease), possibly scared by the awful fate of the male spider who is eaten after copulation, revolted from their inferiority, formed themselves into armies, clubs and fraternities, and thus by the hard and only road to better things in spite of logic and justice became the dominant sex. Hence the Orders of Chivalry, the glories of Pall Mall, and the Masons.

Nor is man alone in this. When on my morning walk to fetch the *Times* my fox-terrier smells a particular lamp-post, it is a male totem pole that with one sniff in thought he smells, tastes, feels, hears and sees; say, "Old Jorrocks, next door, stole my bone, I stole his, good chap though," or "Shrill Peke, fluffy, has its hair combed, bread and milk, utterly contemptible," or "That Airedale, strong meat, pretty fierce, better be careful." His next thought—and you can see him hesitating—is whether to leave a card of fraternity or respect or derision or none at all. This is largely a matter of placing: the card of fraternity is more or less alongside like the signatures of Mr. Eden and Mr. Maisky to a treaty—equals. That of respect, often because it is a bigger dog, is underneath, while the card of derision blots the other's out, and this is sometimes completed by kicking dust and mud over it. This composite form of thought in which all six senses play their part is quite common in man, especially in childhood, illness, and when the emotions are aroused. It suffers from being uncommunicable in detail, but otherwise is perhaps the most complete form of thought there is. When a dog comes to a new town he is most punctilious in leaving his card everywhere. A doctor settling in practice, I believe, does the same, but in other walks of life the residents call on the stranger. The idea behind all seems to be, "I must be known, I must take my place in society, I daren't stand alone." And when the human call is made, how like one of those end-to-end inquiries of dogs: "What sort of a chap is this, what sort of a table does he keep, is he better than I, how shall I appraise him?" But all this is surmise, you'll say. How do you know that the old dog, grunting and squeaking in his sleep by the hearth, is fighting old battles, hunting long-gone rats down puppy paths? All I can answer is that I think I know, for all this day, even on my interesting senile stroll, I have been seeing the familiar hairpin road that rises from Sollum (or did in my time), and smelling the desert air.

## Parliament

## PENSIONS APPEAL TRIBUNALS

MEDICUS, MP

The appointment by the Lord Chancellor after the end of the last war of tribunals to hear appeals from pension awards created a valuable piece of legal machinery—the tribunals are technically courts of the House of Lords—which adjudicated in many cases and remedied many injustices. Records of medical conditions were then often defective and only when, by very painstaking inquiry, more complete histories were obtained and put before the court could a correct assessment be made. The constitution of the tribunal under a legal chairman with a medical member and a service member enabled a wider survey of conditions to be made than could be done by a purely medical body. One of these tribunals still continues at work and deals with cases arising out of the last war, including claims of widows. The Minister of Pensions now announces that he has set up a committee of three members, of which he or his parliamentary secretary will act as chairman, to consider the appointment of appeal tribunals to consider pensions cases arising out of this war. The main issue is stated to be the availability of medical staff; but by the appointment of about 26 medical men and 26 legal and service representatives the present need would be met.

The need for tribunals to deal with cases arising out of this war is actually much greater than in the last war. Whole blocks of medical records have disappeared; not only field records but those of general base hospitals. This happened when so many hospitals with their medical and other staff and equipment were lost in France and Belgium at the Dunkirk period. It happened again in Hong-Kong, in Malaya and Singapore. Other records were lost in Greece, in Crete and in Libya. In cases of wounds or clearly defined illness arising out of these campaigns the issue may be clear. But there are less well-defined cases in which difficulty will be encountered in assigning attributability to or aggravation by conditions of service. Many of these cases will have to be brought before appeal tribunals as the only fair and correct way of establishing the claim of the individual and the liability of the state. The vast increase in the employment of women in the Services may lead to many appeals, for their original medical examinations were often not as thorough or as complete as those of men. The larger number of men enlisted does in itself create another class of cases; invaliding boards inevitably commit a certain proportion of errors by inadvertence or by inexperience of service procedure. Many medical boards are now conducted by non-military officers.

Two typical examples may be given. First, that in which the only invaliding disability stated is that of a defect of vision with no adequate record and sometimes none at all of other physical or nervous conditions. Secondly, that in which the effect of injury due to accidents when on duty has not been recorded by the board and in which it is therefore very difficult to establish the cause of a resulting disability—for example a case diagnosed as conversion hysteria which was in fact jacksonian epilepsy due to severe head injury. The necessity for a survey of the whole man on final invaliding has not always been observed, and this creates endless difficulties for the pensions administration of the future.

The setting up of this committee of inquiry is expected to lead to the appointment of appeal tribunals at an early date, as the committee will begin to sit as soon as Parliament reassembles. The tribunals will be appointed by the Lord Chancellor. The members of the committee are known to have been active in discussing the question in Parliament and outside of it, and the Government has already expressed its desire to act "as soon as practicable." In view of the urgency the necessary priority in respect of medical appointments will, it is expected, be granted. Apart from the tribunals there is the medical organisation needed to prepare the précis of evidence. It was thought at one time that the number of doctors employed on this work in the Ministry must be equal to the number appointed to tribunals. But this should not be necessary. In military hospitals the medical registrar has been replaced by an officer with administrative training belonging to a combatant unit. In other

fields of medical work economies of medical personnel have been made. The same process of rationalisation appears inevitable inside the Ministry of Pensions, where a staff of expert non-medical administrators controlled and directed by a small staff of doctors would effect an economy of medical personnel.

## Letters to the Editor

## ANÆSTHESIA IN THORACIC SURGERY

SIR,—The problem raised by Dr. Halton (*Lancet*, Jan. 2, p. 12) has been my serious concern for many years. I am encouraged to find he agrees that it should be possible to overcome the secretion difficulties and risks of anaesthesia in thoracic surgery by mechanical means. Instruments I have suggested for this purpose have already been described (*Proc. R. Soc. Med.* 1936, 29, 643). I devised a modification of one of these instruments (*Ibid.*, 1941, 34, 506) for passing into a bronchus by direct vision, a metal tube and inflatable rubber sac which bear a strong resemblance in essential principle to Halton's occluder. A difference exists in the method of inflation by hard-bellows and manometer, and in the control of the proximal end of the metal tube by a flexible rubber gland instead of a fixed rack. If it is agreed that an obturator of some kind provides a solution of the problem, it follows that the obturator must be accurately placed if it is to be effective. It is difficult enough to accomplish this by direct vision, but an attempt to pass an instrument into a specified secondary bronchus by any blind method appears to me to involve a risk of error for which there is no justification. I cannot believe that any of my surgical colleagues would dream of trying to insert a tube of radium in a bronchus in such a manner with any hope of success. With regard to nasotracheal intubation, and to the "blind" technique in particular, I should be the last to condemn without good cause a method I have helped to popularise. While I admit its usefulness in other surgical fields, there does not seem to be any excuse for nasotracheal intubation in thoracic surgery, and there is a definite contra-indication to the use of the nasal route: a tube of maximum calibre is necessary for efficient application of controlled respiration, or when part of the lumen of the tube is to be occupied with any instrument such as a suction catheter during the course of the operation. In adults, both male and female, I find that a Magill tube size 10 gives best results, but it is impossible to pass a tube of this dimension through the nose without serious risk of trauma.

Clearly an occluder of any kind can be used only on the adult, or at any rate the adolescent patient. The method is impracticable for children who form a considerable proportion of the "wet" cases requiring lobectomy; for these, posture and carefully applied suction still offer a fair measure of protection. In patients of all ages, irrespective of the method of anaesthesia used, when secretion is abundant deliberate bronchoscopic suction is an essential precaution when the operation is over.

London, W.1.

I. W. MAGILL.

## YOUNG LONDONERS IN WAR

SIR,—In a letter under this heading in *THE LANCET* of Feb. 21, 1942, I gave some comparisons, for what they were worth, between the average heights and weights of groups of London boys and girls between the ages of 14 and 14½, examined for employment at the Headquarters medical branch of the Post Office in 1941, with similar groups examined in 1938, the last complete peace year. It may be of interest to attach for comparison particulars of similar groups examined in 1942, the third year of the war. Owing to a lesser number of examinations of boy candidates, it is only possible to give figures for 1942 in respect of 200 consecutive boys between the ages of 14 and 14½. But the following are the average figures:

	BOYS (300)				GIRLS (200)			
	Height		Weight		Height		Weight	
	ft.	in.	st.	lb.	ft.	in.	st.	lb.
1938	5	1½	7	6½	5	3	7	11½
1941	5	2½	7	9	5	3	7	12
1942 (200)	5	2½	7	6½	5	3½	7	10½

It will be seen that there has been, in respect of the 1942 group of boys, no alteration in average height

but a drop of 2½ lb. in average weight, which is still however the same, in the third year of war, as that of the 1938 entry. In the case of the girls, there has been an increase of half an inch in the average height but a decrease of 1½ lb. in average weight, which was 1 lb. less than that of the 1938 entry. As regards the general health of the boy candidates, in 1938 there were 20 rejections out of 300, the chief cause being defects of vision; in 1941 there were 10 rejections out of 300, the chief cause being defects of vision; in 1942 there were 6 rejections out of 200, 3 of these being for defects of vision. As regards the health of the girl candidates, in 1938 there were 16 rejections out of 200, 7 of these being for defects of vision; in 1941 there were 21 rejections out of 200, 10 of these being for defects of vision; in 1942 there were 22 rejections out of 200, 11 of these being for defects of vision.

General Post Office, E.C.1.

H. H. BASHFORD.

#### KIDNEY FUNCTION AND HYPERTENSION

SIR,—Macleod has stated that the blood-flow through the kidney is only 150 c.cm. per 100 g. of tissue (Physiology and Biochemistry in Modern Medicine, 1922, p. 211). The kidney in man weighs about 4½ oz. (Quain)—i.e., about 140 g. According to this, the blood-supply to and the blood-flow through each kidney per minute is 210 c.cm. But in your leading article of Jan. 2 (p. 19) you say that in hypertension the renal blood-flow has fallen from approximately 1000 ml. to 600 ml. per minute—as though the former figure represents the normal. The renal artery does not seem big enough to allow as much as 500 c.cm. of blood to traverse it per minute. A friend of mine—Philip Robinson—has measured the external diameter of the renal arteries and of the aorta above and below the renal arteries and also that of the common iliacs in seven dissecting-room bodies. He calculates that the mean cross-section of the renal arteries is 0.3 sq. cm.; that that of the aorta above (at the 12th dorsal vertebra) is 2.74 sq. cm.; of the aorta below, 1.69 sq. cm.; and of the common iliacs, 0.95 sq. cm., the thickness of the walls of the vessels being disregarded. A mathematician may be able to calculate the proportion of blood traversing these several vessels; but when we think of the output of the heart per beat, the number of beats per minute, and of the other parts of the body to be supplied, it seems that if one litre of blood is to traverse the two kidneys per minute the volume of the blood must be greater than it is and the renal arteries should be larger than they appear to be.

Rugby.

R. H. PARAMORE.

#### VITAMINS FOR THE UNDER FIVES

SIR,—The Ministry of Food has expressed concern because of the small proportion of parents of children under five who are applying for the cod-liver oil and fruit juices to which these children are entitled. Those not entitled to this ration probably do not realise what obstacles are placed in the way of a busy mother—for whom ordinary shopping is nowadays a complex enough matter. The procedure was drafted by civil servants who do not understand her difficulties, though they have had considerable experience in drawing up schemes for public assistance and other forms of "charity" grant. The regulations are administered by a host of petty bureaucrats in the spirit of the Poor Law. Let me record my wife's experience.

We already have twins, aged two, and a month ago a third baby arrived. We desired to obtain the fruit juice and cheap milk to which the newcomer was entitled. We live 1½ miles from the town, and my wife is able to go there only twice a week for essential shopping. It was necessary, therefore, to visit the food office on one of these days, and to do so between the hours of 10 and 12 or 2 and 4. She was supplied with a vast form, designed without any thought of paper saving, and told to go away and get it filled in. This form requires a statement of the baby's name and date of birth, the name and address of the milk retailer, the signature of the parent, and the signature of a "responsible person who knows the applicant." The rest of the space is devoted to threats describing the penalties for making a false statement.

As my signature has appeared on many documents as that of a "responsible person," I signed this. At her next visit, my wife was told, in effect, that I ceased to be a responsible person when making statements about my own children—the statement being simply that I was the parent of a child born

on the date stated, for whom a week earlier that same food office had issued a ration book in exchange for a form from the registrar of births! A personal visit from myself and some firmness were necessary in order to clear up this point.

A week elapsed; then the permit arrived by post. The next step was to queue at the post office for a supply of 2½d. stamps. Food Office clerks, it seems, are not allowed to handle money—the vitamins must be paid for with stamps, which are stuck on to the coupons, which are then detached from the ration book. This, of course, will only be done if: (a) the applicant has called on the right day of the week (for they are issued only on three days a week); and (b) a supply is in stock, which is often not the case.

All these visits, and the usual shopping queues, must be fitted in between the four-hourly feeds of a month-old baby. Can it be doubted that a mother must be unusually convinced of the value of fruit juices to her children, and of an outstandingly determined character, to fight her way through such a barrage of obstruction? I cannot believe that it is Lord Woolton's intention that mothers should be subjected to such harassment in order to obtain a health safeguard which he has guaranteed as a right to every child under five. I suggest that every green ration book issued should have special coupons for cod-liver oil and fruit juices, which should be obtainable from grocers or chemists, like other rations such as soap. Distribution would thus be taken out of the hands of the local food offices.

The medical profession besides encouraging parents to take advantage of these dietary accessories should use its influence to make them easily obtainable.

Chorley, Lancs.

F. H. TYRER.

#### INGUINAL HERNIA

SIR,—Without in any way disparaging the modification of Bassini's operations described by Squadron Leader Arthur in your issue of Oct. 3, 1942 (p. 387), I should like to observe that his claim that "the normal anatomy of the area is retained" can be accepted only by a stretch of the imagination, as much as of the conjoined tendon. Normal anatomy can however be retained if the much-neglected transversalis fascia is scrupulously sutured after removal of the hernial sac. When this is done nothing further in my opinion is necessary in the way of repair; and, like Arthur, I am thinking in terms of otherwise healthy young adults. If the tip of a finger be inserted through the internal abdominal ring the firm crescentic edge of the transversalis fascia is most distinctly felt, and this manoeuvre often helps to identify and pick up the fascia preparatory to suturing it. In a minority of patients the gap in the fascia is too large to be sutured and some form of herniorrhaphy is necessary.

J. C. LEEDHAM-GREEN.

#### THE MUSIC OF THE FUTURE

If we are to have a greater measure of state control, medical men will want to see radical changes in the controllers before they feel confident that scientific advances in medicine will be rapidly and properly applied. Hence the particular relevance to them of the conference arranged by the British Association's division for social and international relations of science, which took place in September, 1941. In a Penguin Special with the title of *Science and World Order* the views, often conflicting, of the various speakers have been woven into a continuous text, vitally interesting to all who hope to see a better planned world after this war, and believe that we should start thinking about it now. Prof. A. V. Hill says: "For all its devotion and its high traditions, the Civil Service has largely failed"; and the authors of this booklet add: "are we not tempted to wonder whether an education built around a core of Latin and Greek is sufficient for the administration of a civilisation where technical development has reached a very high level." Prof. Bernal believes what is needed is not a government of scientists but a scientific government alive to the possibilities of science. The sections on science and world planning contain much speculation, but Mr. Maisky, the Soviet Ambassador, put things in perspective: "This is the music of the future. We should not lose sight of these distant aims and tasks, but we should never forget that good English expression: first things first." This is a good ninepennyworth, full of meat.



## Notes and News

## HOSPITAL SERVICE FOR MIDDLE-CLASS LONDONERS

King Edward's Hospital Fund, which has been the fairy godfather of the voluntary hospitals of London, has come to the rescue of middle-class Londoners who find it difficult in time of illness to qualify for the pay-beds and still more to pay nursing-home bills and specialist fees. There is now to be a provident fund set up by the London Association for Hospital Services, a non-profit-making company whose solvency has been guaranteed by the King's Fund, which will make available to people of moderate means a comprehensive hospital and nursing-home service on the insurance principle. Details have been prepared with the general approval of London voluntary hospitals, and the council, of which Sir Bernard Docker is the chairman, have been in consultation with the British Medical Association to ensure that the plan is acceptable to the medical profession. There are neither upper nor lower income limits and there are five rates of subscription; a single subscriber £2 12s. annually; subscriber with one dependant £4 4s.; subscriber with two dependants £4 16s.; subscriber with three dependants £5 2s.; subscriber with four or more dependants £5 5s. These payments entitle members of six months' standing to benefits up to £105 annually towards hospital and nursing-home charges and medical and surgical fees, anaesthetist services, consultations during a treatment period, radiodiagnostic service, pathological and bacteriological investigation, radiotherapy costs. Benefits are paid on the grant-in-aid principle, but the association hope to establish a full cover contributory plan for people of moderate means and are anxious to make direct arrangements for hospital and medical treatment as soon as the hospitals and the medical profession are freed from the strain of war. Meanwhile the present benefits which are similar in value to the future full-cover plan, are distributed as repayments when the subscriber presents receipted bills to the association. Repayments are not made for preliminary consultation fees, mental diseases, confinements, contagious or notifiable diseases, war injuries, accidents where damages are recoverable from a third party or compensation is payable under an insurance policy, medical cases treated by the patient's own doctor in the surgery or at the patient's home, incurable and senile cases, dental and certain ophthalmic cases. All residents or people employed within the metropolitan area as defined by the King's Fund are eligible to join the provident scheme, if they are not over 60 and conform to certain conditions. The members of the council of management are Sir Bernard Docker (chairman), Lord Gifford, Lord Luke, Sir Hugh Lett, FRCS, Sir Kenneth Wigram, Sir Edward Peacock, Sir Harold Wernher, Dr. G. C. Anderson, Dr. W. Russell Brain, Mr. B. Lees Read, Mr. S. W. Barnes and Mr. Sydney Garbutt. Mr. T. W. Place is the secretary, and the offices of the association are at 10, Old Jewry, E.C.2.

## HOW TO USE A KITCHEN DEPOT

THE Russians have gone farther with group feeding than we have done, and their experience is instructive. In a study of the evidence now available, Mr. F. Le Gros Clark<sup>1</sup> shows how, after many experiments, they have reached a point at which labour for the housewife is greatly lightened, and communal restaurants and canteens are becoming increasingly competent and attractive. The development of kitchen depots has been strikingly successful. These centres send out uncooked but partly prepared foods to canteens and other dining centres, and also retail such foods to the public. They clean joints for roasting, cut and mince meat, make fish and meat concentrates and bone gravy, prepare liver and kidney, pluck, draw and stuff game and poultry, skin rabbits, prepare fresh and salt fish, peel or scrub potatoes, top and clean root vegetables, wash and shred cabbage, slice beans, and pick over lettuce. The food thus prepared is packed and transported to the dining centres in wooden boxes lined with tin, churns, tins or wooden tubs; and the regulations about cleansing these containers are very

1. Soviet Forms in Communal Feeding. Obtainable from 6, East Common, Harpenden, Herts. Post free 1s. 3d.

strict. Using such partly prepared food in the home the housewife, it is estimated, can get a meal in 15-20 minutes; and of course much time is saved in the dining centres themselves. Waste materials can be salvaged and collected at the kitchen depot, and the standard of the food can also be supervised; thus many depots have their own chemical and bacteriological laboratories where samples of food consignments can be analysed before they are sent out.

## BOOKS FOR THE TROOPS

"If you hesitate to part with a book which has become an old friend, you can be sure that it will be a new friend to men on active service." The Prime Minister, in his broadcast appeal for books and journals for men and women in the Forces, spoke of the need for something to read, during long hours off duty, felt by the bored fighter in a foreign land; and of the pleasure and relief with which books were greeted. The Service Libraries and Books Fund was set up at the beginning of the war at the request of all three Services, and since then has distributed nearly 14 million books to the fighting forces in all parts of the world. Volumes have short lives in the hazards of active service; and the growing size of our Forces and the shortage of new books makes it hard to keep up the supply. We must do as Mr. Churchill suggested—look through our shelves again and again and take the harvest down to the nearest post-office.

## UP TAILS, ALL

THE touch of Fougasse is always the touch of nature. On behalf of the Universities Federation for Animal Welfare he has designed some economy labels stamped with the thought "And while we're about it, let's give animals a fairer deal too." The battered rabbit who can take it, and the springtime rabbit spinning the enamelled mead somehow make it clear that this is exactly what we would all like to do. The labels (2s. 6d. for 100, 10s. for 500, post free) and information about the work of the federation—which goes on, war or no war—are to be had from the UFAW, 284, Regent's Park Road, Finchley, London, NW3.

## University of Oxford

At recent examinations the following were successful:

## FINAL EXAMINATION FOR B.M., B.CH.

*Medicine, Surgery, and Midwifery.*—D. J. Arkle, T. C. Barnes, E. L. Barr, D. F. Barrowcliff, Bryan Bevan, D. C. Byron-Moore, R. I. K. Elliott, A. W. F. Erskine, R. C. Evans, A. M. N. Gardner, C. S. Gardner, D. H. Garrow, J. M. Garvie, J. K. Hawkey, D. G. T. Hicks, E. H. Hillyard, G. K. H. Hodgkin, L. P. Le Quesne, F. E. Lodge, W. B. Matthews, R. T. C. Pratt, A. I. Spriggs, D. M. Strathie, A. M. Sweet, G. M. T. Tate, Philip Vlasto, C. E. M. Wenyon, Margaret Myers, Renate H. Schulz, Constance L. Simpson.

## Royal College of Surgeons of England

A meeting of the council of the college was held on Jan. 14, with Sir Alfred Webb-Johnson, the president, in the chair. Mr. H. S. Souttar was elected vice-president for the remainder of the collegiate year in succession to the late Mr. L. R. Braithwaite. Brigadier W. H. Ogilvie and Mr. L. E. C. Norbury were appointed representatives on the council of the Imperial Cancer Research Fund.

A diploma of membership was granted to R. H. Maudsley, of Liverpool. The following diplomas were also granted, jointly with the Royal College of Physicians:

*DPM.*—F. S. Adams, A. A. M. Askar, Charles Bard, Jean Durrant, Ada Glynn, E. C. O. Jewesbury, Felix Post, Constance D. Roberts, P. H. Tooley, and J. W. Wigg.

*DLO.*—Edgar Benjacar, W. D. Doey, J. B. M. Green, B. L. Harbison, Henry Mower, D. D. Steele-Perkins and W. M. L. Turner.

## Royal Faculty of Physicians and Surgeons of Glasgow

Dr. P. R. Peacock will deliver a Weild lecture in the hall of the faculty, 242, St. Vincent Street, Glasgow, on Wednesday, Jan. 27, at 4 P.M. He will speak on gastric cancer—an experimental approach to the problem of causation.

## Epsom College

The council of the College will shortly proceed to award St. Anne's scholarships to girls attending Church of England schools. Candidates must be fully 9 and under 16 years of age, and must be orphan daughters of medical men who have been in independent practice in England or Wales for not less than five years. The value of each scholarship is dependent upon the means of the applicant and the locality and fees of the school selected. Forms of application can be obtained from the secretary's office, Epsom College, Surrey.

**Medico-Legal Society**

A meeting of this society will be held at 26, Portland Place, London, W.1, on Thursday, 28 Jan., at 4.30 PM, when Mr. H. E. Cox, D SC, will read a paper on recent developments in food legislation.

**Medical Society for the Study of Venereal Diseases**

A meeting of this society will be held at 11, Chandos Street, London, W.1, on Saturday, Jan. 30, at 2.30 PM, when Major Paul Padgett of the US Army Medical Corps will speak on contact investigation in venereal disease control.

**Medical Casualty**

T/Surgeon Lieutenant A. B. Aiton, MB GLASG., RNVR, has been reported missing, presumed killed, after the loss of HM destroyer *Martin*.

**Prisoners of War**

The following RAMC officers, posted as missing after the fall of Singapore, are now officially reported: Lieutenant David Christison, MB GLASG., Captain John Falk, MB CAMB., Captain A. W. Frankland, BM OXF, Captain John Glover, MB CAMB., Lieut.-Colonel John Huston, MB BELF.

WS/Captain A. C. P. D. Thomson, MB EDIN., previously reported prisoner of war is now posted as wounded and prisoner of war.

**Royal Society of Medicine**

On Monday, Jan. 25, at 4.15 PM, a special meeting of the section of odontology will be held to consider the proposal that the part of the odontological museum which is the property of the society be transferred to the Royal College of Surgeons. At 4.30 PM Mr. Ernest Matthews, MD, will open a discussion on artificial restorations for facial deformities. On Jan. 26, at 4.15 PM, at the section of medicine, there will be a discussion on the effect of war-time conditions on the health of the factory worker. The opening speakers are to be Dr. J. M. Davidson, Dr. Horace Joules and Dr. T. O. Garland. On Jan. 28, at 4.30 PM, the section of urology will hold a clinico-pathological meeting with urologists of the Canadian and American Army Medical Corps.

**Socialist Medical Association**

This society is holding a course of lectures on social medicine and public health at 5.30 PM on Thursdays at the Conway Hall, Red Lion Square, London, W.C.1. On Jan. 28, Mr. Aleck Bourne is speaking on mother and child; on Feb. 4, Prof. J. B. S. Haldane, FRS, on statistics of occupational mortality; on Feb. 11, Dr. T. O. Garland on health of the industrial worker; on Feb. 18, Dr. Brian Thompson on social and economic aspects of tuberculosis; on Feb. 25, Dr. Joan Malleon on venereal diseases as a social problem; and on March 4, Prof. Hermann Levy on social insurance. Tickets may be obtained from Dr. L. T. Hilliard, Fountain Hospital, S.W.17.

**BP Amendments**

The following amendments to the British Pharmacopœia 1932 have been made:

When *extractum cascarae sagradae siccum* is prescribed the following formula may be dispensed: Mix 900 g. of cascara sagrada, in coarse powder, with 4000 ml. of boiling water, and macerate the mixture during three hours. Then transfer it to a percolator, allow it to drain, and exhaust it by percolation, using boiling water as the menstruum and collecting about 5000 ml. of percolate. Evaporate the percolate to dryness, reduce the extract to a fine powder, and add sufficient starch, dried at 100°, to make the product weigh 300 g. Mix the powders thoroughly and pass the extract through a fine sieve.

The requirement for content of FeSO<sub>4</sub> in *ferri sulphas exsiccatus* is changed from not less than 80% to not less than 77%.

Yellow soft paraffin may be dispensed for *white soft paraffin* and may be used in its place in making the preparations of the BP.

**Insulin at Reduced Rate**

Since the war the price of insulin has gone up and the Minister of Health has recently reviewed (Circular 2734) the arrangements for providing it free or at reduced rates to diabetics who are finding the new prices too heavy. The NHI, poor-law and education acts all cover sections of the population, but there still remain some people such as the dependants of the insured, widows and spinsters engaged on household duties, and merchant seamen on foreign-going ships, for whom no provision is made apart from poor relief. The Minister considers that their need can best be met by local authorities using the power given them under the public health acts of providing a temporary supply of medicine for the poorer inhabitants of their district. He suggests that this practice should be adopted for the duration of the war.

**Medical Awards**

The military cross has been awarded for gallant and distinguished services in the Middle East to the following RAMC officers: Captain G. O. Brooks, GM, MB CAMB.; Captain M. C. Fulton, LMSSA; Lieutenant F. A. Macrae, MB ST AND., Captain J. W. McMillan, MB CAMB.; Lieutenant D. T. Milnes, MRCS; and Captain A. R. Wilson, MB EDIN.

The RNVR officers' decoration has been awarded to Surgeon Commander Reginald Wear, MD DURH., Acting Surgeon Commander R. S. Allison, MD BELF., and Acting Surgeon Commander A. R. Thomas, B CHIR CAMB.

**Ophthalmological Society of the United Kingdom**

The annual congress of this society will be held on April 30, and May 1, at 1, Wimpole Street, London, W.1. On Friday morning Dr. W. Russell Brain and Mr. L. H. Savin will open a discussion on thyrotoxicosis in its relation to ophthalmology. On Saturday there will be a discussion on the scientific and clinical aspects of night vision at which Prof. W. J. B. Riddell, FRSE, and Air-Commodore P. C. Livingston will be the opening speakers. Further information may be had from the hon. secretary, Mr. Frank Law, 36, Devonshire Place, London, W.1.

**Royal Sanitary Institute**

A meeting of the institute will be held at 90, Buckingham Palace Road, London, S.W.1, on Wednesday, Jan. 27, at 2.30 PM, when there will be a discussion on healthy housing. The openers are to be Mr. Percival Harrison, MInstCE, Mr. Rees Phillips, FRIBA, and George Laws, FSIA.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

**Appointments**

BOTTOMLEY, JANET, MB LOND., FRCS: part-time gynaecological registrar at the South London Hospital for Women.

The following examining factory surgeons have been appointed: CAMERON, ALEXANDER, MB GLASG. for Campbelltown, Argyllshire;

EVANS, A. L., LMSSA, for Blackwood, Mon; NEWTON, A. J. G., MB EDIN. for Amble, Northumberland; MCGLASHAN, W. W., IRCPE, for Bolton, Lancs; and BRAMWELL, B. R., MD MANC., MRCP, for Norwich, Norfolk.

**Births, Marriages and Deaths****BIRTHS**

JAMES.—On Jan. 12, the wife of Mr. J. R. E. James, FRCS, of Carmarthen—a son.

METCALF.—On Jan. 12, at Bristol, the wife of Captain James Metcalf, RAMC—a son.

PERCIVAL.—On Jan. 12, at Oxford, the wife of Dr. Robert Percival—a son.

REMINGTON-HOBBS.—On Jan. 12, in London, the wife of Surgeon Lieutenant C. Remington-Hobbs—a son.

ROBINSON.—On Jan. 10, at Mursley, Bucks, the wife of Dr. R. H. M. Robinson, of Wendover—a daughter.

WIGFIELD.—On Jan. 9, at Hertford, the wife of Captain A. S. Wigfield, RAMC—a daughter.

**MARRIAGES**

WOODLAND-ASHTON.—On Jan. 13, at Dalmeny, near Edinburgh, Richard John Temple Woodland, surgeon lieutenant, RNVR to Jane Ashton.

**DEATHS**

BOND.—On Jan. 14, at Cheltenham, James Henry Robinson Bond, CBE, DSO, MRCS, colonel RAMC.

DICKINSON.—On Jan. 12, at West Malvern, Harold Bertie Dickinson, MD LOND., FRCS.

EDGEWORTH.—On Jan. 14, at Bath, Francis Henry Edgeworth, MA, MD CAMB, D SC LOND.

HAMILL.—On Jan. 9, at North Creake, Norfolk, Samuel Morrell Hamill, MD RUI, late of Burnham Market and Coleherne Court, S.W.5, aged 85.

HAY.—On Jan. 17, Percival John Hay, MD EDIN, of Glossop Road, Sheffield.

HEYWOOD.—On Jan. 13, at Newbury, William Benjamin Heywood, MD CAMB.

HUTCHINSON.—On Jan. 3, at St. Albans, Frederick William Hutchinson Hutchinson, MA, B CHIR CAMB, aged 74.

LANE.—On Jan. 16, in London, Sir William Arbuthnot Lane, BT, CB, MS LOND, FRCS.

MARCH.—On Jan. 15, at Reading, Edward Gerald March, MD BRUX, FRCS, aged 73.

MURPHY.—On Jan. 9, at Dublin, William Lombard Murphy, MD CAMB, FRCSI, aged 66.

PEACOCK.—On Jan. 17, at Ovingdean, Sussex, Chesnut Peacock, MB RUI.

## CHARLES DARWIN AND PSYCHOTHERAPY

DOUGLAS HUBBLE, M D LOND

ASSISTANT PHYSICIAN TO THE DERBYSHIRE ROYAL INFIRMARY;  
PHYSICIAN TO THE DERBYSHIRE HOSPITAL FOR SICK CHILDREN

The excellence of each [man] is an inflamed individualism which separates him the more.—EMERSON.

Charles Robert Darwin was born in 1809, the younger son of a successful physician in Shrewsbury. His father had been taken to Shrewsbury at the age of 19 by his father (himself a physician still well-remembered as Erasmus Darwin) and there left with £20 to set him up in practice. This £20 was so many times multiplied by his industry and talents that his six children, including Charles, were spared the need to make money for themselves. Charles was sent to Edinburgh to study medicine but having spent there two sessions and having seen, as he writes, "two very bad operations, one on a child, I rushed away before they were completed. The two cases fairly haunted me for many a long year," he did not like the thought of becoming a physician.

Therefore his father, fearing that his son would become an "idle sporting man," for he was a fine shot and devoted to field sports, planned to make him a clergyman. To Cambridge he went with the intention of taking Holy Orders but, he notes in his autobiography, "no pursuit at Cambridge was followed with so much eagerness or gave me so much pleasure as collecting beetles." Rural rectories have often been occupied by men who were more naturalist than parson but Darwin's passion must have excluded even a weekly sermon and a few pastoral visits; it drove him instead to exile for five years as naturalist to the voyage of the *Beagle* which sailed to Patagonia, to the South Seas and then home by way of the East Indies. He spent the months of November and December, 1831, at Devonport waiting for the ship's preparations to be completed and it is here that the first indication of ill health is given. He wrote:

I was out of spirits at the thought of leaving all my family and friends for so long a time, and the weather seemed to me inexpressibly gloomy. I was troubled with palpitation and pain about the heart, and like many a young ignorant man, especially one with a smattering of medical knowledge, was convinced that I had heart disease. I did not consult any doctor as I fully expected to hear the verdict that I was not fit for the voyage, and I was resolved to go at all hazards.

It is certain that these symptoms could not have originated in active heart disease for he showed great physical endurance in the subsequent shore excursions from the *Beagle*. On one occasion when all were suffering from want of water, he was one of the two who were better able than the rest to struggle on in search of it. The emotional associations of his physical symptoms are clearly set out both by him and by his children. It is apparent in the quotation above where he connects his palpitation and præcordial pain with his gloom and depression. The effort syndrome was not described by da Costa until 1871, but there can be little doubt that Darwin experienced it in 1831 at Devonport.

## HIS LIFE OF INVALIDISM

He described the two years and three months that he spent as a bachelor in London after the conclusion of the *Beagle's* voyage as the most active time of his life, "though I was occasionally unwell," he writes, "and so lost some time." In addition to his scientific work he acted as one of the honorary secretaries of the Geological Society and found time for much general reading and some social activities. After his marriage in 1839 the three succeeding years were by contrast equally unfruitful. He writes:

During the three years and eight months whilst we resided in London, I did less scientific work, though I worked as hard as I possibly could, than during any other equal length of time in my life. This was owing to frequently occurring unwellness and to one long and serious illness.

I can find no evidence as to the character of this long and serious illness, but the nature of his "frequently occurring unwellness" is not in doubt. He and his wife decided that, since his social contacts and his attendances at scientific meetings were so bad for his health, they

would live in the country. They purchased the house at Down, since presented by Sir Buckston Browne to the Royal College of Surgeons, and lived there for the rest of their lives. It is not possible to describe here the picture of the family life at Down, drawn for us by his son and daughter. There can be no doubt that Darwin was a man of unusually fine character who loved his wife and his children with a deep and sensitive affection. He was just, generous, considerate and gay, and it is no wonder that his family was devoted to him. The story has profound interest as a picture of a Victorian household, but it is as a clinical study of invalidism that it has for students of medicine an unusual value. Against the background of Darwin's invalidism his family grew up and his scientific work proceeded with undiminished patience and enthusiasm through nearly forty years.

The day's work at Down was one of undeviating routine. He rose at 7 AM and after a short walk breakfasted alone at 7.45 AM. He worked between 8 and 9.30 and at 9.30 went in to the drawing-room for his letters. The family letters were read aloud to him as he lay on the sofa; when the letters were finished a novel was read to him till about 10.30. He then returned to work till 12.15; by this time he considered his day's work over, and would often say in a satisfied voice, "I've done a good day's work." After lunch he read the newspaper, lying again on the drawing-room sofa. He then wrote letters for an hour or so, sitting in an arm-chair by the fire, his paper supported on a board resting on the arms of the chair. He went up to his bedroom at 3, "mounting the stairs with a heavy footfall as if each step were an effort," and there rested "lying on the sofa, smoking a cigarette, and listening to a novel or other book not scientific." Then a walk from 4 o'clock to half-past, more work for an hour and then another rest with novel-reading and a cigarette. Dinner at 7.30 PM after which he never stayed in the room but used to apologise by saying he was an old woman who must be allowed to leave with the ladies. "This was one of the many signs and results of his constant weakness and ill-health. Half-an-hour more or less conversation would make to him the difference of a sleepless night and the loss perhaps of half the next day's work," wrote his son. Then games of backgammon after dinner, an hour's reading of some scientific book and so to bed—but not to sleep. "His nights were generally bad, and he often lay awake or sat up in bed suffering much discomfort. He was troubled at night by the activity of his thoughts, and would become exhausted by his mind working at some problem which he would willingly have dismissed. At night, too, anything which had vexed or troubled him in the day would haunt him."

Four hours' work in the daytime sufficed for the performance of the most important scientific work of the nineteenth century—work, too, that demanded an intense industry and a laborious attention to detail.

## THE NATURE OF HIS ILL HEALTH

There are occasional references to his heart, after the Devonport episode already related, scattered through his letters. In 1863 he wrote to J. D. Hooker:

I have been not a little uncomfortable from frequent uneasy feeling of fullness, slight pain and tickling about the heart. But as I have no other symptom of heart complaint I do not suppose it is affected. . . .

It was his stomach ("my accursed stomach," he called it) which was responsible for most of his symptoms. That these stomach disturbances represented an emotional disorder is clear from many references scattered through his autobiography, his letters<sup>1</sup> and the reminiscences of his children.<sup>2</sup> I select a few:

I always suffered from the excitement of talking, but now it has become ludicrous. I talked lately 1½ hours with my nephew, and I was ill half the night. It is a fearful evil for self and family.

I dread going anywhere, on account of my stomach so easily falling under any excitement. My nights are *always* bad and that stops my becoming vigorous.

I believe I have not had one whole day, or rather night, without my stomach having been grossly disordered during the last three years, and most days great prostration of strength;

1. Life and Letters of Charles Darwin. Edited by his son Francis Darwin. In 3 vols. John Murray, 1888.
2. Life of Charles Darwin. Edited by his son Francis Darwin John Murray, 1902.

thank you for your kindness; many of my friends, I believe, think me a hypochondriac.

Darwin wrote. On the 13th of November (1848) my poor dear father died. . . . I was at the time so unwell that I was unable to travel, which added to my misery. All this winter I have been bad enough and my nervous system began to be affected, so that my hands trembled, and my head was often swimming.

He bore his illness with such uncomplaining patience, that even his children can hardly, I believe, realise the extent of his habitual suffering. . . . No one, indeed, except my mother knows the full amount of suffering he endured, or the full amount of his wonderful patience. . . . But it is, I repeat, a principal feature of his life, that for nearly forty years he never knew one day of the health of ordinary men, and that this his life was one long struggle against the weariness and strain of sickness.

Other relevant passages are found throughout the *Life and Letters*. It is apparent that this illness carries the unmistakable marks of an emotional disorder. This diagnosis is confirmed by the frequent references to the calming and relieving influence of his scientific activities:

I have been as yet in a very poor way; it seems as soon as the stimulus of mental work stops, my whole strength gives way.

My chief enjoyment and sole employment throughout life has been scientific work; and the excitement from such work makes me for the time forget, or drives quite away, my daily discomfort.

There are many references, too, to the minor stigmata of a psychoneurosis. He hated the sight of blood:

We used to dread going in for sticking-plaster, because he disliked to see that we had cut ourselves, both for our sakes, and on account of his acute sensitiveness to the sight of blood.

His attitude to his children's future was one of fearfulness and timidity:

It makes me sick whenever I think of professions. All seem hopelessly bad, and as yet I cannot see a ray of light. . . . How paramount the future is to the present when one is surrounded by children. My dread is breeding ill health; even death is better for them.

Honest and generous man though he was he would use his ill health to get himself out of a difficulty. He replied to a friend who had asked him to read through some proofs (the same friend having frequently rendered Darwin the same service):

You will believe me that I speak strictly the truth when I say that your Australian Essay is *extremely* interesting to me, rather too much so. I enjoy reading it over and if you think my criticisms are worth anything to you, I beg you to send the sheets (if you can give me time for good days); but unless I can render you any little, however little, assistance I would rather read the essay when published. Pray understand that I should be *truly* vexed not to read them if you wish it for your own sake. I had a terribly long fit of sickness yesterday, which makes the world rather extra gloomy today, and I have an insanely strong wish to finish my accursed book.

He repented in a letter written ten days later.

This psychoneurosis, which protected his scientific genius to a remarkable degree, had an extraordinary effect on his aesthetic development:

I have said that in one respect my mind has changed during the last twenty or thirty years. Up to the age of thirty, or beyond it, poetry of many kinds, such as the works of Milton, Gray, Byron, Wordsworth, Coleridge, and Shelley, gave me great pleasure, and even as a schoolboy I took intense delight in Shakespeare, especially in the historical plays. I have also said that formerly pictures gave me considerable, and music very great delight. But now for many years I cannot endure to read a line of poetry: I have tried lately to read Shakespeare, and found it so intolerably dull that it nauseated me. I have almost lost my taste for pictures or music. Music generally sets me thinking too energetically on what I have been at work on, instead of giving me pleasure. . . . This curious and lamentable loss of the higher æsthetic tastes is all the odder, as books on history, biographies, and travels (independently of any scientific facts which they may contain), and essays on all sorts of subjects interest me as much as ever they did. My mind seems to have become a kind of machine for grinding general laws out of large collections of facts, but

why this should have caused the atrophy of that part of the brain alone, on which the higher tastes depend, I cannot conceive.

There is no evidence that his appreciation of music or pictures was at any time of his life unusually keen, but with literature it was different. The schoolboy who took intense delight in Shakespeare grew into an old man who found Shakespeare nauseatingly dull; the young man who slipped a volume of Milton into his saddle bag in his excursions from the *Beagle* in middle age found poetry unendurable. There is no doubt that the enjoyment of Shakespeare and Milton demand a liveliness of approach which Darwin reserved for his scientific thought, but it may also be that psychoneurotic preoccupations destroy æsthetic appreciation.

#### DARWIN'S DOCTORS

It seems a pity that such a nicely adjusted psychoneurosis should have required any treatment. Physical symptoms there were, so doctors and medicine there had to be—a succession of doctors and a plenitude of treatments to protect him from the suspicion of shamming. From 1839 until 1848 he tried the "regular doctors," but they did him no good and of them we hear but little. Other remedies had to be found and our profession did its best for Darwin. This was the heyday of hydropathy and he went to the waters of Malvern where Dr. Gully, lately returned from Germany, was working miracles; thither, in spite of the thunderings of the *Provincial Medical Journal* and Dr. Charles Hastings, went the sufferers as to the Pool of Bethesda. Back in Down, the butler learnt to be his bathman.

I have built a douche, and am to go on through all the winter, frost or no frost. My treatment now is lamp five times per week, and shallow bath for five minutes afterwards; douche daily for five minutes and dripping sheet daily. The treatment is wonderfully tonic and I have had more better consecutive days this month than in any previous ones. . . . I am allowed to work now two and a half hours daily, and I find it as much as I can do, for the cold-water cure together with three short walks, is curiously exhausting; and I am actually forced to go to bed at eight o'clock completely tired. I steadily gain in weight, and eat immensely and am never oppressed with my food. I have lost the involuntary twitching of the muscles, and all the fainting feelings, etc. Black spots before the eyes, etc. Dr. Gully thinks he shall quite cure me in six or nine months more.

But like all other remedies, it had only a transient effect. Perhaps it was not the remedy that failed but Dr. Gully.

It is a sad flaw, I think, in my beloved Dr. Gully, that he believes in everything. When Miss — was very ill, he had a clairvoyant girl to report on internal changes, a mesmerist to put her to sleep—an *homœopathist*, viz. Dr. —, and himself as *hydropathist*! and the girl recovered.

He was prepared to swallow as much water as need be in the interests of his own health, but not clairvoyance, hypnotism and homœopathy as well. Dr. Gully's catholic enthusiasms chilled his faith and he changed to "Dr. Lane's beautiful water establishment at Moor Park, near Aldershot," which he visited for many years. Fifteen years after his first visit to Malvern, in a period of wretched ill health, he gave Gully another chance, but the magic had departed. A new doctor was required and Dr. Brinton was the man; reassurance and encouragement were the chief shots in his locker. "He does not believe my heart or brain are primarily affected." In spite of this "hopeful opinion from one of the most cheery and skilful physicians of the day," he remained ill and depressed. Two years later (1865) the familiar name of Bence-Jones appears. A change in the regime was needed—fasting and then exercise were the watchwords. "Bence-Jones half-starved me to death," he wrote. The exercise prescribed was riding and "a cob, Tommy, the easiest and quietest in the world," was found. Darwin enjoyed these rides, but one day Tommy fell with him on Keston Common. "This upset his nerves and he was advised to give up riding." Unlucky Bence-Jones. From here, there was but one choice, inevitable and consoling: the Victorian sick found their ultimate haven in the comforting presence of Sir Andrew Clark.

Of him Sir Francis Darwin wrote :

It was not only for his generously rendered service that my Father felt a debt of gratitude towards Sir Andrew Clark. He owed to his cheering personal influence an often-repeated encouragement, which latterly added something real to his happiness. . . .

In March, 1882, he was seen for the last time by Sir Andrew, whose treatment was then continued at Down by Dr. Norman Moore, of St. Bartholomew's Hospital, and Mr. Allfrey, of St. Mary Cray. T. H. Huxley was not satisfied with this arrangement but Darwin replied to his protest on his death-bed, "Dr. Clark's kindness is unbounded to me." Sir Francis explains :

Sir Andrew Clark himself was ever ready to devote himself to my father who, however, could not endure the thought of sending for him, knowing how severely his great practice taxed his strength.

In truth, Charles Darwin had never needed his doctors less. This was his first dangerous illness and his last. He died of myocardial degeneration on April 19, 1882, at the age of 74.

#### THE CAUSE OF HIS ILL HEALTH

It is apparent from this account of Darwin's psychoneurosis that here is a clinical picture drawn with a clarity and detail which are accounted for by two fortunate circumstances unlikely ever again to be conjugated. The first that Darwin and his family were trained in the exact recording of their observations, and the second that no-one in Darwin's circle recognised the origin of his illness or thought of withholding it from posterity. Illness was at that time regarded as having both physical and mental causes, but these causes were accepted as breeding true; so that physical illness did not arise from mental disorder nor was the emotional disturbance occasioned by physical disease of any account. For physical symptoms which had no physical basis the only diagnosis was "shamming."

It is inconceivable that today anyone, rich or poor, great or small, could travel through forty years of happy invalidism without having it explained, by doctor, nurse, kind friend or aggrieved relation that his illness was neurotic in origin. Darwin suffered from a variety of symptoms which can be recognised as neurotic because they were associated with unpleasant emotions, because they were relieved by the pleasurable excitement connected with his work, because even he recognised that his illness brought him gains and he frequently used it to avoid difficult situations, because no physical illness was discovered in him and he lived to a good age. Yet the nature of his painful emotion, its origin and its development remain unrevealed.

He himself was fearful that there might be an inherited weakness which he might pass on to his children; and there is some evidence of inherited ill health of a nervous sort in the older generations of the family. Charles's grandfather, the great Erasmus, and his uncle Charles both stammered badly. His uncle Erasmus committed suicide at the age of 40 in "a state of incipient insanity." His brother Erasmus lived from boyhood to the age of 77 in continuous invalidism. Charles's father had robust physical health and died at the age of 82 but both he and Charles showed a morbid dislike of blood.

Charles's mother died when he was 8 years old and it is possible to see in Charles's relationship with his father a factor in his neurosis. He always spoke of his father in superlatives as "the wisest man I ever knew" or "the kindest man I ever knew" or "the largest man whom I ever saw" (6 ft. 2 in. and 24 st.); "his powers of observation and his sympathy neither of which I have ever seen exceeded or even equalled." To live in the shadow of parental displeasure is no doubt difficult enough, but to know that a god-like being of this splendour disapproved of one's activities must have been disintegrating to the young Charles. "To my deep mortification," he wrote, "my father once said to me, 'You care for nothing but shooting, dogs and ratcatching, and you will be a disgrace to yourself and all your family.'" "I think," comments Charles mildly in later years, "my father was a little unjust to me when I was young," and Sir Francis suggests, not unexpectedly, that "Charles' memory of his father which he loved the best was that of him as an old man"—by which time Charles

had earned his father's respect and increasing assurance had abated something of his awe. Two qualities of Darwin's which may well have been related to this father-son relationship were his ambition and his sense of guilt. He discourses dispassionately of his ambition in his autobiography:

Sedgwick called on my father, and said I should take a place among the leading scientific men. . . . After reading this letter I clambered over the mountains of Ascension with a bounding step, and made the volcanic rocks resound under my geological hammer. All this shows how ambitious I was; but I think I can say with truth that in after years, though I cared in the highest degree for the approbation of such men as Lyell and Hooker who were my friends, I did not care much about the general public.

This is candid and revealing enough: one mainspring of his ambition was to reverse his father's unfavourable early judgment of him and then to win the approval of his father-substitutes Sedgwick, Lyell and Hooker.

His well-developed sense of guilt is shown by this extract:

How I did enjoy shooting! but I think that I must have been half-consciously ashamed of my zeal, for I tried to persuade myself that shooting was almost an intellectual employment.

And of his life at Cambridge:

My time there was sadly wasted, and worse than wasted. From my passion for shooting and hunting, and when this failed for riding across country, I got into a sporting set, including some dissipated low-minded young men. We used often to dine together in the evening, though these diners often included men of a higher stamp, and we sometimes drank too much, with jolly singing, and playing at cards afterwards. I know that I ought to feel ashamed of days and evenings thus spent, but as some of my friends were very pleasant, and we were all in the highest spirits, I cannot help looking back to these times with much pleasure.

It will be recalled that Darwin's first ill health appeared at Devonport, possibly, as he himself suggests, as a result of his depression at leaving his father and family for five years. This gloom may have been reinforced by the knowledge that his voyage was contrary to his father's first wish which had been so emphatically expressed that Charles had promptly written to refuse the position of naturalist to the expedition. His father's opposition was withdrawn on the advice of his uncle, Mr. Josiah Wedgwood. This conflict between father and son never had open expression, but there was a good deal behind it, for it had been understood by both that Charles was, at his father's suggestion, entering Holy Orders after Cambridge, and although this was never again mentioned it was tacitly assumed by both that the voyage of the *Beagle* meant the end of such intentions.

The physical expressions of Darwin's psychological disturbances were those that are recognised as the natural expression of intense emotion in man—palpitation, tremor, shivering, nausea and vomiting. That his emotions readily found physical expression is shown by his description of his first shoot at the age of 15, long before the onset of his ill health: "How well I remember killing my first snipe, and my excitement was so great that I had much difficulty in reloading my gun from the trembling of my hands." It might be interesting to speculate how far his ill health can be attributed to this lability of emotional reflexes and whether this abnormal sensitivity was innate or acquired, but this summary represents in my view the conclusions which it is justifiable to draw from the published evidence.

#### RELATION OF HIS ILL HEALTH TO HIS LIFE-WORK

Darwin's genius consisted in remarkable facility for the construction of likely hypotheses, unusual ingenuity in the devising of experiments to test these theories and tireless persistence in the making of observations and the collection of facts. His work was his "chief enjoyment and sole employment" and his whole life was ordered and controlled with this one objective. The price he paid for this singlemindedness was the sacrifice of his health, for his ill health gave him the essential conditions for the performance of his work. He and his wife fled from London because scientific meetings and social occasions made him so ill that work of the required intensity became impossible. Can we go further and

state that what made him ill was the recognition that, as a family man, work was impossible for him in London? This is not certain but it is highly probable, since in the years before his marriage he had, in London, worked harder than at any time of his life. It may be urged against this theory that his health should then have improved once his working conditions were satisfactory in the country. But by this time his ill health was a constant element in his daily life and was, in fact, an essential condition of his very curious methods of work.

His work demanded long hours of contemplative thought for the formulation of hypothesis and the planning of experiment; this occupied his night hours when he worked "at some problem which he would willingly have dismissed." The performance of his experiments, the recording of his observations and the writing of his books required but four hours of his day. Darwin had a horror of idleness, and yet what, to a superficial observer, to an unkind critic and indeed to Darwin himself, could have appeared more idle than Darwin's four-hour day? How to justify his lounging on sofas and in arm-chairs, his novel readings, his saunters through the garden, his play with the children? Darwin could have done his work in no other way and his ill health provided him with his necessary justification. He did not realise this but he did recognise that his ill health had protected his life-work since it saved him from wasting his time and energy in scientific meetings and social conversations. It saved him, too, from plunging into the controversies, for which he was temperamentally unfitted, which followed the publication of his *Origin of Species*. Had Darwin risen, as did the doughty Huxley, to meet the onslaught of Bishop Wilberforce at the famous meeting of the British Association, not all the waters of Malvern and Moor Park would have prevented his final and irretrievable breakdown ("Mr. Darwin does not talk as well as he writes," said H. T. Buckle). His psychoneurosis may be regarded as an adaptation to his environment which nourished and protected in the highest degree his uncommon genius.

#### HIS TREATMENT BY PSYCHOTHERAPY

It is impossible for any doctor, whether psychiatrist or physician, to read this story of Darwin's ill health without asking himself how it should have been treated. Aubrey Lewis has recently defined the methods of psychological treatment, when inappropriately applied, as "superficial dabbling, harmful probing, and crude ploughing and plugging." One who has frequently and unsuccessfully used all three methods may be allowed to say a word in explanation of them. Of the first it may be said that it occasions the minimal harm. Of the second that it seeks with the best intentions to cast out devils and is not this the proverbial road to hell? Of the third that it displays a misguided but noble belief in the value of reason when applied to emotional problems. The second and third methods represent the hang-over from the first enthusiasms of twenty years ago when the new evangel appeared to mean salvation through suffering. The metaphor of psychological surgery, of probing, of incision and excision was present to our minds—but we forgot the anaesthesia. The psychiatrists discovered this soon, possibly by force of economic circumstance, and a new caution crept into their writings, a new respect for the personality of the patient. A recognition, too, that although the patient's adjustments in the eyes of the psychiatrist, and maybe of God, were clumsy, ineffective and even noxious, yet it might not be easy to substitute a more favourable adaptation. I was a little longer than some in catching up with this idea and it has been a profound shock to me on several occasions that the patient preferred to change his doctor rather than his life-style.

Several of the principles that one has learnt by painful experience are illustrated by, and might have been deduced from, a consideration of the invalidism of Charles Darwin. It is now agreed that the possibilities of successful psychotherapy are limited by the extent of the patient's intelligence and the degree of his psychological insight. Although those conditions are obvious they are not always easy to assess. Related to these limiting conditions are the nature of the patient's personality, his endocrine and autonomic equipment and the stability of his psychosomatic reflexes. The clinical

and scientific investigation of these problems is only now beginning; it is not yet possible to say how much of one's personality is acquired and how much innate. Psychoneurosis is by definition an environmental reaction but there can be no doubt that individuals are born with a special liability to the development of such a reaction. No doubt also, at least to the family doctor's mind, that some children display an exaggerated reaction to physical stimuli, such as noise, in the first few days of life. A surgical chief of mine used to pass hurriedly by the neurotic patient murmuring, "Poor protoplasm, poor protoplasm." Suckled by Freud, nourished by Jung and Adler, we smiled in disdain at such heresy, but these problems look less simple today. I have pointed out above that there is reason to suggest that Charles Darwin showed a marked liability of psychosomatic reflexes before the development of his neurotic symptoms. Such liability predetermines the onset of visceral neuroses with psychogenic components and must inevitably compromise the therapeutic result in them.

Another group of well-recognised therapeutic principles can be illustrated by Darwin's illness. A fruitful way to regard psychoneurosis is as an adaptation to environment. Such adaptations may be disabling in the highest degree and yet they represent for the subject a protection, an escape, a reward. Darwin by his psychoneurosis secretly and passionately nourished his genius; he was protected thus from painful and wasteful contacts, escaped from any circumstance which interfered with his work, was rewarded by nights of sleepless suffering which stimulated his restless mind. Although psychotherapeutic problems vary with the individual and are very uncommonly related to the protective adaptations of genius making its inevitable compromise with environment, yet even in ordinary folk it is a mistake to underestimate either the biological value or the fixity of their adaptations. It is axiomatic in treatment that one is unlikely to be successful unless one can proffer the patient a gain greater than that afforded by his illness. This is illustrated by an example given by Ross, said to be the outstanding psychotherapist of our time. He was making very little headway with a ward full of "shell-shocked" soldiers until he promised one of them that he would get his discharge from the Army when he became well. The stimulus—not only to the fortunate one, but also to the unfortunate many—was immediate.

What could one have offered Charles Darwin in place of his invalidism? Freedom from pain, the life of a country squire, the meetings of the British Association and the Geological Society, the encroachment of his family on his working hours, sound sleep at night with his problems unsolved and tomorrow's ideas not sifted, an enhanced appreciation of Milton, Turner and Sullivan, the relief of his guilt feelings and the slackening of his ambition. Who can doubt his reply? It is agreed, too, that if at any stage of psychotherapy one presents the patient with an idea which is too painful for him to accept then the prognosis is poor. Charles Darwin was a man of affectionate nature and extreme sensibility. It was a source of peculiar distress to him that his illness imposed such a burden on his wife and family. I cannot imagine that any psychotherapist, however ingenious and skilful, could have brought Darwin to the recognition that his illness was emotional in origin and that he might, if he accepted this, rid his family of their heavy burden.

Treatment which would have been simple at Devonport had become impossible fifteen years later. How then to treat Charles Darwin in 1943? It would be tempting to explain to the author of the *Expression of the Emotions in Man and Animals* that his own illness displayed the autonomic disturbance characteristic of emotional expression in man. It would be easy for the author of the *Origin of Species* to understand that his illness might represent an unfavourable adaptation to environment. Then the course would be set for an investigation of the nature of the unresolved conflicts that at once profoundly disturbed his somatic functions and deeply impelled his scientific genius. Could one relieve the one without impeding the other? Restore the healthy naturalist with his tastes for shooting and Milton without at the same time destroying the *Origin of Species*? No-one in his senses would attempt the perilous task. "The chamber is swept and garnished," quoted Middleton Murry twenty years ago in a passionate protest against

psycho-analysis, "and the seven devils enter in." With Darwin the danger would be that one might restore the chamber's garnishings and sweep out the only devil that mattered—the devil of single-mindedness. Superficial psychotherapy would be the ineluctable method; reassurance, hope and comfort, in much the same fashion as his Victorian doctors gave them to him. One may regret that he would not wash in the waters of Jordan with Allfrey of St. Mary's Cray but preferred the waters of Abana with the pompous Lane and of Pharpar with the self-gulling Gully. Still, his doctors did him pretty well. No-one could have reassured him more strongly than the "cheery and skilful" Brinton, no-one could have given him more hope than Lane and Gully, no-one could have encouraged and consoled him more adroitly than the courtly Clark. He retained his reason and he wrote the *Origin of Species*. This is his doctors' justification. It is a terrifying thought that the Darwins of today may be known to posterity only in the case-books of the psychiatrists.

## PROPAMIDINE IN CHRONIC WOUND SEPSIS

### AN EXPERIMENTAL AND CLINICAL STUDY

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A SERIES of aromatic diamidines prepared by Ewins<sup>1</sup> was found by Lourie and York<sup>2</sup> to possess well-marked activity against various protozoal organisms. Later, some of these compounds were shown by laboratory tests to have a considerable antimicrobial action. Wien (unpublished work) investigated also the pharmacological properties of these drugs. In established wound sepsis the local application of sulphonamides is of limited value, mainly because their action is inhibited by the peptones and other constituents of pus and tissue fluids. The bacteriostatic action of the amidines proved not to be inhibited in this way, and there therefore seemed good grounds for studying the possible value of these compounds in the local treatment of wound sepsis. In particular, the action of 4:4' diamidinodiphenoxypropane dihydrochloride (now called 'Propamide') was investigated in detail in the laboratory, and later was tested clinically in patients suffering from septic wounds. The results of this work are now described.

### In-vitro Experiments

Several strains of *Staphylococcus aureus* were used to test the bacteriostatic properties of the drug. Tests were also carried out with the hæmolytic streptococcus which, when resistant to sulphonamides, often interferes with the success of plastic operations. Two methods were employed for evaluating the in-vitro antibacterial activity of propamide: (a) Fleming's (1924-25) slide-cell technique, which gave a comparative estimate of the efficiency of propamide and sulphathiazole, and (b) a dilutional method in nutrient broth which simply gave an estimate of the antibacterial activity without reference to sulphathiazole.

### FLEMING'S SLIDE-CELL TECHNIQUE

Normal human defibrinated blood was used as the medium, incubated at 37° C. for 24 hours. With an inoculum giving discrete countable colonies in the control, the cell was noted in which the lowest concentration of the drug inhibited the growth of the organism. The effect is probably a bacteriostatic one and subculture in order to determine bactericidal effects is not possible by this technique.

Table I shows the results of 13 experiments, using five strains of *Staph. aureus*, obtained mainly from cases of osteomyelitis. Ten different samples of normal human blood were used as the medium. Other strains of *Staph. aureus* obtained from gunshot and similar wounds have also been tested against propamide, but these results have not been included here since a comparison with

1. Ashley, J. N., Barber, H. J., Ewins, A. J., Newbery, G. and Self, A. D. H. *J. chem. Soc.* February, 1942, p. 103.  
2. Lourie, E. M. and Yorke, W. *Ann. trop. Med. Parasit.* 1939, 33, 289.

TABLE I—COMPARATIVE ANTIBACTERIAL ACTIVITY OF PROPAMIDINE AND SULPHATHIAZOLE AGAINST VARIOUS STRAINS OF *Staph. aureus*, USING FLEMING'S SLIDE-CELL TECHNIQUE

Expt.	Minimal effective concentration		Source of organism	Expt.	Minimal effective concentration		Source of organism
	Sulphathiazole	Propamide			Sulphathiazole	Propamide	
1	1:64,000	1:128,000	1	8	1:16,000	1:64,000	4
2	1:32,000	1:64,000	2	9	1:32,000	1:32,000	5
3	1:64,000	1:32,000	3	10	1:16,000	1:64,000	5
4	1:64,000	1:16,000	3	11	1:32,000	1:32,000	5
5	1:32,000	1:128,000	4	12	1:64,000	1:64,000	5
6	1:32,000	1:128,000	4	13	1:32,000	1:32,000	5
7	1:32,000	1:128,000	4				

Source of *Staph. aureus* strains: Nos. 1, 2 and 3 were all isolated from osteomyelitis cases; no. 4 was isolated from a case of septicaemia; no. 5 was isolated from a case of urinary infection.

sulphathiazole was not made simultaneously. It will be observed that against three of the five strains of staphylococcus propamide was more effective than sulphathiazole.

*Effect of p-aminobenzoic acid.*—As was to be expected from the chemical structure of these compounds, the antibacterial effect of the amidines is not inhibited by p-aminobenzoic acid, which antagonises the action of the sulphonamides. In a typical experiment, sulphathiazole exerted an antibacterial effect in a minimal effective concentration of 1:32,000; this action was completely inhibited by the additions of 1:10,000 to 1:1,000,000 of p-aminobenzoic acid. Propamide, on the other hand, was unaffected by the p-aminobenzoic acid in the same dilutions and exerted an antibacterial effect at a minimal effective concentration of 1:128,000 in both cases.

### DILUTIONAL METHOD IN NUTRIENT BROTH

Tubes containing serial dilutions of the drug in nutrient broth were inoculated and incubated at 37° C. for 24 hours. The bacteriostatic effect was observed by noting the tube with the smallest concentration of the drug which showed no turbidity; bactericidal action was observed in subcultures on agar plates. *Staph. aureus* was used as the test organism, various human and bovine strains being employed (table II). A somewhat lower concentration was found to be effective with the serial dilutional method than with the Fleming's slide-cell technique, but the concentration was of the same order. In addition the compound has been tested for its antibacterial activity in vitro against *Streptococcus pyogenes*,

TABLE II—IN-VITRO ANTIBACTERIAL ACTIVITY OF PROPAMIDINE BY SERIAL DILUTIONAL METHOD IN BROTH

Organism	Strain	Medium	No. of expt.	Minimal effective concn.	
				(a)	(b)
<i>Staph. aureus</i>	Bovine, non-hæmolytic on ox blood	Nutrient broth	1	1:256,000	1:128,000
			2	1:256,000	1:256,000
			3	1:512,000	1:128,000
<i>Staph. aureus</i>	Bovine, hæmolytic on ox blood	Nutrient broth	4	1:128,000	1:128,000
			5	1:128,000	1:128,000
			6	1:256,000	1:128,000
			7	1:128,000	1:128,000
			8	1:512,000	1:128,000
<i>Staph. aureus</i>	Human, non-hæmolytic on ox blood	Nutrient broth	9	1:256,000	1:256,000
			10	1:512,000	1:256,000
<i>Staph. aureus</i>	Human, hæmolytic on ox blood	Nutrient broth	11	1:256,000	1:256,000
			12	1:128,000	1:128,000
			13	1:128,000	1:64,000
			14	1:256,000	1:128,000
<i>Strep. pyogenes</i>	Richards's	Serum broth	1	1:2,048,000	1:1,024,000
			2	1:2,048,000	1:2,048,000
			3	1:2,048,000	1:1,024,000
			4	1:4,096,000	1:4,096,000

(a) Bacteriostatic; (b) Bactericidal.

Richards's strain ( $\beta$  haemolytic), serum broth being used as a medium in these experiments. It will be seen that the minimal effective concentration for the bactericidal effect of propamidine did not differ significantly from the figure for bacteriostatic action. These in-vitro experiments demonstrated the high bactericidal action displayed by propamidine. So far no detailed experimental work has been done on clostridia but preliminary studies suggest that the degree of activity possessed by propamidine is of the same order as that against staphylococci.

#### EFFECT ON BLOOD-CELLS AND ON BACTERIA IN PUS

The effect of the drug on the phagocytic activity of leucocytes was tested in vitro. Reconstituted blood was used, prepared by adding fresh serum to washed blood-cells in equal volume; 0.2 c.cm. of this was mixed with the same volume of a saline dilution of the drug and the tubes were incubated usually for 3 hours. Either one or two drops of a heat-killed 3-hour staphylococcal broth culture was then added to each tube, and the tubes

TABLE III—PHAGOCYTOSIS EXPERIMENT

Tube	Propami- dine %	Phago- cytosis	Tube	Propami- dine %	Phago- cytosis
1	0.4	3.3.50	5	0.025	100.37.50
2	0.2	49.29.50	6	0.0125	115.41.50
3	0.1	117.42.50	7	Saline	88.33.50
4	0.05	93.41.50			

Two drops of killed 3-hour culture was added to each tube after 3 hours' incubation. In column three, for example, 117.42.50, indicates that 117 cocci were seen within 42 out of the 50 phagocytes counted, paired cocci being counted as single organisms.

were shaken and incubated for 30 minutes. Films were made by loop from each tube. Fifty phagocytes were counted in each film and the numbers of ingested cocci and of cells containing organisms were noted. Repeated tests by this method—e.g., table I—showed that at 0.1% of propamidine phagocytosis is practically unaffected, it is slightly reduced at 0.2% and inhibited at 0.4%. It was also found that the leucocytes were not killed by the higher concentration (0.4%), since, if the cells were washed in saline after 3 hours' incubation with the drug and fresh serum added with the suspension of cocci, phagocytosis was readily obtained. No haemolysis was found with concentrations up to 0.4%.

In-vitro tests were also made to ascertain the activity of the drug in the presence of pus. Pus was used as it became available in suitable volume. It was often too thick to be drawn readily into a pipette and it was therefore usually shaken up with one or more volumes of nutrient broth to give a suspension capable of being

TABLE IV—BACTERICIDAL EFFECT IN PRESENCE OF PUS

Tube	Propami- dine %	Daily subcultures			
		1	2	3	4
1	0.1	+	+	(+)	37 col.
2	0.05	+	+	(+)	40 "
3	0.025	+	+	+	(+)
4	0.0125	++	+++	+++	+++
5	0.006	++	+++	+++	+++
6	0.003	++	+++	+++	+++
7	Saline	+++	+++	+++	+++

Pus, containing many clumps of staphylococcus, diluted with about an equal volume of broth.

Subcultures were made after shaking up tubes by plating one loopful on nutrient agar. The colonies were counted if less than 50.

measured with reasonable accuracy. This was mixed in equal volume with varying concentrations of the drug diluted in saline. Even so the pus after incubation tended to form into masses which appeared to prevent an even distribution of the drug; for with daily subcultures it was often not until the third or fourth day that a clear end-point was obtained. In table IV, for example, the fourth subculture from the tube containing

0.025% propamidine gave a poor growth, indicated as (+), whereas that from the tube with 0.0125% gave a growth indistinguishable from that in the control tube. The pus in this case contained large numbers of staphylococci, and under these conditions the lowest concentration to show a clear bactericidal effect was usually 0.025%, although with undiluted pus the end-point may come at 0.05%. Where fewer staphylococci were present in the pus a lower concentration was effective, such as 0.006%. Pus containing haemolytic streptococcus was used on only two occasions and gave end-points of 0.003% and 0.004%; in one case, however, the organism died out in all tubes by the fourth day, but the result could be assessed with fair accuracy from the first subculture since the pus in this case gave an even suspension.

These two series of experiments suggest that, whereas a concentration of 0.1% should have little effect on the activity of leucocytes in a wound, a concentration of 0.025% should have a considerable sterilising action on a wound surface with serious coccal infection.

#### Clinical Application

The clinical evaluation of an active compound such as propamidine involved certain preliminary investigations. Since in-vitro experiments indicated that low concentrations should be used, a suitable vehicle had to be found. In treating the cases to be described a watery gel of methyl cellulose of constant viscosity, the strength varying between 4.5 and 5% was selected for exhibiting propamidine. The viscosity of any preparation to be applied to wounds is of great importance, for it should be little affected by changes of temperature and while capable of adhering to dependent surfaces of the body must be soft enough to be spread painlessly on raw surfaces. The possibility of effecting further improvements in gels is under consideration. The optimum concentration to be placed in contact with human tissue could be determined only after clinical trial. It was necessary also to find out what intervals should be left between dressings, how long treatment should be continued, and what further measures should be taken. When this knowledge had been obtained by numerous clinical trials it remained to estimate the general efficacy of the product in combating existing wound sepsis, and to show whether healing was thereby expedited and whether operation was made possible in cases where the original septic condition of the wound would have rendered this hazardous.

**Technique.**—The technique of the dressing is simple but important. At the beginning of treatment the wound is cleaned with normal saline and if necessary explored to ensure that the jelly can make contact with the entire surface. A sterile spatula is used to fill up the cavity to skin level with 0.1% propamidine jelly. The jelly must not remain on the skin edges, which should be left dry. The wound and surrounding skin are then covered with two or three layers of impermeable 'Vaseline' gauze to make a good joint (the use of tullegras is inadvisable as it is permeable). Only a thin layer of gauze or wool is needed over the vaseline gauze to allow the bandage to fit snugly; thus considerable economy in dressings is effected. When the dressing is repeated, exudate and stale jelly are swabbed or washed out with saline and fresh jelly is applied as before. Although the preparation is self-sterilising, the stock supply should not be contaminated by introducing into it the spatula used for applying the jelly to the wound.

#### CASE-HISTORIES

During these investigations some 50 patients with various septic wounds were treated. The following case-notes show the evolution of the technique which was later employed successfully by other workers.

**CASE 1.**—A soldier, aged 23, sustained an open fracture of the right femur with soft-tissue damage on the anterior and posterior aspects of the thigh from a gunshot wound in May, 1940. He was treated with pin transfixion and full-length plaster. In June, 1940, his wound was found to be infected with *Staph. albus* and diphtheroids. In July, 1941, after a year's treatment with various forms of fixation, he was left with imperfect bony union and two chronic septic wounds on his thigh, each about 6 in. long. In a radiogram there was evidence suggestive of a small sequestrum at the site of the fracture. From the pus *Staph. aureus*, *Proteus vulgaris*, and



*Pseudomonas pyocyanea* were isolated. Using Fleming's slide-cell technique this staphylococcus was tested against sulphathiazole and propamidine, the latter proving to be twice as effective as the former as an antimicrobial agent.

On July 15, and subsequently at 3-day intervals, 0.2% propamidine jelly was applied to one of the wounds, the other being treated with plain jelly. It soon became apparent, not only in this case but also in another treated at the same time, that the jelly base had no effect on the wounds and its further use for control purposes was considered unnecessary. After two applications of propamidine the wound showed a striking improvement, and no organisms could be seen in smear preparations. The patient had for a long time been running a low-grade temperature, but this now settled. For another week, 0.4% propamidine jelly was applied, but a whitish ground-glass appearance developed on granulations which before appeared healthy. It is now recognised that this appearance is due to a mild superficial necrosis which may result from too vigorous or too long treatment. The whole mental and physical outlook of the patient was changed as the surface lesions shrank to two small sinuses leading to the fracture. Circumstances, together with insufficient experience, prevented the further treatment of this patient with propamidine. Recent improvements in technique suggest that with the help of this compound, operations may be successfully undertaken even in the presence of sequestra and obvious sepsis (see cases 6 and 7).

CASE 2.—In April, 1941, during an air-raid, a woman of 48 was wounded in the right buttock near the anus. The injury was sutured immediately, but 3 days later it was obviously infected and when explored was found to contain a piece of curtain. The cavity was infected with staphylococci and streptococci and remained indolent for 3 months, during which time the patient had irregular fever. The wound slowly got smaller as a result of various treatments employed but remained infected and unhealed.

In July, 1941, dressings with 0.1% propamidine were instituted on alternate days. There was initial improvement in the appearance of the wound and in the bacteriological picture. After 19 days the surrounding skin was much inflamed, so treatment with propamidine jelly was stopped. The wound then healed rapidly.

CASE 3.—A youth, aged 16, was admitted to hospital in May, 1941, with second degree burns of the arms and a closed fracture in the lower third of the right femur. His limb was fixed in plaster, but a fortnight later the knee-joint became infected with non-haemolytic streptococci; this was treated by aspirations and plaster. Shortly afterwards he developed a large abscess on the inner side of the thigh which was drained. By August, 1941, his general and local condition were so unsatisfactory that further drainage of the wounds was performed followed by plasters, which had to be changed frequently on account of the excessive discharge. Cultures then showed haemolytic streptococci and later staphylococci and *P. vulgaris*.

In October, 1941, the plasters were removed and 0.2% propamidine jelly applied for 10 days. Under this treatment the wounds became cleaner and there were many less organisms, their nature being as before. The wounds were then dressed with proflavine solution for 3 weeks, but local relapse occurred due to pocketing of pus. The wounds were explored and again treated with propamidine (0.1%). Within a fortnight striking improvement took place and a little tulle-gras only was needed till the small granulating areas finally healed.

CASE 4.—A French sailor, aged 20, was admitted to hospital in September, 1941, with old osteomyelitis of the humerus involving the whole shaft of the bone. As a result of an injury the bony infection had flared up in two places where abscesses developed which were adequately drained. One of the operation wounds 2 in. long continued to discharge pus and remained persistently unhealed. On Oct. 12 daily local applications of 0.1% propamidine jelly were begun, and in 4 days the discharge and bacterial content lessened and clean granulations appeared. The improvement was maintained till Oct. 22 while propamidine was being applied, after which the wound made no progress, owing, it was found, to a further collection of pus requiring drainage.

CASE 5.—A woman, aged 52, admitted to hospital on March 4, 1942, for papilloma of the tongue, was found to have advanced diabetes which was immediately treated. On the 10th she developed a carbuncle over the lower dorsal region for which customary local remedies were given. On the 12th

the necrotic area was excised and the surrounding skin cut away. After this the lesion continued to spread, undermining the skin and resisting all treatment. On the 30th and 31st 9 g. of sulphamilamide was administered by mouth, but this was stopped on account of vomiting. By this time the wound measured 10 in. transversely and 6 in. vertically.

From April 9, 0.1% propamidine jelly was applied on alternate days for 10 days, by which time the lesion was rapidly cleaning up, discharge had ceased and a clean granulating area was left which progressively diminished in size. There was no further spread of inflammation after propamidine was begun. Her general condition improved, but three more carbuncles subsequently appeared, one over the right hip measuring 3 in. by 4 in., and two small ones in the lumbar region, the skin over them remaining unbroken. Despite effective control of her diabetes with insulin, she showed no local tissue reaction to the new infections and died on June 1.

CASE 6.—A joiner, aged 48, was an air-raid casualty in September, 1940. His major injury was an open double fracture of the right tibia in which the middle fragment was dislocated forwards. The bone, at the time of injury, did not become grossly infected and good union resulted, but the overlying skin, partly owing to tension and partly to infection, never healed in spite of intensive local treatment of all kinds. An indolent area about the size of half a crown remained covered with dirty granulations overlying superficially infected bone, with a zone of progressive fibrosis around.

From May 17, 1942, 0.1% propamidine jelly was applied over a period of 10 days, during which time the wound became clean and covered with healthy granulations. On the 27th an open operation was done to excise the scar and projecting infected bone and to remove a small sequestrum. The site of operation was "frosted" with sulphamilamide and the wound closed without drainage; it healed by first intention.

CASE 7.—An engine-driver, aged 45, was an air-raid casualty in January, 1941, his major injury being an open fracture of the right tibia. The bone united firmly, but at the point of entry of the missile a hole an inch in diameter remained, at the entrance to which was a ring of scar tissue. A purulent discharge persisted, yielding *Staph. aureus* on culture and often containing small sequestra. This cavity was treated with 0.1% propamidine jelly and after 10 days yielded sterile cultures and was so much improved in appearance that excision was justified. On May 27, 1942, the surrounding scar and necrotic bone was excised and the area dusted with sulphamilamide. The size of the hole was such that it could not be closed completely. Rapid epithelialisation occurred from the edges, final healing being effected with an inlay skin-graft.

CASE 8.—A man, aged 21, on April 23 tore the skin from the whole dorsum of his left hand in a motor-cycle accident, leaving the extensor tendons exposed. Debridement and subsequent treatment proved ineffective and he was left with a raw area covered with irregular granulations between which were rivulets of pus from which staphylococci and streptococci were isolated. On May 14, 0.1% propamidine jelly was applied in the usual manner and a clean granulating wound was present by the 24th with epithelium spreading in rapidly from the edges. Full-thickness skin-grafting was necessary to obtain a good functional result and a pedicle graft was applied successfully on June 26.

CASE 9.—A boy, aged 15, had an operation in 1939 for osteomyelitis of the upper third of the right femur, and 18 months later a residual abscess was drained. In April, 1942, a further abscess was drained, also a cavity in the upper end of the femur, the hip then being fixed in plaster which was removed after a fortnight because of the excessive discharge. A radiogram at this time showed gross thickening of the upper end of the femur, and a few dark areas which were probably small cavities, but no sequestrum. Cultures from the wound were overgrown with *P. vulgaris*.

On May 29 the wound was thoroughly explored. A cavity 3 in. long and 1½ in. deep extended down to, but not obviously into, the femur at the level of the lesser trochanter. The wound was filled with 0.1% propamidine jelly and covered in the usual way. On June 4 the dressing was changed. There was still a lot of discharge but the wound was much shallower. Cultures were as before. Jelly was reapplied and the limb immobilised by splinting. On the 12th the wound was re-dressed. There was no real cavity left, only a shallow granulating wound with some discharge on the surface. At one end there was a little redness of the adjacent

skin, possibly due to the jelly. No further application of propamide was made and healing was shortly complete.

CASE 10.—A man of 47 received a lacerated wound of the calf during an air-raid on April 26. The wound suppurated and on May 14 showed a round area 2½ in. in diameter extending down to the muscle and covered with sloughing indolent granulations. After 10 days' treatment with 0.1% propamide jelly it was clean and healthy and a Thiersch graft was successfully applied. This illustrates the value of propamide as a preliminary to skin-grafting.

#### Discussion

The watery methyl cellulose gel was selected as a base in the hope that it would maintain the concentration of propamide in a wound over a period of a few days while allowing free diffusion of the drug from the base to the wound surface. The only disadvantage observed in the jelly was its tendency to irritate the skin at the edges of the wound (e.g., cases 2, 5 and 9). It was at first thought that the skin trouble seen in case 2 and in others treated at that time was due to propamide itself, but in case 5 progressive necrosis of the skin margin was stopped by treatment and it seems probable that it is long contact with jelly, and not the action of propamide, which makes the skin sodden and inflamed. A similar appearance of the skin is noticeable in the treatment, otherwise satisfactory, of burns through failure to keep the application localised to the affected part. Bases of the Mumford type are now being used in the treatment of second degree burns.

The disadvantage of too high a concentration of the drug is shown by case 1, in which a 0.4% preparation soon produced necrosis of granulation tissue. On various other occasions it was noted that concentrations in excess of 0.1% tended in time to injure granulations. The efficacy of the 0.1% preparation appears to make higher concentrations unnecessary, and in shallow wounds without much discharge even weaker concentrations may be effective.

All the cases described show that full benefit will be obtained in 10 days. Long application may lead to a mild superficial necrosis and to a relapse in the bacteriological picture; but in a wound which later becomes reinfected a second course of treatment can be given, as in case 3. Case 9 shows that a satisfactory result may sometimes be obtained when an interval of a week is left between dressings. When dressings are painless and readily performed it has appeared advisable to repeat them on alternate days, or even daily at first when there is much discharge.

The general efficacy of the preparation is demonstrated by the rapid improvement noted in all the cases. The wounds treated had often remained infected for months, sometimes for more than a year. Such patients provide their own controls and it is not conceivable that the regular response to the application of the jelly, seen also in many cases which have not been quoted, was due to chance. It is seldom possible, as it was in case 1, to give one wound specific treatment and use a second in the same subject as a control. Attempts were made to estimate the number of organisms per microscopic field in smears of exudate removed from the wounds at successive stages, but technical difficulties rendered the procedure of doubtful value. Cultures showed that of the various micro-organisms present in the wound the streptococcus first disappeared and then the staphylococcus. *P. vulgaris* and *Ps. pyocyanea* often persisted without appearing to retard progress. Where there is infection of bone or a sequestrum sinuses are likely to persist, although the surrounding tissues may become clean and healthy.

Correctly used, propamide can clear the field of dangerous organisms within 10 days, but as soon as this has been done the surgeon must apply without delay such measures as may be necessary to promote the final closure of the wound. Sometimes spontaneous healing will take place but often such operations as skin-grafting or secondary excision will be needed. The relative or absolute sterilisation of the tissues brought about by propamide makes the success of such operations probable (e.g., cases 6, 7, 8 and 10). In case 1, however, the opportunity was missed and infection recurred. The full benefit from the treatment will be obtained by the tenth day and operative interference has at that time

its best chance of success. Where pedicle skin-grafting is needed, the graft should therefore be prepared in advance so that it will be ready when required.

#### SUMMARY

In-vitro experiments have demonstrated that propamide possesses a bacteriostatic activity against *Staphylococcus aureus* of the same order as sulphathiazole.

The bactericidal activity of propamide is about equal to its bacteriostatic activity.

Effective concentrations did not inhibit phagocytosis or cause hæmolysis.

The bactericidal effect of the drug was not seriously lessened by the presence of pus.

A technique is described for the use of propamide in a jelly base in the treatment of chronic wound sepsis.

Ten cases illustrate the efficacy of this technique.

We are indebted to the biological department of May and Baker for the work summarised in tables I and II, and particularly to Mr. Freeman, and to Dr. F. Kohn, Mr. J. Burrows, Mr. E. C. Butler, Mr. J. B. Hume, Mr. E. S. Lee and Mr. K. Pridie for providing some of the cases described.

### PROPAMIDINE IN CHRONIC STREPTOCOCCAL INFECTION OF RAW SURFACES

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RESISTANT microbial infection of wounds, particularly by a beta-hæmolytic streptococcus, seriously delays healing and limits the possibilities of reparative surgery. This is particularly true now, when every effort is made to replace the loss of skin and soft tissues with a graft at the earliest possible moment. The methods commonly adopted to overcome persistent infections have been the local application of antiseptics, such as eusol, or the use of various sulphonamide compounds together with a strict cleansing regime. These are successful in most instances, but too often a persistent streptococcal infection becomes established and healing is delayed. These wounds are a constant danger in an open ward from the point of view of cross-infection. Elimination of the responsible organism is of the highest importance and there is pressing need for a substance which will act as an effective bactericide without injuring the tissues.

Private reports of the successful use of 'Propamide' (4:4' diamidinodiphenoxypropane dihydrochloride) elsewhere suggested that this compound would be useful in the streptococcal infections often met with in a plastic unit. A supply was placed at our disposal by the manufacturers. To assess its value we selected 11 examples of persistent secondary infection by a beta-hæmolytic streptococcus of open wounds and old burns, most of which had failed to clean up under treatment with eusol or sulphanilamide, tullegras and saline. One uninfected fresh burn was also included in the series for comparison with burns being treated with propamide in another unit. To give the preparation a fair chance, cases were chosen in which there was no obvious removable focus of infection, such as a sequestrum, sloughing tendon, or deep sinus. The wounds were all granulating areas with loss of skin, in which healing was retarded or grafting made difficult by a persistent streptococcal infection on the surface.

The technique employed was that originally developed by Thrower, and consisted in the application for ten days of 0.1% propamide in a water-soluble jelly base, renewed every 48 hours. Swabs were taken at the beginning of treatment, during its course and at the conclusion of the ten-day period. Three successive negative swabs were required before the surface was declared free of streptococci; particular notice was not taken of other organisms except where they appeared in pure culture.

#### CASE-REPORTS

CASE 1.—Paraffin burns of forehead, face, neck and hands, first and second degree. Admitted to this unit after 3 days; treated with sulphanilamide powder, tullegras and saline dressings. The forehead, face and hands were healed on the 14th day but the area on the back of the neck was infected

with  $\beta$ -haemolytic streptococci and had become indolent. On the 20th day, propamidine jelly was applied. The dressings were done daily, for it was impossible to keep a thick layer of the jelly in place for longer. Negative cultures were obtained from the 22nd day on. The area became clean and healthy in appearance. The area was healed on the 32nd day (12 days after beginning treatment with propamidine). The temperature, which had risen to 100° F. every evening, became normal 3 days after propamidine treatment was instituted.

**Comment.**—Indolent first and second degree infected burn 20 days old. Streptococcus infection controlled in 2–3 days; rapid healing.

**CASE 2.**—Petrol burns (first and second degree) of face and neck; gunshot wound of right thigh and foot. Primary treatment: sulphanilamide powder and saline packs. Admitted to this unit 12 hours after injury. Saline baths, sulphanilamide powder, tullegras and saline dressings were applied to all areas. On the 7th day all areas were found to be infected with  $\beta$ -haemolytic streptococcus, later found to be of a sulphanilamide-resistant strain. On the 16th day there was a fairly heavy discharge from all areas; propamidine jelly was applied and renewed every 48 hours. On the 18th day there was definite improvement, the small area on the dorsum of the right foot had completely epithelialised, the granulations on the thigh looked clean and healthy, the face showed signs of healing and cultures were negative. On the 26th day the face and neck were completely healed and the granulating areas on the right thigh were covered with a Thiersch graft, about a quarter of which was lost through infection with *Staphylococcus aureus*; healing was rapid.

**Comment.**—Indolent first and second degree infected burn 16 days old. Streptococcal infection controlled within 3 days. Staphylococcus infection apparently persisted and caused partial loss of graft. Rapid healing.

**CASE 3.**—Lacerated wound on dorsal surface of left thigh with a large area of skin loss. Primary treatment: debridement, rubber drains, sulphanilamide, tullegras and dry dressings. Admitted on the 7th day after injury. An intermediate skin-graft was applied on the 8th day; about 35% of this was lost through  $\beta$ -haemolytic streptococcal infection. The raw surface was treated with saline baths, sulphanilamide powder, tullegras and saline dressings. The cultures were still positive on the 24th day, when treatment with propamidine jelly was instituted. By the 30th day cultures were negative for streptococci and the granulating area looked clean and healthy. Propamidine was discontinued on the 34th day and the sulphanilamide powder, tullegras and dry dressings recommenced. On the 40th day there was a recurrence of the streptococcal infection, so a further 10 days' treatment with propamidine was carried out. A Thiersch graft was then applied with satisfactory results, there being no further reinfection.

**Comment.**—Indolent infected wound 24 days old. Streptococcus controlled in 6 days. Relapse on the 40th day but again controlled in 4 days with propamidine.

**CASE 4.**—Petrol burn (third degree) of hand. A Thiersch graft to the whole of the dorsum of the right hand suffered a 25% loss through a sulphanilamide-resistant haemolytic streptococcal infection. Six weeks' treatment by various means was required before healing was complete. During his convalescent leave a slight abrasion of the area became reinfected, and on return to this unit there were three dirty granulating areas  $\frac{1}{2}$ –1 inch in diameter which on culture showed a similar strain of streptococci to the original infection. After a week's treatment with half-strength eusol compresses the infection was still present. Treatment with propamidine jelly was instituted. By the 4th day the wound looked much cleaner and a negative culture was obtained on the 6th day. One of the areas was healed on the 10th day, and the remaining two on the 14th day.

**Comment.**—Persistent streptococcal reinfections during grafting procedure over a long period finally controlled by a 10-day course of propamidine followed by rapid sound healing.

**CASE 5.**—Cannon-shell splinter wound of skin over lower third of right tibia; no bone involved. Primary treatment; sulphanilamide, tullegras and saline dressings. Thiersch graft on the 8th day suffered 50% loss through infection. Organism not known. Treatment with saline baths, sulphanilamide, tullegras and saline dressings was continued

until his transfer to this unit 35 days after the original graft. There was then an oval granulating area (4 in.  $\times$  3 in.) with a moderate amount of discharge, which gave a heavy growth of  $\beta$ -haemolytic streptococci. Two-hourly dressings with half-strength eusol were carried out for 5 days but there was no change in the bacteriological findings; propamidine jelly was then applied every 48 hours. On the 4th day of this treatment negative cultures were obtained, and cultures continued to be negative until the 10th day, when a Thiersch graft was applied; about 20% of this was lost through a *Staph. aureus* infection; no haemolytic streptococci were found.

**Comment.**—Infected wound 35 days old. Streptococcus eliminated by propamidine in 4 days but graft partially lost from staphylococcal infection which was apparently not controlled.

**CASE 6.**—Cannon-shell wound of left elbow and forearm and 4th finger of left hand. Primary treatment: suturing of upper 2 in. of wound at elbow-joint. Areas of loss on forearm and 4th finger treated with sulphanilamide and saline dressings. Whole forearm enclosed in plaster. Admitted after 24 hours. Thiersch graft applied to forearm on 5th day, when cultures negative for streptococci. There was a 50% loss of the graft due to infection with  $\beta$ -haemolytic streptococci. Eusol dressings 2-hourly to both areas were continued for 48 hours but positive cultures were still obtained. Cultures were still positive at the end of 2 weeks' treatment with sulphanilamide powder and tullegras dressings. Treatment with propamidine jelly was then begun as an outpatient procedure and negative cultures from both areas were obtained on the 8th day. Healing was then rapid and complete on the 10th day. The finger remained healed but there was a considerable keloid scar in the elbow area which subsequently broke down and became infected with a  $\beta$ -haemolytic streptococcus. A second course of propamidine cleared this and the wound healed again. The scar was still unstable and broke down again 3 weeks later with a similar type of infection. This again was cleared with propamidine. Healing was now complete.

**Comment.**—Persistent streptococcal infection for 3 weeks. Cleared in 8 days with propamidine. Two similar reinfections of unstable keloid scar disinfected with propamidine and sound healing obtained.

**CASE 7.**—Shrapnel wound causing skin loss over right tibia. Admitted 4 months after original injury with a granulating area in an unstable scar 4 in.  $\times$  2 in. over the right calf muscle and extending on the tibia. Cultures were negative. The scar was removed and a Thiersch graft applied. There was a small loss in the centre of the graft from a *Staph. aureus* infection. This area gradually became smaller but was still present a month after grafting, when the patient was given 2 weeks' sick leave. On return the central area had increased in size and the lower edge of the graft had broken down, cultures showing  $\beta$ -haemolytic streptococci. Propamidine jelly was applied. On the 6th day cultures were negative and the granulating lower edge had epithelialised. The central area was small and healthy but was slow to heal (21 days); there was no further streptococcal infection.

**Comment.**—Streptococcal infection of old tibial wound. Streptococcus controlled with propamidine in 6 days.

**CASE 8.**—Air-raid casualty. Extensive skin and muscle loss of left popliteal fossa. Admitted 4 months after original injury. Extensive scarring with moderate contracture on the left popliteal area. Three small areas granulating. Cultures showed  $\beta$ -haemolytic streptococci (heavy growth). Frequent half-strength eusol dressings were carried out, but on the 8th day the cultures were still strongly positive. Propamidine jelly dressings were then applied every 48 hours. On the 2nd day cultures were still positive. On the 5th day there was some evidence of healing and a pure growth of *Staph. aureus* was obtained. Only one swab was taken in this case and a graft applied on the 6th day; this resulted in a 95% take.

**CASE 9.**—Haemolytic streptococcal infection of intermediate skin-graft donor area; 4 days after an intermediate skin-graft from the abdomen the area was heavily infected with  $\beta$ -haemolytic streptococci. Propamidine jelly was applied every 48 hours. The area improved rapidly in appearance and epithelialisation was noted by the 6th day, when a negative culture was obtained. Cultures continued to be

negative for streptococci but one culture (on the 8th day) showed *Bacillus proteus*. The area healed in 15 days.

CASE 10.—Infection of pedicle attachment. The area of attachment of a tube pedicle to the face became heavily infected with a sulphonamide-resistant streptococcus, resulting in a loss of two-thirds of the flap. This area continued to give positive cultures for 9 weeks despite various methods of treatment. Healing was very slow, leaving a granulating area  $\frac{1}{2}$  in. in diameter. Propamide jelly was applied and culture on the 2nd day of treatment was negative; by the 4th day the area was completely healed. The next stage of the operation was carried out 8 days later, when the wrist attachment was divided. The suture line on the wrist became infected with the same strain of streptococci (the pedicle was unaffected) on the 5th day. This was immediately treated with propamide and the cultures became negative in 6 days; healing was complete 2 days later.

*Comment.*—Pedicle graft persistently infected with  $\beta$ -haemolytic streptococcus. Propamide undoubtedly controlled the infection.

CASE 11.—Admitted 8 days after the right arm had been disarticulated at the shoulder-joint in an industrial accident. There was also an area of skin loss about 14 in.  $\times$  8 in. over the right iliac area; this was partially covered with a Thiersch graft on the 24th day. The graft was successful but the remaining raw areas—two about 2 in. in diameter—became indolent, and on the 55th day gave an almost pure culture of  $\beta$ -haemolytic streptococci. The remaining granulating area on the right shoulder was also infected. The areas were treated with sulphanilamide powder, tullegras and saline packs, and for 6 days with half-strength eusol dressings without satisfactory results. On the 75th day cultures were still positive and a 10-day course of propamide jelly was begun with daily dressings. On the 82nd day negative cultures were obtained. The areas became healthy in appearance, there was no reinfection and healing was complete on the 99th day.

*Comment.*—Healing had been seriously delayed by streptococcal infection and further grafts had been inadvisable. Propamide controlled infection and produced rapid healing.

CASE 12.—Cordite flash burn (first and second degree) of right side of face and ear and nose. Admitted 3 hours after injury; no previous treatment. Area cleaned with saline and blisters cut away; negative swabs for streptococci; 0.1% propamide in formula 5 base<sup>1</sup> with 1% 'Stovaine' applied. Covered with 'Vaseline' gauze and dry dressings. No further pain. Forty-eight hours later the dressing was removed and the area cleaned with saline swabs. There were several moist areas on the cheek and nose; 0.1% propamide in a Mumford base was applied for two further 48-hour periods, when the whole area was healed and the patient discharged to duty. No haemolytic streptococci were found during the course of treatment.

*Comment.*—Uninfected burn. Rapid painless healing without streptococcal infection.

#### DISCUSSION

In some instances the clinical improvement in the wounds was striking within 48 hours of the commencement of propamide treatment. This appeared to be so in those more recently infected. Older more indolent surfaces responded less rapidly. But there was no doubt that steady improvement occurred in all cases coincidently with the disappearance of the  $\beta$ -haemolytic streptococcus. Streptococcal control took place in 2–10 days, though reinfection was noted several times requiring a second course.

We had been warned that if propamide was applied for longer than 10 days irritation of the surrounding skin and necrosis of the granulations might be expected. This was not seen, though in one case in which the 10-day period was exceeded there was a mild irritation of the skin. While it is clear that the  $\beta$ -haemolytic streptococcus was effectively controlled in this series no such certainty exists in regard to other organisms. In 3 cases subsequent grafts failed partially, because of staphylococcal infection. It must be remembered that although healing may take place at a normal rate in the

presence of saprophytic and mild pathogenic organisms such as *B. proteus*, *Pseudomonas pyocyanea*, *B. subtilis* or *Staph. albus* a graft can be destroyed by any pus-producing organism which mechanically lifts it from its bed, just as easily as it can be killed by the most virulent streptococcal infection. This difficulty is now being investigated. Further experience seems to indicate that 0.1% propamide in a Mumford base (lanette wax and paraffin) has a considerable advantage over the water-soluble jelly mixture and other cases are now being treated with it. The result in the only fresh burn in the series was impressive.

#### SUMMARY

In 11 cases of persistent  $\beta$ -haemolytic streptococcal infection in which other methods had failed, 0.1% propamide in a water-soluble jelly base successfully controlled infection within 4–10 days.

We are indebted to Dr. Dora Colebrook for her help in the bacteriological side of this investigation.

#### PROPAMIDINE IN BURNS

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'PROPAMIDINE' has been shown experimentally to possess polyvalent bactericidal properties of great potency, and it therefore seemed logical to test its properties clinically not only in the control of established sepsis in wounds and burns but also in the prevention of sepsis in a fresh burn. Seven recent burns were treated from the start by the method to be described, usually beginning within 5 hours of the accident. Five other burns treated had received preliminary treatment elsewhere for periods from 3 days upwards. A further two cases were given propamide treatment to prepare infected areas for skin-grafting. It is realised that no conclusions can be substantiated from so small a series.

#### TECHNIQUE

The preparations used were as follows:

- (1) 0.1% propamide in a Mumford base (a lanette wax base).
- (2) 0.1% propamide in a water-soluble jelly base.
- (3) 0.05% propamide in the same jelly base.
- (4) A "first-aid" preparation of 0.1% propamide with 1% amylocaine hydrochloride ('Stovaine') in the same Mumford base.

Fresh burns were initially cleaned with saline. No anaesthetic was given and trauma to the burnt areas was avoided. Dead skin was removed from the surface of blisters and preparation (1) was then spread thickly over the burnt areas with a spatula. A sealing dressing of thick 'Vaseline' gauze was then applied and held in place with ordinary bandages. This was left untouched for 48 hours. The dressing was changed in a saline bath (this is by no means essential). We were informed that necrosis of the granulations is apt to occur with a bacteriological relapse if propamide dressings are applied for more than 10 days; treatment was therefore changed at the end of this time to sulphanilamide and tullegras dressings.

For infected burns it was found advisable to employ a similar technique, using preparation (3) in the jelly base, because the water-soluble jelly enables more intimate mixing of propamide with the slough and granulation. It was sometimes a slightly painful dressing and tended to make the surrounding skin soggy.

#### FRESH BURNS

CASE 1.—Chemical burn from petrol-soaked clothing (not ignited), involving left side of buttock and loin. Second degree. Swab on admission grew staphylococci with a few streptococci and *Bacterium coli*. First-aid: sodium bicarbonate compresses. On admission: propamide. After 5 days the healing area grew *Pseudomonas pyocyanea* and *Bacillus proteus* only. The burn was completely healed in 12 days.

CASE 2.—Petrol fire. Second degree burn of forearm. First-aid: saline packs. On admission: propamide.

1. Formula 5 base contains 'Lanette' wax-paraffin and an anti-freeze; attempts are still being made to find the best combination.

Original swab grew *Bact. coli* only. Five days later swabs grew numerous *Ps. pyocyanea* and *B. proteus*. Clinically, a clean granulating area with excellent epithelial reaction. Healed in 7 days.

CASE 3.—Petrol fire. Second degree burns of both hands and face. On admission: propamide. The areas involved were individually too small to require swabbing, but clinically they showed rapid healing and were completely epithelialised in 7 days.

CASE 4.—Petrol flame. Deep second degree burns to moderate-sized area of both legs. First-aid: propamide preparation (4). This gave immediate relief from pain. Subsequent treatment: preparation (1). Swabs on admission showed *Ps. pyocyanea* diphtheroids, *Staphylococcus aureus* and hæmolytic streptococci. Five days later the culture grew a fair number of *B. proteus* and *Ps. pyocyanea* only. Clinically, the burns looked clean and epithelialisation was almost complete in 10 days.

CASE 5.—Aircraft fire, from electrical short circuit. First and second degree burns to a fairly wide area of hands and face. First-aid: saline dressings. Propamide treatment began on admission, when swabs grew a few staphylococci and streptococci. Five days later a swab yielded a heavy growth of *B. proteus* and *Ps. pyocyanea*. The face was healed in 7 and the hand in 14 days.

CASE 6.—Petrol and dope fire. Second degree burns of small areas of face and hand. First-aid: saline packs. Propamide on admission, when swabs grew a few staphylococci and streptococci. Six days later, culture yielded diphtheroids and *Ps. pyocyanea*. Clinically, the burns cleaned rapidly and were completely healed in 7 days.

CASE 7.—Petrol fire. Second degree burns of moderate area of neck and hands. First-aid: saline packs. Propamide on admission. Initial swab showed very scanty growth of staphylococci. Swabs on 6th, 8th and 11th days all grew numerous *Ps. pyocyanea* and diphtheroids. Clinically, the burnt areas remained extremely clean, and epithelialisation was rapid. The burns were almost completely healed in a fortnight, but one small third degree area on the hand delayed complete healing until the fourth week.

#### BURNS TREATED INITIALLY ELSEWHERE

CASE 8.—Petrol flames. Second and third degree burns of moderate area of face and arms. Initial treatment: saline packs to arms and gentian violet to face. Admitted to burns centre on the 5th day, when swabs grew numerous *Ps. pyocyanea* and a few staphylococci. Propamide treatment was begun, and swabs taken on the 8th, 10th, 20th, and 25th days all yielded profuse growths of *Ps. pyocyanea* and *B. proteus*, the last swab yielding also a slight growth of hæmolytic streptococci, by which time the course of propamide had ended and been replaced by saline-sulphanilamide treatment. Clinically, the face was completely healed without scarring, 9 days after admission. The arms, which were much more deeply burnt (third degree in places), were heavily infected and covered with deep slough on admission. They cleaned up rapidly and the slough softened, but it was so deep that it had not completely separated when the propamide was replaced by routine sulphanilamide-saline treatment. The areas finally epithelialised in about 4½ weeks.

CASE 9.—Petrol flame. Second degree burns of face and right arm. Initial treatment: saline pack, followed by Bunyan-Stannard envelope to arm and gentian violet to face. Admitted to burns centre on 5th day and propamide treatment begun at once. Swabs on admission showed hæmolytic streptococci, staphylococci and diphtheroids. The face burn was obviously only trivial and required no further treatment. The arm was treated with propamide preparation (1). Swabs taken 5 days after admission showed *B. proteus* and *Ps. pyocyanea*; healing was complete in 12 days.

CASE 10.—Petrol fire. Second and third degree burn of right hand and second degree burn of face. Treated initially by cleansing under general anaesthetic and vaseline dressings. Admitted to burns centre after 2 days, when burns looked fairly clean. Swabs on admission showed a growth of *Staph. aureus*. After 3 days of propamide the face was completely epithelialised and the sloughs were loosening on the right hand, which had been burned more severely. After 7 days of propamide, the right hand was healed except for a small deep central area on the dorsum. Swabs now showed

*B. proteus* and *Ps. pyocyanea*. Complete healing with full movement and supple epithelium in 3½ weeks.

CASE 11.—Electrical burn. Localised patches of very deep third degree burn on hands, arms and shoulder. Treated with saline and sulphanilamide for 4 weeks. Several of these deep burns had then become indolent and were heavily infected with hæmolytic streptococci and *Staph. aureus*. The patient had a hæmolytic streptococcal tonsillitis. Treatment of the burns with propamide preparation (2) was instituted to try and dislodge the persistent infection; 5 days later, all swabs from the burns showed *B. proteus* and *Ps. pyocyanea*, but no streptococci or staphylococci. At the end of the 10 days' course the burns looked entirely different. All but two of the five main areas were healed; the remainder were clean and soon epithelialised with routine saline-sulphanilamide treatment.

CASE 12.—Second and third degree burns of face and hands. Treated initially with sulphanilamide and tullegras. Transferred to burns centre after 3 days. On admission the face was virtually healed. The hands had second and third degree burns with much slough. Swabs on admission showed copious growth of *Staph. aureus* and diphtheroids. Treatment with propamide preparation (2) was instituted. In 10 days the sloughs had separated and a clean granulating surface with rapid epithelialisation was obtained. Swabs at this stage showed copious growths of *B. proteus* and *Ps. pyocyanea* only. Final healing was complete with full movement in 4½ weeks.

#### DISCUSSION

Propamide may prove to be an almost ideal first-aid preparation. A soft cream, the 1% stoveina preparation (4) is simple to apply and extremely soothing. Almost all the cases have shown on culture a profuse growth of *B. proteus* and *Ps. pyocyanea* and diphtheroids. These growths have been so profuse that they may have obscured any streptococci and other organisms present, but clinical observations—absence of systemic reaction and speedy healing of the burnt areas without relapse or indolence—suggest that streptococcal and staphylococcal infection is effectively controlled. After a period of treatment with propamide, it is necessary to eradicate *B. proteus* and *Ps. pyocyanea*, which are both pus producers, before grafting should be contemplated.

Propamide treatment gives relief to both patient and nursing staff, in that the dressings need be changed at 48-hour intervals only and no special or elaborate apparatus is required beyond the general technique of an aseptic dressing and control of cross-infection. It seems that propamide should not be employed for more than 10 days at a time—a longer course is said to be less effective and a bacteriological relapse may occur. The 10-day course can, however, be repeated after an interval in which other treatment is employed. The progress of our cases has been remarkable for the rapidity of separation of slough and the speed of epithelialisation. The latter and the mobility of the part throughout treatment combined to produce a minimum of scar tissue and an extremely good cosmetic and functional result in this series. Where propamide was tried as an alternative dressing for areas which had become indolent or infected with sulphonamide-resistant organisms, such infection yielded quickly to propamide and healing was accelerated. In two cases propamide was used on such areas with a view to cleaning them up preparatory to skin-grafting. It seemed to be successful in controlling streptococcal infection, but its failure to control infection with *B. proteus* and *Ps. pyocyanea* resulted in the complete failure of one sheet razor graft, although another case had 100% success with pinch grafting. Propamide seems to be of value in the early separation of tight sloughs in deep burns by virtue of its apparent property of controlling streptococcal and staphylococcal infection while allowing saprophytic and proteolytic organisms to flourish. These organisms must be controlled by other measures before a surface can be considered adequately prepared for skin-grafting.

In conclusion, these observations on a very few cases seemed sufficiently encouraging to merit this early report and more extensive trial.

We wish to thank Messrs. May and Baker for supplies of these preparations, and Dr. W. R. Thrower for his advice and guidance in the technique used.

## PROPAMIDINE AT AN EMS HOSPITAL

F. KOHN, M D PRAGUE

M. H. HALL  
MRCSCLARA D. CROSS  
MD SHEFF, MRCP

THE following is an account of the use of 'Propamide' in a series of substantially unselected consecutive cases in an EMS hospital, such as may be found in any casualty service. The technique employed in treatment was that of Dr. W. R. Thrower and demonstrated to us by him. All the infected wounds were first cleaned with saline and the discharge examined bacteriologically. The surrounding skin was dried and the propamide applied evenly to the whole wound surface. In the majority of cases the propamide was applied in a jelly base but in some of the burns a Mumford base was employed. The whole wound was then covered with sterile fine-mesh 'Vaseline' gauze, on top of which was placed a thin layer of cotton-wool and the bandage. Wounds were dressed every 48 hours, employing a similar technique, and not more than 5 applications were given in any course of treatment. Discharge from the wound was examined bacteriologically before each dressing.

## ULCERS AND WOUNDS

CASE 1.—A man, aged 32, with an ulcer of 18 months duration on the leg. It was complicated by an eczematous condition of the skin of the whole leg and had resisted all other forms of treatment. A swab showed numerous polymorphonuclear pus cells and the presence of *Staphylococcus aureus* and many non-hæmolytic streptococci. After one application of propamide the streptococci disappeared, and after the third the pus cells were replaced by healthy looking epithelial cells and there were only a very few staphylococci. Five applications of propamide jelly were made, by which time the sodden sloughy base was replaced by clean healthy granulations ready for grafting.

CASE 2.—A woman, aged 76, an air-raid casualty, with a deep penetrating wound very close to the left shoulder-joint having many pockets of pus. The discharge showed numerous polymorphonuclear pus cells and many staphylococci. Because of her age and poor general condition it was considered unlikely that the wound would ever heal; therefore, under general anaesthesia, the pockets were explored and the whole converted into a single cavity which was packed with propamide jelly. Five applications were made, after which the wound was clean and filled with healthy granulations. The pus cells were now largely replaced by epithelial cells and the number of staphylococci greatly diminished. In 25 days after the first application of the jelly the wound was completely healed.

CASE 3.—A man, aged 46, an air-raid casualty, among other injuries sustained a compound fracture of the left scapula with deep lacerations. After debridement and dusting with sulphanylamide powder the wound three weeks later still measured 6 in. by 2 in. by 1 in. deep; it was discharging freely and sloughs were forming. The predominating organism was *Bacillus proteus*. Five applications of propamide jelly were made and by that time the wound was sterile. Five weeks from the first treatment the wound was completely healed.

CASE 4.—A man, aged 20, with a varicose ulcer had been under treatment in bed for more than 3 months. It showed no tendency to epithelialise and measured 3 in. by 1½ in., having a sloughy base and thickened oedematous edges. There was great varicosity of the veins of the leg. *B. proteus* and *Pseudomonas pyocyanea* were the predominating organisms. After four treatments with propamide jelly no organisms were obtained and the wound looked clean. A radical cure of the varicose veins was made and the ulcer successfully Thiersch grafted.

CASE 5.—A man, aged 22, had an old osteomyelitis scar on his leg which had completely broken down exposing the underlying tibia. The scar was excised, the skin mobilised and sutured over the bone, and the defect caused by the counter incisions was Thiersch grafted. Eight days later the wound was found to be infected by *Ps. pyocyanea* and non-hæmolytic streptococci. The skin flaps were necrotic and there was a profuse purulent discharge. After 5 dressings with propamide jelly over the whole wound including the skin-grafts the discharge had almost ceased and only a very few colonies

of *Ps. pyocyanea* could be cultured. Healthy granulations were visible and the skin-grafts which had previously been in grave danger of absorption recovered and "took."

## BURNS

There were 8 cases of burns in the series. The technique employed was rather different from that used for traumatic wounds in that the jelly or Mumford base preparation was applied directly to the burnt area without any preliminary cleaning, except where tannic acid had been employed, when the tan was first removed under general anaesthesia. In all other burns there was no surgical interference whatever; blisters were left intact and no debris was removed. Five applications of propamide were made, as in the case of wounds. In burns of the hands and feet the injured part after dressing was put into a loosely fitting jaconet bag and active movements encouraged from the beginning. The bag—intended to prevent undue drying up of the propamide in the jelly base—was found unnecessary when wax was employed as a base. In cases where there was more than blister formation an offensive smell occurred; this was most noticeable at about the middle of the course of treatment, tending to disappear when the applications of propamide were completed. No consecutive bacteriological examinations were made in the burns.

CASE 6.—A man aged 54, was burnt on the dorsum of both hands by an incendiary bomb. On admission next day, both burnt areas were already infected despite tanning after removal of blisters. Under general anaesthesia tan was removed and propamide jelly applied. After 5 applications the wounds were almost healed, and healing was complete in a further 4 days.

CASE 7.—A man, aged 24, sustained large blisters from burns extending over the whole of the dorsum of the left hand and fingers. After 5 applications of propamide jelly the burns had completely healed.

CASE 8.—A man, aged 17, had petrol burns with blistering extending over the whole of the front of the right forearm except for an area 3 in. by 4 in. in the centre where the blisters had broken. After 4 applications of the Mumford base preparation there was complete healing.

CASE 9.—A man, aged 25, sustained petrol burns extending over the whole of the palm of the right hand, with blistering. The burns were healed 2 days after the fifth dressing with the Mumford base preparation.

CASE 10.—A woman, aged 35, was the most severely burnt case of the series. She was admitted the day after receiving burns on the palm of both hands by an incendiary bomb. In spite of preliminary tanning under aseptic conditions the whole area was infected and there were several patches of necrotic skin. The tan was removed under general anaesthesia and propamide jelly applied. After 5 applications the discharge had ceased and epithelialisation was proceeding. Treatment was then changed to sulphanylamide powder and vaseline gauze dressings, healing being completed in a further 30 days. When seen a month later there was a very slight amount of scarring along the palmar surface of two fingers and a third finger had a band of scar tissue across its base. Apart from slightly limited extension due to this band all other fingers have full movements and functions.

CASE 11.—A man, aged 51, was admitted to hospital 11 days after receiving a burn of mainly second but partly third degree on the dorsum of one foot and ankle. Up to this time treatment had consisted of dressing with sulphanylamide and vaseline gauze but despite these the area had become infected. After 5 applications of propamide jelly all areas were healed except one of the deeper patches which required a further 11 days treatment.

CASE 12.—A man, aged 24, was admitted 11 days after receiving a scald of the right foot which extended from 3 in. above the ankle to the toes. It had been treated with sulphanylamide and vaseline gauze after removal of blisters. There was one area 3 in. by 1 in. on the dorsum of the foot where the skin was necrotic. After 5 applications of the Mumford base preparation all areas had healed except an area of necrotic skin; healing of this was delayed by the patient's habit of scratching the area with his other foot at night.

CASE 13.—A woman, aged 46, scalded the whole of the right breast with hot tea. The whole area was covered with blisters except an area of skin necrosis 1 in. by 1 in. inferiorly;

5 applications of propamide in a Mumford base resulted in complete healing of all areas except the deeper patch, healing of which is proceeding rapidly.

DISCUSSION

It is realised that the number of cases is very small and no definite conclusions can therefore be drawn. But since in many of the cases either recognised methods of treatment had failed or the conditions were such that orthodox methods, even if successful, would involve lengthy periods in hospital the results obtained warrant further clinical studies. One particularly satisfactory feature was that Thiersch as well as pedicle grafting was possible much earlier than with any method we had used before (some of these cases will be reported elsewhere). Furthermore, in wounds where skin-grafting was unnecessary the relative freedom from infecting organisms resulted in a much quicker epithelialisation than usual. In the treatment of burns there are several distinct advantages of the method: pain is lessened; where there is only blistering healing may be complete in ten days, and was so in all our cases; and in no case treated at once with propamide did infection occur.

On the other hand, we have found no speeding of slough separation either in wounds or in burns. We have the impression that scar formation, with its consequences, is certainly not increased.

EXPOSURE OF ARCHED SEGMENT OF ANTERIOR TIBIAL VESSELS

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THE proximal segment of the anterior tibial vessels forms a deeply sequestered arch which juts forward from the popliteal stem near the top of the leg; then it goes through the interosseous membrane and curves down like a kitchen tap. Records of bleeding from the arch are scarce enough to leave most surgeons unprepared to stop it by direct exposure; yet this hæmorrhage is dangerous, for the resulting mass of blood, or clot, is placed exactly where it can shut off the tap—and the main as well. Fiolle and Delmas<sup>1</sup> describe how Pierre Duval, in order to reach an aneurysm of this arch, divided and drew aside the upper third of the fibula. For that purpose he exposed the bone by cross-cutting the outer head of gastrocnemius and part of the soleus, after first liberating the external popliteal nerve and looping it safely out of the way. But the state of the only patient I saw with bleeding at this site made me unwilling to try so complex a measure. I used instead a tiny Mikulicz tampon placed to control the leak from an unseen arch—a method which I imagine might sometimes fail to stop bleeding or else might block residual circulation. Looking for another solution I found a simple one.

THE EXPOSURE

I shall assume that with the patient prone we have already made our first exploration from the back—the reasonable quarter in which to seek control of an unknown source of bleeding in this region. We have therefore—through a mesial incision of at least 8 in.—separated the two heads of gastrocnemius and defined the popliteal vessels down to the mouth of the bridge formed by the soleus between tibia

and fibula. And if this mouth has overhung and masked the branched end of the popliteal stem, we have already cleared a view to the branching by dividing the muscular bridge in the longitudinal grain. But still there is no sight of our objective: the vascular arch juts forward away from us and is held so fast in front that we may not yet venture to draw it back. Let us turn therefore at once to the front of the leg and mobilise the arch in the anterior compartment; then it will come quite easily through into the posterior wound.

*Position.*—Until now a sand-bag under the instep bends the knee and slacks the calf of the injured limb. Now (without altering the face-down posture of the patient) raise the foot from the sand-bag and lay its medial edge across the other ankle—a small move that will let us explore the anterior compartment of the leg, leaving us at the same time in full control of the posterior wound.

*Rule of thumb for the anterior incision.*—The first step is to separate the two muscles that cover the front of the vascular arch and its anterior tibial continuation. Between the two muscles the plane of cleavage is curved in cross-section; for the belly of extensor longus digitorum bulges into the adjoining belly of tibialis. The line along which this curved plane comes to the surface can be found with ease. Press and fit the pulp of a thumb—directed up from below—into the pointed, gothic archway where tibia and fibula meet. A cut is then made in the patient's skin of such length and direction as would bisect the guiding thumb and metacarpal from nail to wrist (fig. 1).

This means of finding the proper line for incision and cleavage is more precise than that of joining a distal mid-malleolar spot with one half-way between the lateral tibial condyle and fibular head: these last afford no clear points but areas—wide enough to stray in. A thumb, however, will fit straight into the tibiofibular archway at any depth of dissection, without groping through towels. And while trauma fades out the ghostly intermuscular landmarks of academic teaching—the groove, the petty artery and whitish line—it will not invalidate this plain "rule."

Using the same guide we open the deep fascia along the same line without tearing muscle. A finger will separate the interlock of the two bellies and show the anterior tibial vessels. Covered by the long extensor they lie well to the fibular side of the cleavage plane on a background of interosseous membrane. When they are thoroughly exposed in the whole length of the wound we can proceed to mobilise the vascular arch.

*Leash, membrane, muscle.*—The arch is moored in front by its own recurrent tibial branch and venous tributaries, a wide-flung leash of vessels.<sup>2</sup> We must

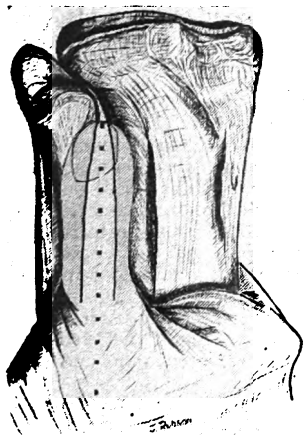


Fig. 1—Finding the intermuscular plane for opening the upper reach of the anterior compartment of the leg. The thumb, pressed up from below, fits lengthwise into the pointed arch between tibia and fibula. Open skin and fascia along a line bisecting the thumb from nail to wrist. The line marks where the curved plane of cleavage comes to the surface (see text); it does not mark the course of the anterior tibial bundle which here lies deep to the lateral muscle.

1. Fiolle, J. and Delmas, J. Surgical Exposure of the Deep-seated Blood Vessels, London, 1921, p. 21.

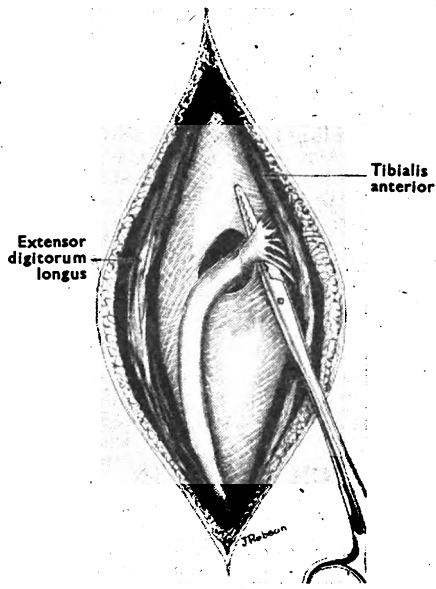


Fig. 2—Finding the leash of anterior recurrent tibial vessels. A pair of forceps slides up the interosseous membrane medial to the main neurovascular bundle and lifts the leash for section. A few small nerve twigs may run with it and can be spared: they do not moor the arch. If they are cut, the tibialis anterior remains well supplied. (The diagram shows arteries, without veins or nerves.)

2. John and Charles Bell say (Anatomy and Physiology of the Human Body, London, 1816, vol. II, p. 281) of the anterior recurrent tibial: "It is a branch which comes off the fore part of the tibial artery instantly after it has pierced the interosseous membrane; it turns immediately upwards under the flesh of the tibialis anticus; it gives many muscular branches, some to the head of the tibialis, others to the upper part of the extensor digitorum, and branches go round the head of the fibula to the origin of the long peroneus muscle. One branch goes directly upwards and spreads all over the front of the knee-joint mixing its branches in the common muscular net-work."

therefore find and sever the narrow, proximal end of the leash (fig. 2). Then, if the hole in the interosseous membrane is large enough to give free passage, we can at once draw the arch back into the calf. But if the hole is small and fibres of tibialis posterior clothe the membrane to a high level we must enlarge the passage first, dividing the membrane down the *tibial* side of the vascular bundle (to avoid the nerve) and using a finger to stretch a path through the sheet of muscle. When that is done the last impediment goes and gentle traction brings the arch to view in the posterior wound.

So far, I believe, use of the method has been confined to the cadaver. But I have come to realise that any exposure devised with due regard to principle and thoroughly proved in the dead will work well in the living. And I have watched by now more than fifty surgeons try this one to their own satisfaction.

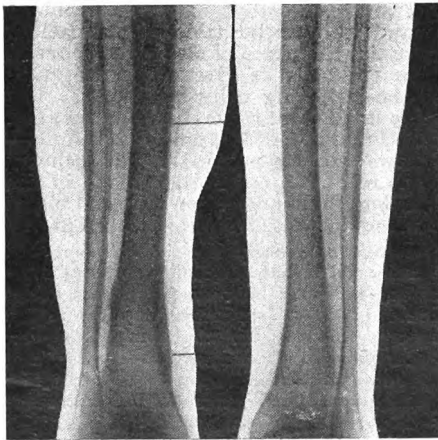
My thanks for the illustrations are due to Mr. J. Robson, senior technician to the department of surgery of the British Postgraduate Medical School.

## BONE CHANGES IN VARICOSE ULCER

A. P. BERTWISTLE, M B LEEDS, F R C S E

In the Hunterian Collection at the Royal College of Surgeons was a jar containing three grossly enlarged tibiae, the result of varicose ulcers. I have not noticed any reference to this condition in radiological literature, so perhaps the following case may be of interest; the Wassermann reaction was negative, so syphilis could be ruled out. Such cases are becoming increasingly rare owing to the advent of bandages of the 'Elastoplast' and 'Viscopaste' type.

A woman, aged 73, had a "white leg" on the right side, unconnected with childbirth. She sprained her ankle 16 years later and since then the leg had never felt comfortable; 7 years ago, as the result of a knock, an ulcer developed which has never healed in spite of all treatment. It now encircles the limb save for 2 in. anteriorly, between the bones. She is in constant pain, boring in character, worse at night; she



Affected and normal leg compared. The ulcer lay between the two black lines shown above.

refuses amputation. In the radiogram (see figure) the site of the ulcer is indicated by two black lines. The girth of the limb is decreased in the region of the ulcer. Comparison of the two tibiae shows the right to be considerably increased in size. Just above the internal malleolus is a plaque of dense new bone which fades away as it is traced upwards; some new periosteal bone is apparent on its outer surface. Except below the ulcer there is no sign of medulla, owing to the increased depth of the cortex. The right fibula is thickened in the region of the ulcer, above which it is normal. A calcified phlebolith is seen 3 in. above the external malleolus on the right side and several small ones on the left side.

The periosteal bone is laid down according to the law I have advanced elsewhere<sup>1</sup>: that whenever young vascular tissue comes into contact with bone or a calcified deposit new bone is formed. Two factors are essential: a supply of calcium and a young blood-supply. In this case the abundant granulation tissue invaded the bone and caused fresh bone to grow.

I am grateful to Dr. H. L. Groom for the radiogram.

1. Bertwistle, A. P. The Role of Chemotaxis in Bone Growth, London, 1937, pp. 21 and 31.

## MURINE TYPHUS IN BRITISH SOLDIERS IN WEST AFRICA

FELIX SMITH  
M D BIRM, M R C P  
LIEUT.-COLONEL RAMO

R. WINSTON EVANS  
B SC LOND, M R O S,  
CAPTAIN RAMO

THIS paper describes 4 cases of typhus in Europeans in a West African colony in which the disease has not hitherto been described. It illustrates that the diagnosis may not only be missed clinically because of the mildness of the clinical course but may also be confused by alterations in the Widal reactions due to TAB inoculation and by failure to read agglutination tests as late as the 21st day after the onset. The importance of early diagnosis and of strict isolation of flea-borne typhus is emphasised by the known transmutation of murine into louse-borne epidemic typhus. The possibility of a louse-borne epidemic is stressed by Mackenzie,<sup>1</sup> who points out the importance of undernourishment but that robust and well-fed people readily become infected.

The 4 cases were in soldiers living under good conditions in a good climate. Their food was liberal. Their ages ranged from 28 to 36 and none gave any history of previous disease of importance. One only—case 4—was shown to have subtertian malaria parasites in the blood, but he gave no history of clinical malaria. The longest time spent on the West Coast of Africa was 10 months (case 1).

Descriptions of the symptoms of typhus available to us are confined to the epidemic louse-borne form of the disease. The endemic form is dismissed as much milder and the symptoms described as transient and mild. It is worth noting that the first of our cases could not well have been more severely ill and survived, and that the picture he presented conformed closely to the classical descriptions of epidemic typhus.<sup>2</sup> The 3 other cases were less severe and returned to duty after about a month's convalescence.

### CASE-HISTORIES

CASE 1.—This was the only case which gave cause for anxiety about recovery. The febrile period lasted 10 days, the fever being intermittent between 104° F. and 100° F. with a remission to 98.4° F. on the 6th, 8th and 10th day. Physical signs at the outset were negative, the most striking feature being the rapid loss of weight and onset of the typhoid state, the patient lying still and flaccid in the bed with a cyanotic complexion and bright restless eyes. On the 8th day subsultus tendinum developed with sordes on the lips, a dry coated tongue, a thin thready pulse (rate 120 per minute) and short periods of coma. More often he was rational and made no complaint of pain, except of headache which was constant and severe. On the 9th day he was incontinent and the swallowing reflex was lost. White count 14,300 per c.mm.; polymorphs 12,655 (88.5%), lymphocytes 1001 (7%), monocytes 501 (3.5%), metamyelocytes 143 (1%). It was characteristic that in convalescence he had little memory of his illness. He spontaneously told us of delusions that "his spine was lying on the floor by the side of his bed."—a type of delusion usually associated only with the exanthematic form of typhus. A typical rash—scattered small discrete roseate spots on the abdomen and lower part of the chest, not disappearing on pressure and very slightly raised—appeared on the 5th day of illness. By the 9th day the rash was fading. The spleen was never palpable. The temperature settled on the 11th day, reached 100° F. in the evening of the 12th day, and thereafter remained normal. Convalescence was uneventful and rapid.

Cases 2, 3 and 4 all came not only from the same billet but actually from the same bed, each case moving into the infected bed as the previous occupant left it to be admitted to hospital. Clinically they were milder than the first case.

CASE 2.—This man complained of severe headache and insomnia, but without delusions. A typical rash appeared on the 6th day and was widespread over the trunk only by the 8th day, when the white count was 5600 per c.mm.; polymorphs 3752 (67%), lymphocytes 1680 (30%), monocytes 168 (3%). The temperature, which varied between 100° F.

1. Mackenzie, M. D. *Proc. R. Soc. Med.* 1941, 35, 141.

2. Murchison, C. A Treatise on Continued Fevers of Great Britain 1873, London.



## WEIL-FELIX REACTIONS IN 4 CASES OF MURINE TYPHUS AND 11 OTHER PYREXIAL SUBJECTS

Case	Day of disease or date	<i>Proteus</i> O X19	Titre <i>Proteus</i> O X2	<i>Proteus</i> O XK	Disease
1	12	625	625	250	Typhus
	24	1260	840	250	
	41	1000	840	315	
2	8	315	125	125	Typhus
	13	1260	125	415	
3	9	125	50	50	Typhus
	17	1260	315	415	
4	9	50	50	50	Typhus
	15	250	125	250	
	24	1260	315	315	
5	May 9	50	250	315	Bacillary dysentery
	July 1	50	50	50	
6	May 23	50	50	50	Undulant fever
	June 26	50	50	50	
7	May 22	50	50	50	Undulant fever
	" 29	25	50	250	
	June 30	50	50	50	
8	June 10	125	50	50	Enteritis
	" 19	50	50	25	
	" 27	50	50	50	
9	April 30	25	50	25	Malaria
10	April 26	25	125	50	Malaria
	July 3	50	50	315	
11	April 14	50	250	415	Enteric fever
	" 25	50	250	315	
	July 3	50	125	315	
12	March 21	50	50	50	Chronic ulcer of leg
	" 27	50	50	125	
13	March 21	50	50	50	Postoperative peritoneal adhesion
	" 27	50	125	250	
14	March 18	Nil	125	125	Malaria
15	April 28	Nil	50	250	Vaccinia pyelitis
	July 8	50	125	125	

and 102° F. from the onset, reached its peak (103° F.) on the 3rd day and settled on the 11th day. On this day the tongue, which had been dry and coated, became moist, the temperature became normal, and the general condition improved rapidly.

CASE 3.—This case ran a slightly longer course. Severe headache, insomnia and nausea were again a feature. The temperature was within the same limits as in Case 2, but reached 104° F. on the 7th day and did not settle until the 16th day. The spleen was firm and enlarged to 1 in. below the costal margin. On the 6th day a few discrete rose spots appeared on the abdomen and sides of the chest. White count on the 8th day was 8200 per c.mm.; polymorphs 5494 (67%), lymphocytes 1640 (20%), monocytes 943 (11.5%); eosinophils, basophils and Turck cells 41 (0.5%) each. Headache and insomnia were persistent and troublesome until the 9th day, after which improvement began. The rash was distinctly hæmorrhagic on the 11th day, but fading rapidly on the 14th.

CASE 4.—This patient ran an 11-day pyrexia, intermitting between 104° F. and 101° F. Persistent severe headache was again a feature. Spleen was slightly enlarged. The rash developed on the 5th day and was extensive, particularly over the shoulders, and did not fade until the pyrexia settled. White count on the 10th day 8000 per c.mm.; polymorphs 3920 (49%), lymphocytes 3120 (39%), monocytes 720 (9%), eosinophils 160 (2%), basophils 80 (1%).

Common to all 4 cases were the following signs and symptoms not already mentioned: a dusky cyanotic flush of the face; mental clarity during the day and delirium at night; and the signs and symptoms of bronchitis. With these features, together with a severe frontal headache and insomnia, the characteristic rash on the 5th or 6th day, and the continuous temperature lasting 10–16 days, it will be seen how closely the cases resembled each other and also the classical descriptions.

None of our cases showed either leucopenia or hypogranulocytosis. A shift to the left of the Arneth count was recorded in each case. In the most severe case (case 1) a leucocytosis was observed with a consider-

able shift to the left, and the appearance of metamyelocytes in the peripheral blood. The contrast with the blood-picture of typhoid fever will be noted. The table shows the results of Weil-Felix reactions in the 4 cases of murine typhus and 11 cases of pyrexia due to other causes. In both series the patients had been inoculated and re-inoculated with TAB vaccine.

## THE WEIL-FELIX TESTS

All our agglutination tests were performed macroscopically, using Royal Army Medical College suspensions of the OX19, OX2, and OXK strains of *Proteus*. The following observations appear to us to be important.

OX19 suspensions were often agglutinated in low titres in the non-typhus series. The commonest titre obtained was 1 in 50, and very little variation was observed; in only one instance was the titre above 1 in 50.

The control sera showed only slight variations in the agglutination reactions against the OX2 strain. The highest titre recorded with this suspension was 1 in 250, and this was seen three times in the series, accompanied on each occasion by a parallel rise in titre of OXK suspensions.

The greatest variations in the control series occurred in the agglutination reactions with the OXK suspensions. Here the variation was from 1 in 25 to 1 in 415, 1 in 50 being the most frequent result. The titre of 1 in 415 occurred only once, in a case of enteric fever.

In the 4 cases of murine typhus the maximum titre obtained with the OX19 suspension was 1 in 1260. This was observed in each of the cases, between the 13th and 17th day of the disease.

In 2 of the 4 cases the presence of the agglutinins in a diagnostic titre (i.e., above the highest figure in the control series) was not demonstrable until after the 9th day of the disease.

It is considered therefore that any rise of titre above 1 in 50 with OX19 suspension is suggestive of typhus, and further agglutination tests on the 14th and 21st days of the illness must be made before a diagnosis can be confirmed or excluded with certainty. Only by this means can the presence or absence of a rising titre be established, and it is on this that the diagnosis, for practical purposes, depends.

## SUMMARY

Four cases of endemic murine typhus are described.

A table comparing the Weil-Felix reactions in these 4 cases with those in a series of non-typhus pyrexial cases shows that a rise in titre above 1 in 50 with OX19 suspension suggests typhus, and a rising titre subsequently confirms the diagnosis.

We wish to thank Brigadier R. A. Hepple, OBE, AMS, for permission to publish these cases.

## ADDITIONAL BENEFITS FROM THE IRISH NHI SOCIETY.

—Early last year the National Health Insurance Society of Ireland was given statutory authority to provide a number of additional benefits. The only benefits then provided were for sickness, disablement, and maternity. A scheme has now been approved by the Minister which includes dental benefit, optical benefit, specialist benefit, medical and surgical appliances, and hospital and sanatorium benefit. During the past few weeks satisfactory proposals have been made for the provision of most of these services. Considerable difficulty has been encountered, however, in arranging for hospital benefit. The society has, it is understood, made agreements with the local (rate-supported) hospitals, but many of the voluntary hospitals have raised objections. The society offered a weekly payment of two guineas per patient while in hospital to cover maintenance and treatment. This proposal has been criticised by the governors of several of the hospitals as inadequate for maintenance, while the members of the honorary staffs resent the sale of their services. Several conferences have taken place but so far no agreement has been reached, and in the meantime the hospital benefit has been held up. Some members of the honorary staffs also protest that the proposals of the society will increase the power of the Department of Local Government and Public Health, which they hold is already excessive if the voluntary character of the hospitals is to be preserved. Exploitation of the staffs by public authorities has gone as far as it can, they consider, unless the staffs are to be remunerated.

## Reviews of Books

### Application of Absorption Spectra to the Study of Vitamins, Hormones and Enzymes

(2nd ed.) R. A. MORTON, DSc, FIC, lecturer in the department of chemistry, University of Liverpool. London: Adam Hilger. Pp. 226. 28s.

ABSORPTION spectroscopy has been a welcome aid to the many workers who have recently advanced our knowledge of vitamins and hormones, as appears in this rewritten and enlarged edition of Dr. Morton's textbook. He deals with notation and apparatus in a short preliminary chapter, discusses the chromophoric groups of simple substances, and gives a detailed account of the spectroscopic properties of the sterol group. This vast family of substances, including members so divergent as cholesterol, the D vitamins, and the numerous sex hormones, has been frugally derived by nature from minor modifications and attachments to a single molecular skeleton, cyclo-pentano-perhydro-phenanthrene. A chapter is devoted to carotenoids and vitamin A covering their chemical, physical, and physiological properties, vitamin A in milk, visual purple and low intensity vision, human requirements of the vitamin, its international standardisation, and the analytical problems it presents. He also deals with vitamin E and antioxidants, vitamin C and vitamin P, the vitamin-B complex, purine and pyrimidine derivatives and proteins. Finally he comes to one of the most fascinating aspects of biochemical research—the relation between enzymes and vitamins. He shows that riboflavin, a member of the vitamin B<sub>2</sub> group, is the prosthetic group of Warburg's so-called "yellow enzyme"; that the anti-pellagra vitamin, nicotinamide, another member of this group, forms part of a co-enzyme to enzymes effecting hydrogen transfer, while vitamin B<sub>1</sub> acts as a co-enzyme to carboxylase. Diagrams display side by side the structural formulæ and absorption spectra of the substances under discussion. The author's tendency to digress on topics only indirectly related to absorption spectroscopy adds to the interest, for he shows against a general background the special points of attack against which the services of spectroscopy have been so successfully applied.

### Medical Progress Annual

Vol. III. Editor: R. N. NYE, MD, managing editor, *New England Journal of Medicine*. London: Baillière, Tindall and Cox. Pp. 678. 27s. 6d.

THESE 52 articles on recent advances in diagnosis and treatment were originally published during the year 1941 in the journal which Dr. Nye edits. Such books are apt to fall between two stools, being neither sufficiently detailed for the specialist nor sufficiently general for the practitioner, but in this one specialist articles and summaries on general topics are well mixed. The standard of teaching, too, is high. H. L. Blumgart writes illuminatingly on chemotherapy in heart disease and the false diagnosis of heart disease, W. Salter reviews clinical blood chemistry in general practice, C. Janeway considers serological tests, and there are useful articles on nutrition, surgical shock, obstetrics, physiotherapy, and neurosurgery, as well as chapters on such special subjects as aviation medicine, hypothermia and iso-immunisation. Besides being a pleasure to read this book is a useful addition to a reference library.

### Advances in Enzymology and Related Subjects

Editors: F. F. NORD, C. H. WERKMAN. London: Imperia Book Company. Vol. I, pp. 433; II, pp. 374. 33s. each.

Dr. Nord was joint editor of the valuable publication *Ergebnisse der Enzymforschung*, which was published in Leipzig each year from 1932 onwards, so it is not surprising that this new publication resembles the former both in format and in scope. It will provide annually a series of reviews on various topics, by experts in the United States and other countries, who have themselves contributed original research to the subject under consideration. Among the subjects covered by this first volume are protein structure (H. B. Bull, USA); Physikalisch-chemische Gesichtspunkte zum Problem der Virusaktivität (L. Holzapfel, Germany); specificity of proteinases (M. Bergmann and J. S. Fruton, USA);

Untersuchung enzymatischer Prozesse in der lebenden Pflanze (A. L. Kurssanov, USSR); Die Verdauung bei niederen Vertebraten (H. J. Vonk, Holland). The second volume includes articles on bacteriophages (M. Delbrück, USA); proteolytic enzymes (M. Bergmann, USA); the chemistry of tea-fermentation (E. A. Houghton Roberts, India); reciprocal integration of carbohydrate and fat catabolism (E. J. Witzemann, USA); the chemistry and physiology of vitamin K (H. Dam, Denmark), and the adrenal cortical hormones (J. J. Piffner, USA). With such diversity of authorship and of subject unevenness is inevitable, but the contributors to the first two volumes have maintained a nice balance between critical appreciation and thoroughness. The editors are justified in hoping that the publication will be of service to investigators; it will also be useful to practising doctors who have reason to appreciate the truth of the tag that living matter is just one enzyme system after another.

### Textbook of Midwifery

(11th ed.) R. W. JOHNSTONE, MD Edin, FRCOG. London: A. and C. Black. Pp. 524. 25s.

IN THIS edition of his deservedly popular textbook Professor Johnstone adds to the account of Barcroft and Barron's work on the onset of respiration at birth, and gives a useful key diagram to the X-ray pictures of the foetal circulation. Some curious anomalies are still to be found in the text. The only operative treatment mentioned for fibroids which prevent delivery by the natural route is caesarean hysterectomy, and he still advocates inhalational anaesthesia for caesarean section. The chapter dealing with placenta praevia is still somewhat inadequate. In the tenth edition the author insisted that expectant treatment was never justifiable, but he is now willing to grant that it is permissible provided the patient is in hospital. However, he still advocates that suspected cases should be examined under general anaesthesia with the operator's entire hand in the vaginal canal—a procedure which must surely involve some unnecessary risk. Methods of treatment in placenta praevia are described rather superficially for a textbook of this calibre. No reference is made to the high foetal mortality associated with "plugging with the half breech," a manoeuvre rarely indicated in modern hospital practice. In a series of 679 cases of placenta praevia seen during seventeen years at the Royal Maternity Hospitals and the Simpson Pavilion in Edinburgh he found the maternal mortality to be 4.8% and the gross foetal mortality 62.5%. These figures are reasonable, but with modern methods a far lower maternal mortality-rate can now be obtained. The book as a whole is lucid, readable, presents its subject in good perspective and maintains a high position among other works of its kind.

### Food, Health, Vitamins

(9th ed.) R. H. A. PLIMMER, DSc Lond, VIOLET G. PLIMMER. London: Longmans, Green. Pp. 196. 7s. 6d.

THIS book has run through nine editions since it first appeared in 1925. A little care would increase its utility. Cow's milk and green vegetables are the chief sources of calcium, we are told; but greens are not, in fact, to be relied on for calcium. Soya beans are mentioned as having long been used by the Chinese and Japanese as a source of complete protein; yet Aykroyd could obtain no increased growth in mission school-children in India by adding soya flour to their diet, whereas with dried skimmed milk he could. Dry seeds such as peas, beans and lentils, we are told, contain as much protein as lean beef; true, but we are not as hens who eat their pulses raw. Stewed beefsteak has 30% protein, boiled haricots no more than 6.6. Such statements must mislead the unwary. The later portions of the book are better than the earlier.

### A Bibliography of Aviation Medicine

E. C. HOFF; J. F. FULTON. London: Baillière. Pp. 237. 4s.

THIS is a comprehensive and up-to-date list of books, pamphlets and articles covering all aspects of medicine in relation to flying. It has been prepared for the committee of aviation medicine of the National Research Council of America, with the object of completeness rather than of critical selection. It is accurate and fully documented; and the arrangement of titles under subjects and authors make obscure references easy to find.

# THE LANCET

LONDON: SATURDAY, JANUARY 30, 1943

## PROPAMIDINE AND WOUNDS

THE therapeutic properties of the diamidine compounds were first discovered by KING, LOURIE and YORKE,<sup>1</sup> who started from the clue that 'Synthalin' (a guanidine compound) was actively trypanocidal. Further work by A. J. EWINS and his colleagues led to the production of a large number of substances, of which the three most active are diamidino-stilbene (stilbamidine), diamidino-diphenoxy-pentane (pentamidine) and diamidino-diphenoxy-propane (propamidine). These compounds have been found to be curative for a variety of protozoal infections such as kala-azar (for which they will possibly replace the antimonials previously used), sleeping sickness, and babesiasis of animals; in addition they exert a limited activity against malaria in monkeys and in man. More recently, the scope of these compounds has been extended by the discovery that they possess also a strong bacteriostatic action, first described last year by FULLER.<sup>2</sup> Their antibacterial action has been studied intensively in the laboratories of MAY and BAKER Ltd.; and as a result of this work one of the compounds, propamidine, was considered to show promise as a wound antiseptic. This impression is well confirmed in a series of four papers, printed in our present issue, recounting the clinical application of propamidine under a variety of conditions. It is applied to the wound or burn, in a jelly or cetyl-alcohol preparation, on alternate days for ten days. This treatment is effective in removing streptococci from the wound; often but not always it removes staphylococci; it has little action against proteus or pyocyanea. In the concentration suggested (0.1%) no harm is done to granulation tissue nor is phagocytosis lessened; higher concentrations may however cause local necrosis and irritation of the adjacent skin. The antibacterial action is not inhibited by pus or by *p*-aminobenzoic acid, and it is not affected by the presence of sulphonamide resistance. Judging by the clinical results the compound has been of striking value both in treating old infected wounds and in dressing fresh burns. The chief weakness noted to date is the failure to control infection with proteus or pyocyanea which, although mainly saprophytic, may give enough trouble to hinder skin grafting.

The extent to which absorption of the drug may occur from the wound into the general circulation is at present unknown, since no method of estimating small concentrations of propamidine is available. That absorption is limited and spread over a considerable period is made probable by the work of HAWKING, HENRY and their collaborators<sup>3,4</sup> on the related compound stilbamidine, whose presence is betrayed by its fluorescence. Stilbamidine, when introduced into the body, is stored particularly in the liver and kidney, much is absorbed by the red blood-cells, and about 10% of the dose injected is excreted in the urine during the first three days; probably propamidine follows a

similar course. No general toxic effects are recorded in the present series of papers. Judging by experiments with mice and streptococci<sup>5</sup> propamidine and its similars seem unlikely to exert a therapeutic effect upon bacterial infections when administered systemically by intravenous injection. After injection (tolerated dose about 2 mg. per kg.) of the drug for sleeping sickness, immediate collapse has occurred, resembling histamine shock but soon passing off; after pentamidine violent itching may occur (LOURIE<sup>6</sup>). Late toxic effects have been rare, but in animals degeneration of the liver and kidneys have been observed; NAPIER and GUPTA<sup>6</sup> have reported several cases of neuritis in the trigeminal nerve. Such symptoms are not likely to occur when propamidine is applied locally by the technique described above unless very large areas are treated, but the possibility should be borne in mind. The whole investigation so far has been a pretty piece of teamwork and further progress will be followed with zest.

## CRIPPLING DISEASES

ANY disease or disorder which leads to incapacity could be called a crippling disease—a patient's capacity for work might be limited by cardiac, pulmonary or renal disorder—but the term is conveniently restricted to disablement of the locomotor system. Among the more important causes are the chronic rheumatic diseases, including rheumatoid arthritis, osteo-arthritis and non-articular rheumatism affecting the fibrous tissues and muscles, ligaments, nerves and the capsules of the joints. The size of the problem they create has often been noted; probably no single medical disorder leads to greater suffering to the patient, or loss of efficiency and cost to the country. It has been estimated that more than a million patients in England consult their doctors annually because of the chronic rheumatic diseases, and that a sixth of the total invalidity of the insured population is due to this cause. The cost, in England and Wales, is at least £20,000,000 annually. DAVIDSON and DUTHIE<sup>7</sup> investigated the incidence of the rheumatic diseases in the north-east of Scotland and calculated that in the whole country at least 300,000 persons annually required medical treatment. Most of the patients were suffering from non-articular rheumatism, but many thousands were incapacitated by more serious forms of arthritis. This finding is confirmed in the official publications of the Department of Health for Scotland, which state that 14% of the total invalidity of persons insured under the NHI Act was due to rheumatism, and that 50,000 insured persons in Scotland were totally incapacitated every year, the average period of incapacity being 60 days. Three million working days were lost annually because of the ravages of the chronic rheumatic diseases, and the annual economic loss to Scotland was estimated at £3,000,000, with resulting misery to patients and dependents.

No official attempt has been made so far to tackle the problem; and it was in the hope of stimulating the official conscience that the Empire Rheumatism Council published in 1940 a plan for national action,<sup>8</sup> which sets out simply a few facts about causation and

1. King, H., Lourie, E. M. and Yorke, W. *Ann. trop. Med. Parasit.* 1938, **32**, 177.

2. Fuller, A. T. *Biochem. J.* 1942, **36**, 548.

3. Hawking, F. and Smiles, J. *Ann. trop. Med. Parasit.* 1941, **35**, 45.

4. Henry, A. J. and Grindley, D. N. *Ibid.*, 1942, **36**, 102.

5. Lourie, E. M. *Ibid.*, 1942, **36**, 113.

6. Napier, L. E. and Gupta, P. C. S. *Indian Med. Gaz.* 1942, **77**, 71.

7. Davidson, L. S. P. *J. R. Inst. Publ. Hlth Hyg.* 1940, **3**, 245.

8. Rheumatism: A Plan for National Action. London, 1940.

the limited facilities for treatment available and concludes with a general plan for the control of this group of disorders. The monograph has stimulated medical thought and in eighteen months has had to be reprinted three times. But it must not be overlooked that other diseases and disorders causing incapacity of the locomotor system deserve attention in any national scheme. Crippling may result from congenital defects, birth injuries, acquired postural disorders, trauma including fractures, and infective diseases such as tuberculosis and poliomyelitis. Treatment of crippling due to this group has in the past been left in the charge of the orthopædic surgeon, whereas treatment of the rheumatic diseases has been mainly in the hands of the physician. In the future it is to be hoped that compartments will disappear and that teams of surgeons and physicians trained in the investigation and treatment of diseases of the locomotor system will work together. The physician specialising in the chronic rheumatic diseases realises the help he receives from his orthopædic colleagues in the control of spasm, pain and swelling of the joints by means of properly applied plaster splints, traction and manipulation. These orthopædic measures are an important advance in treatment. But if the orthopædic surgeon is to obtain the best results, he must have sound medical advisers who will help him to recognise and correct malnutrition, anæmia or hidden infection. Economic advantage will follow the joint use of clinics, equipment and technical staff which form the background of both the medical and surgical treatment of the crippling diseases.

The importance of such co-operation has been recognised by the Scottish Orthopædic Council, the British Orthopædic Association and the Empire Rheumatism Council; the last two bodies have recently issued a joint memorandum<sup>9</sup> on the subject. The basic features of their plan is to establish in each medical region of the country one or more base hospitals for the treatment of the crippling diseases. These would be staffed jointly by orthopædic surgeons and physicians trained in the diagnosis, prevention and treatment of the crippling diseases. Special hospitals are required, these bodies consider, because the treatment of the crippling diseases calls for a long period in hospital. Moreover, until large numbers of such patients are congregated in a single institution under controlled conditions no satisfactory advance in the discovery of causal factors or of the value of various therapeutic measures can be expected. At the periphery of the medical regions diagnostic centres with limited facilities for treating outpatients would be established. These centres would be visited at regular intervals by the specialist staff of the base hospital, who would diagnose the type of disease and decide whether the patient should be treated at the base hospital, the peripheral outpatient clinic, or in the patient's home. The family doctors in the region would be consulted and by securing their interest, and by giving postgraduate instruction on the spot, the first step towards successful treatment would have been made—namely, early diagnosis.

It is to be hoped that the joint standing advisory committee which the Empire Rheumatism Council

and the British Orthopædic Association have now set up will formulate a comprehensive scheme for the prevention and control of crippling diseases acceptable to the Ministry of Health and the Department of Health of Scotland, so that it can be incorporated forthwith in the postwar national medical service.

### THE DYSENTERY CARRIER

IN bacillary dysentery the infection is confined to the bowel without as a rule any systemic spread, and when the dysentery bacilli continue to be excreted after the patient is clinically well the organisms are presumably living on the bowel mucosa or in unhealed ulcers. FAIRLEY'S<sup>1</sup> experience with the sigmoidoscope that the dysentery ulcer may be present when there is no clinical evidence of it is confirmed by BREWER,<sup>2</sup> who recommends a prolonged and intensive course of sulphaguanidine for such cases. Even so, the many mild Flexner and Sonne infections indicate that the convalescent carrier state must often occur without any persisting lesion in the mucosa, and this belief is supported by the commonness of symptomless carriers among contacts of clinically infected cases. Unlike the systemic enteric infections, persistence of the carrier state for more than 6 months is rare in bacillary dysentery, and when it happens is probably always associated with ulceration of the bowel and intermittent diarrhoea so that the case is really one of chronic dysentery. But if "chronic dysentery carrier" is a misnomer, convalescent carriers are common enough, and more than half the clinically infected cases may still be excreting the organism 3-4 weeks after onset. In the contact carrier infectivity is more evanescent, although a few cases are persistently positive for weeks. When infection attacks a community the brunt of it falls on the younger children, and both clinical cases and carriers become much less common in the older age-groups; should subsequent outbreaks develop in the same community, the incidence of clinical infection is much less than in the original epidemic. For example, in one institution, 48 (22%) of the 220 originally infected cases had clinical symptoms, but only 3 (4%) of 76 cases subsequently attacked.<sup>3</sup> Thus dysentery may be endemic in an institution with a high carrier-rate but few clinical cases until there is a large admission of new patients when the infection flares up again—a not uncommon happening in mental hospitals.

As the spread of dysentery is mostly by contact from cases and carriers, the detection and control of the unsuspected convalescent and contact carriers is a matter of prime importance. Detection has been greatly facilitated by the introduction of the desoxycholate-citrate agar,<sup>4</sup> and in searching for carriers with this medium a specimen of faeces is probably preferable to the rectal swab, for there is little risk of the relatively scanty dysentery bacilli being masked by the profuse coliform flora. In young children, however, it may be more convenient to use the rectal swab; and, provided the specimen is kept moist, there is no great urgency in getting it to the laboratory, for both Flexner and Sonne bacilli remain alive in

9. Obtainable from the secretaries of the joint committee, Mr. Norman Capener, FRCS, The Princess Elizabeth Orthopædic Hospital, Bucknell Bore, Exeter, and Sir Frank Fox, 106, Finchley Road, London, N.W.3.

1. Fairley, N. H. *Lancet*, 1942, 2, 648.

2. Brewer, A. E. *Brit. med. J.* 1943, 1, 36.

3. Hardy, A. V., Shapiro, R. L., Chant, H. and Siegel, M. *Publ. Hlth. Rep., Wash.* 1942, 57, 1079.

4. Hynes, M. J. *Path. Bact.* 1942, 54, 193.

fæces for some days in temperate climates. Once detected, control of the carrier is best effected by his being kept in isolation until 3 consecutive negative cultures have been obtained, although doubts on the reliability of this criterion of cure have recently arisen in the case of Sonne carriers.<sup>5</sup> Intermittency of excretion is possibly favoured by the preventable tendency to constipation after mild dysentery, and where a positive culture is obtained after a number of negatives, the possibility of reinfection must always be excluded. In Flexner infections 3 negative cultures seem to be sufficiently reliable and in all cases of dysentery this criterion of cure should probably be accepted, unless the child is being returned to an institution when 4-6 negatives may be required. But many mildly infected cases and symptomless carriers are never detected, and so facilities for washing the hands after use of the water-closet must be more generally provided and the need for doing so instilled by propaganda in the public mind. Fortunately, we have in the new intestinal antiseptic, sulphaguanidine, a drug which can be confidently expected both to prevent the carrier state after a clinical attack and to cure it when it develops,<sup>6,7</sup> provided the infection is due to one of the Flexner group of organisms. Results have been much less satisfactory in Sonne dysentery, though larger doses—2-3 g. three times a day for children—than are often used should be given from the onset of symptoms. Succinyl sulphathiazole (sulphasuxidine) may prove more useful here; it acts apparently by the liberation of sulphathiazole, and large doses are safely tolerated since only about 5% of it is absorbed. Sulphathiazole itself, like sulphapyridine and sulphadiazine, is beneficial in the acute case of dysentery, and stools may give negative cultures while the patient is on the drug, but when treatment is stopped faecal cultures may again become positive.<sup>8</sup> Thus, although *in vitro* and in mice these absorbable drugs seem to be the most powerfully active against the intestinal bacteria,<sup>9</sup> best results for the cure of the dysentery carrier are likely to be got from drugs like sulphaguanidine and sulphasuxidine which remain in the gut to attack the organisms *in situ*.

#### AIR POLLUTION FROM MOUTH AND NOSE

It was once widely believed that the air contained small devils—the Little Men of our peripatetic correspondents—which flew into the mouth in unguarded moments and caused trouble. Coughing and sneezing were believed to be effective aids to their removal, and when so expelled they flew about until the next victim came along. In the last 40 years bacteriologists from FLÜGGE onwards have shown this belief to be only too true, though for "devils" one must read "bacteria" and "virus particles." Our knowledge of such air-borne infection has advanced considerably owing to improved methods of sampling air for bacteria devised by WELLS and others, and to the development of flash photography by EDGERTON and its application by JENNISON to the study of coughs and sneezes. The symposium *Aerobiology*<sup>10</sup> contains

5. *Mon. Bull. Emer. publ. Hlth Lab. Ser.* 1942, 1, 2.

6. *Lancet*, 1942, II, 13.

7. Hardy, A. V., Watt, J., Peterson, J. and Schlosser, E. *Publ. Hlth Rep., Wash.* 1942, 57, 529.

8. Jannet, H., Leibovitz, A. and Deutsch, J. V. *J. Amer. med. Ass.* 1942, 120, 184.

9. White, H. J. *Bull. Johns Hopk. Hosp.* 1942, 71, 213.

10. *Aerobiology*, Washington, DC: American Association for Advancement of Science, 1942, p. 106.

an admirable summary by JENNISON of his work with flash photography. The photographs include selections from a cine-film of a sneeze taken at 700 frames per second. This impressive technical achievement shows that the process of expulsion of droplets lasts about  $\frac{1}{4}$  sec. and that the droplets cease to be visible after about  $\frac{1}{4}$  sec. Other photographs have given some idea of the large numbers of droplets emitted in sneezing and of their velocity and trajectory. Studies here and in America<sup>11</sup> have shown that of the numerous bacteria-carrying (and probably virus-carrying) particles emitted by a sneeze, perhaps 20,000 may travel for 3 ft. in a nearly horizontal line, and so may immediately infect another person. About 100,000 such particles are likely to remain suspended in the air for a minute or more. Of these as many as 4000 may still be floating around in a viable (and presumably infective) condition half an hour after the sneeze.

The dangers of scattering infection by sneezing and coughing are thus very real, and are now becoming recognised, but it is less widely known that most people—if not all—emit infected droplets in ordinary conversation. JENNISON shows a photograph of a subject enunciating the letter "f" which makes a germ-conscious reader reflect on the advantages of life in a Trappist monastery. He adds, "While the number of droplets resulting from ordinary conversation is small—perhaps a few dozen for a consonant or word—in loud talking the numbers may be of the same order of magnitude as in strenuous coughing, that is a few hundreds." The velocity of some of these droplets approaches that of sneeze droplets. Hence they travel directly to a distance of several feet from the speaker. GORDON'S studies in our own House of Commons in 1906, and more recent work in the United States, have shown to what long distances such particles may travel after expulsion.

No wonder, then, that respiratory infections are the most prevalent of diseases. For in our present code of manners little exception is taken to the practices which obviously spread respiratory infection. Most people think it proper to attend work with a heavy cold without wearing a mask, refraining from talking, or even warning people with whom they converse. They thus pollute the air freely, although a similar pollution of water-supplies would be considered disgusting. There has been a change of public opinion about spitting; it is time for another about other ways of polluting the air. The proper use of a handkerchief when sneezing or coughing must be considered really important. We must learn to respect people who wear a mask when they come to work with a cold, instead of laughing at them; the ideal alternative—to stay at home for the first three days of an acute cold—is not often practicable these days. But we should take pride not as at present in the heroism with which we ignore our colds, but in being so careful with speech and handkerchiefs that other people do not catch them. Such changes can be brought about in time. The Ministry of Health poster campaign, "Coughs and sneezes spread diseases. Trap the germs in your handkerchief," made a beginning; Arthur Askey's film on sneezing helped. Doctors and schoolteachers can now do more than anyone to keep public opinion moving in the right direction.

11. Wells, W. F. *J. industr. Hyg.* 1935, 17, 253; Bourdillon, R. B., Lidwell, O. M. and Lovelock, J. E. *Brit. med. J.* 1942, I, 42.

## Annotations

## FLUORINE AND THE PARATHYROIDS

THE Allied occupation has drawn attention to the economically important phosphate zones of North Africa. The rock phosphates there are highly valuable fertilisers, but they are deleterious as phosphorus supplements for animals because they are rich in fluorine. Darnous, the endemic fluorosis found among man and animals born or long resident in those regions, has been graphically portrayed by Gaud and Charnot.<sup>1</sup> During the last few years surveys<sup>2</sup> have proved that mild endemic fluorosis is common in the British Isles. Spira suggests without experimental basis that symptoms of fluorine intoxication are due to a direct effect of this halogen on the parathyroids. He points to the association of the parathyroids with epithelial structures—dental enamel, nail, hair and so on—but these glands are principally concerned with calcium and phosphorus balance and hence with bone metabolism. The concentration in which fluorine is found in blood and tissues in endemic fluorosis is more likely to upset the cycle of intimate chemical changes involved in calcification.<sup>3</sup> Direct observations on pigs fed with toxic doses of fluorine showed little or no abnormality of the parathyroids, though other organs, notably the kidneys, were severely damaged.<sup>4</sup> The story of mottled teeth is now an old one; workers in different countries<sup>5</sup> have more recently studied the important skeletal changes brought about by endemic fluorosis, which may be crippling. There is evidence that the general nutritional status largely modifies the effects of fluorine,<sup>6</sup> and animal experiments<sup>7</sup> have demonstrated that high calcium intakes reduce the retention of injected fluorine.

## THE KENNY METHOD IN POLIOMYELITIS

THE claims of Miss Elizabeth Kenny, an Australian nursing sister, to have developed a new technique in the treatment of poliomyelitis were investigated some years ago by an Australian medical committee<sup>8</sup> and in 1938 by a committee appointed by the London County Council.<sup>9</sup> Both these bodies considered that though her methods were of value there was nothing original in her principles; and it was thought that as good results would be obtained by orthodox methods energetically applied. Since 1920 Miss Kenny has been working at the University of Minnesota and her results have been assessed by a committee invited to serve by Mr. Basil O'Connor, president of the National Foundation for Infantile Paralysis. This committee, composed of men who at the outset were sceptical of the value of the method, has very largely reversed the opinion of the two former committees. In reporting the conclusions of the members,<sup>10</sup> Dr. F. H. Krusen tells how Dr. Miland Knapp, head of the department of physical therapy at Minnesota University, was frankly puzzled by Miss Kenny's use of terms at the outset, and had not been able to follow her when she talked of "spasms," "incoördination" and "mental alienation." These three, however, are now regarded by the workers at Minneapolis as the three major symptoms of early poliomyelitis. This entails a

revolution in the usual conception of the disease. The muscular spasm covers a group of symptoms including fibrillary twitchings, hyper-irritability to stretching and a more or less tonic contraction in the muscle-fibres which often can only be overcome by considerable force. This has been observed by other workers outside the Minneapolis group. The spasm affects chiefly the hamstrings (100% of cases in the Minneapolis General Hospital), the quadriceps, the back and neck muscles, the gastrocnemii, pectorals, muscles of respiration and the biceps brachii; it can be demonstrated and photographed. The incoördination is described as being of two types: that due to a spread of motor impulses intended for one muscle to other muscles or muscle groups; and ineffectual contraction within the muscle itself, instead of a coördinated rhythmic contraction acting on the insertion. Substitution movements produced by the first type result in abnormal patterns of motion. The mental alienation—an unattractive term which no-one has been able to better—is described as an inability to produce a voluntary purposeful movement in a muscle in spite of the fact that the nerve paths are intact; they distinguish this physiological block from the organic interruption resulting from destruction of anterior horn cells by the disease. It comes about, they think, when a muscle is pulled beyond its normal resting length by an opponent in spasm; when an attempt to contract the alienated muscle causes pain in its affected opponent; when spasm and its results in an affected muscle are so severe that it acts as a brake on its unaffected opponent; and when changes in the nervous system, not amounting to destruction of cells or fibres, interfere with normal neuromuscular action. Dr. Krusen finds this unusual conception difficult to accept; he gives as an example the idea that in foot-drop the affected muscle is the gastrocnemius, which is in spasm, while the dorsiflexors are mentally alienated; when the spasm is relieved by the Kenny method of treatment and mental awareness of the dorsiflexors established by re-education, the foot-drop disappears; and some of the Minneapolis observers have seen this happen in 48 hours. Treatment is by hot packs to the muscles in spasm; passive movement, even in the early stages, to the range which can be achieved without pain; re-education of mentally alienated groups; and the entire absence of splints. The results have led the foundation's committee on research for the prevention and treatment of after-effects to conclude that during the early stage of the disease the time during which pain, tenderness and spasm are present is greatly reduced, and that contractures caused by muscle shortening are prevented by the Kenny method. Dr. Krusen himself has seen no contractures, malalignments or spinal curvatures attributable to contractures after this treatment; there are of course such after-effects as flail limbs and Trendelenburg limbs due to nervous damage beyond repair. The Minneapolis workers believe that the prognosis for a given muscle can be assessed by placing it slightly on the stretch and stimulating it by moving the joint back and forth; if it responds to the extent of making it possible to follow the tendon from the insertion to the belly recovery may be expected; "loss of tendon"—that is, complete loss of muscular tone—probably indicates permanent loss of function.

In comparing the Kenny method of treatment with those hitherto in vogue it may be wise to distinguish between theory and practice. Miss Kenny advocates the application of hot packs throughout the day, at least every two hours, sometimes every 15 minutes, to muscles which are in spasm. Passive movement is begun early and is soon followed by re-education. The demands on the nursing staff are obviously exacting, and probably if this concentrated attention was available from the beginning of the illness in every case the results of treatment would be much better than they often are. It is

1. Gaud, M. and Charnot, A. *Bull. Off. int. Hyg. publ.* 1938, 30, 1280.
2. Murray, M. M. and Wilson, D. C. *Lancet*, 1942, i, 98. Spira, L. *Ibid.*, p. 649; *J. Hyg. Camb.* 1942, 42, 500.
3. Robison, R. and Rosenheim, A. H. *Biochem. J.* 1934, 28, 684. Gutman, A. B., Warwick, F. B. and Gutman, E. B. *Science*, 1942, 95, 461.
4. Kick, C. H., Bethke, R. M., Edgington, B. H., Wilder, O. H. M., Record, P. R., Wilder, W., Hill, T. J. and Chase, S. W. *Bulletin* 558, Agricultural Experimental Station, Ohio, 1935.
5. Short, H. E., McRobert, G. R., Barnard, T. W. and Nayyar, A. S. M. *Ind. J. med. Res.* 1937, 25, 553. Ockerse, T. S. *Afr. med. J.* 1941, 15, 261. Kemp, F. H., Murray, M. M. and Wilson, D. C. *Lancet*, 1942, ii, 93.
6. Pundit, C. G., Raghavachari, T. N. S., Subba Rao, D. and Krishnamurti, V. *Ind. J. med. Res.* 1940, 28, 533.
7. Lawrenz, M. and Mitchell, H. H. *J. Nutrit.* 1941, 22, 91.
8. *Lancet*, 1938, i, 121 and 855.
9. *Ibid.*, 1938, ii, 957.
10. *Proc. Mayo Clin.* 1942, 17, 449.

likely, however, that immobilisation by splinting is an imperfect biological method of preventing the stretching of paralysed muscles, and that the influence of muscular pain has not been properly appreciated. It may well be that advances in physical therapy springing from Miss Kenny's enthusiasm will outlast her theory and terminology.

#### THE HOWELL-JOLLY BODIES

THE Howell-Jolly bodies are small refractile granules about  $1\mu$  in diameter that are sometimes found in red blood-cells; they are usually eccentrically placed and may be single or multiple. They have not attracted much attention, in spite of their cheerful name; they are classed with Cabot's rings and other nuclear remnants, and hæmatological textbooks still find them a place on their colour-plates. They have however a long history, and in continental literature particularly they are associated with the spleen. Some 30 years ago, Howell-Jolly bodies were noticed in the red cells after splenectomy, and have been reported to persist in the blood for as long as 11 years after; they have also been noted in the blood-cells of patients who were afterwards found to have atrophic spleens. This connexion between the Howell-Jolly bodies and atrophy of the spleen has recently been reviewed by Boveri.<sup>1</sup> The number of published cases he quotes is small; he describes two cases of his own—in only one was the atrophy of the spleen confirmed at autopsy—and gives a few facts about 7 more cases found among hæmatological records covering 5 years; in 5 of these the state of the spleen was not known, in the remaining 2 it was fibrotic but not atrophied. The evidence thus obtained is admitted by Boveri to be poor, but a few interesting facts emerge. Nearly all the patients had disturbed absorption from the alimentary tract, such as achlorhydria or excess fat in the stools; and such disturbances have been linked—again by continental writers—with atrophy of the spleen. They are only really significant if they persist in the red cells of patients who are *not* anæmic, in whom the proportion of affected cells is of the order of 1-5 per 1000; if the patient is anæmic, there should be many affected cells—5% have been found after splenectomy—and they should persist at the 1-5 per 1000 rate even if the anæmia is successfully treated. In these circumstances a diagnosis of atrophy of the spleen may be made, and this seems to be specially true of cases of non-tropical sprue. There is no evidence that Howell-Jolly bodies always connote a disorder of the spleen. Except as a help to complete the pathological picture, the knowledge that a patient's spleen is atrophied is neither thrilling nor helpful; nevertheless, since Boveri has reminded us that they have some significance, it is likely that the Howell-Jolly bodies will continue to be allowed their quiet corner in the colour-plate and their few propitiatory lines in the textbook.

#### BATTLE WOUNDS OF THE HEAD

ONE of the most useful functions of specialised surgical units in war is to formulate a policy for the guidance of the general surgeon who under war conditions must be prepared to treat all types of wound. Major Miller,<sup>2</sup> who was in command of a neurosurgical unit in the Middle East, tells the general surgeon exactly what he wants to know about the treatment of gunshot wounds of the head. He points out that the practice of leaving battle wounds unsutured has no place in head wounds. All head wounds should be treated by scrupulous debridement and closure. In the Western Desert this could be successfully carried out even three or four days after the injury. "Nothing is more fraught with danger," he says, "than partial interference with such wounds in forward field units from which an early and exhausting evacuation will have to be made." The surgeon who has

to deal properly with the wound must have a suction apparatus which provides the only way to keep the operation field clear: a foot-pump suction apparatus, at least, should be available for every surgical team. Cushing clips should be provided, for electrosurgical apparatus is rarely available. 'Pentothal Sodium' as a preliminary anæsthetic allows thorough shaving and cleaning of the scalp, the operation being then continued under local anæsthesia. Thorough excision of the wound is essential. The scalp flaps are freely mobilised to facilitate closure; bone edges are excised by sharp rongeur forceps; soiled dura is removed with scissors, hæmorrhage being controlled by silver slips or an under-running suture. When no endotherm is available the red-hot tip of a probe is useful to seal small bleeding points on the dura. The brain wound is cleaned by irrigation and gentle suction until a clear field is obtained. Artery forceps are of course never applied to the brain, and swabbing is avoided except for the application of a small moist wool slab to bleeding points. Hæmorrhage from venous sinuses is controlled by a "stamp" of temporal muscle. Deep foreign bodies are left severely alone, and only those which can be gently dislodged are removed. Glancing gunshot wounds may cause local contusions of the underlying brain with resulting temporary hemiplegia. This is sometimes misinterpreted as a sign of intracranial hæmorrhage requiring operation, but in these glancing wounds there is usually no impairment of consciousness and this serves to exclude progressive cerebral compression requiring surgical relief. The sulphonamides have greatly reduced the risk of meningitis and brain abscess. Regular examination of the cerebrospinal fluid is performed in cases of infection. The fluid intake must be well maintained, if necessary by intravenous infusion. There is usually little or no concussion of the brain as a whole, and treatment consists essentially in dealing with the area of local injury to the scalp, skull and brain.

#### HOME TREATMENT OF PNEUMONIA

THE Boston Dispensary, which has been running since 1796, provides a free pneumonia service for poor patients. The aim is to give them treatment in their own homes, so lessening the burden on overcrowded hospitals, and avoiding the psychological disturbance of moving them from familiar surroundings, the risks of transport in ambulance, and possible delays in starting treatment. Against these advantages may be set poor homes and inadequate nursing and the possible lack of medical equipment or of immediate medical attention in an emergency. Rosenthal, MacColl and Pratt,<sup>1</sup> in a report of 132 cases treated by the dispensary staff, suggest that with the proper use of sulphonamides the death-rate of patients treated at home may be as low or lower than that of patients in hospital. During the winter of 1940-41 four physicians undertook treatment and the patients ranged in age from 2 months to 86 years, 17% of them being above the age of 50. As a rule treatment could be started within 48 hours of the onset of the illness and the usual initial delays over hospital admission were of course eliminated. In all cases the sputum was examined, pneumococci being found in 53%; blood-counts were done and the urine examined regularly. Sulphathiazole was given by mouth, an initial dose of 4 g. being taken in the presence of the physician. The average total dosage given was 37 g. for adults, and 12 g. for children. For patients not showing pneumococci in the sputum the average dose was 23 g. for adults and 10 g. for children. The temperature dropped to normal in about 48 hours in almost all cases and the average duration of sulphathiazole treatment was 4 days for adults and 3-6 days for children. A low white-cell count was not regarded as a contra-indication to the treatment,

1. Boveri, R. M. *Guy's Hosp. Rep.* 1942, 91, 81.  
2. Miller, D. *Med. J. Aust.* 1942, ii, 207.

1. Rosenthal, J., MacColl, W. A., Pratt, J. H. *New Engl. J. Med.* 1942, 226, 845.

and there were no serious toxic symptoms; a rash was seen in two patients, gross hæmaturia in one, and red cells found in the urine of a few.

In addition to sulphonamides, patients were instructed to take 3 quarts of fluid daily; but no oxygen, digitalis or artificial stimulants were employed at all. The response of infants and children to treatment at home was specially good and absence of the emotional strain of being taken away to hospital seemed to be of real benefit. No direct control over the administration of sulphathiazole was possible, and nursing was largely in the hands of the patients' relatives with the help of the community health (district) nurse; but it was found that family or parental coöperation was good and treatment was well carried out. The mortality-rate among these 132 patients was 3.8%, a figure which, though of little significance by itself, suggests that home treatment was as successful as that in hospital. Before the use of sulphonamides, the mortality of pneumonia in patients over 50 years of age was in the region of 50%. A comparison of the death-rates before the introduction of chemotherapy has been lately published by Lubsen in Amsterdam<sup>2</sup>; in his cases, studied over the years 1930-38 and treated symptomatically in hospital, the mean fatality-rate was 14.3% (8.2% for patients under 50 years old and 43.5% for those over 50 years). In America mortality-rates were in the neighbourhood of 20-30% for all types. In Lubsen's cases the fatality-rate was lower the earlier the admission to hospital, and he suggests that the results are worse in the region of Utrecht, for example, because patients had to be brought long distances to hospital. All reports emphasise the importance of early and adequate sulphonamide treatment. The Boston experiment shows that such treatment given to the patient in his own home produces good results even with unskilled nursing. Complications and toxic effects were few, and the mortality-rate was less than a third of the lowest recorded in the presulphonamide era.

#### AGE AND MASS RADIOGRAPHY

THE South Australian branch of the British Medical Association has recently discussed the proposal of the civic authorities of Adelaide for a mass radiography survey of 30,000 school-children. Dr. D. R. W. Cowan described the scheme as a waste of time and money owing to the rarity of pulmonary tuberculosis in the age-groups involved. He also pointed out that an X-ray survey could never replace careful history taking and physical examination, especially in children in whom the common chronic chest diseases produce little if any change sufficient to cast a shadow on the screen. Although other speakers mentioned the occasional occurrence in childhood of lesions of adult type and also the advantages of getting the population into the habit of undergoing periodic medical examination, the impression remains that the results of mass radiography in children are unlikely at present to justify the labour and expense involved. It might even give parents a sense of false security, since one normal film does not exclude the chance that the child has already been infected, or give any indication about susceptibility. In the control of tuberculosis in childhood, more valuable information can probably be obtained by extensive Mantoux testing than by radiography, though Mantoux-positive contacts should of course be examined with X rays. The discussion may well make us pause and consider how we in Great Britain are to make the best use of the relatively small number of miniature radiography sets soon to be available. Trail, investigating the incidence of tuberculosis in the RAF found: in the under-20 age-group, active disease in 0.16% and inactive in 0.09%; in the 20-24 age-group active disease in 0.35% and inactive in 0.36%; over the age of 25 the numbers examined

were smaller, and the incidence about 0.1% active and 1.0% inactive. Since the first signs of tuberculosis appear at different ages in different people, it is obviously impossible to pick on any one age for radiological survey that will give a satisfactory answer to the problem. The Committee on Tuberculosis in War-time (HMSO, 1942) regard routine periodic mass radiography as the best method of controlling pulmonary tuberculosis. With this ideal and with the practical conclusion of the committee that in the limitations of war-time certain groups should be given priority it is difficult to disagree. Among these groups selected as being particularly important are: the Services; men and particularly women entering war industries; nurses and medical students; and merchant seamen. If these recommendations are followed there would be no risk of our limited facilities not being usefully employed.

#### CARE OF WOMEN IN INDIA

THE Countess of Dufferin's Fund in 1888 started to provide medical relief by their own sex for the women of India, then living closely secluded lives; this relatively small fund is now concerned mainly with the granting of scholarships to women studying at medical colleges in different parts of India. The Women's Medical Service is supported by an annual contribution from the Government of India together with certain grants received from provincial governments, and its object is to supply well-qualified medical women to various Indian women's hospitals. The annual report<sup>1</sup> of the two organisations shows that at the end of 1941 the strength of the service was 48 members—a miserably small number considering the vast area to be served. Only 17 of them were of non-Indian domicile; many are employed on the staff of the Lady Hardinge Medical College, Delhi, a central training centre for Indian women seeking higher medical qualifications. The hospitals to which members of the WMS are appointed outside Delhi are under the control of provincial authorities. This report shows that the financial condition of hospitals in such areas is often unsatisfactory. Pupil nurses are expected to live on a mere pittance and the nursing staff and equipment are not up to modern requirements. The blackout imposes an additional burden on those working in a high temperature associated with great humidity. Despite such discouraging conditions the members of the WMS are able to report the treatment of large numbers of medical, surgical and gynaecological cases, and an increasing emphasis on antenatal work and paediatrics. Many of these doctors are placed at hospitals distant from any up-to-date medical centre and the council of the WMS has arranged for them a postgraduate conference at Delhi, with opportunities of meeting other women doctors and discussing medical problems. During the year under review two new women's hospitals, staffed by members of the WMS, have been opened—a well-equipped building at Cawnpore, and a second at Quetta which has been built, to replace the former hospital destroyed by an earthquake, in a manner to withstand further shocks. At Jubbulpore in the Central Provinces a fine hospital is in course of construction, and at Calcutta a modern nurses' home is being attached to the large women's hospital in order to meet the nursing needs of recent ward extensions. The greatest difficulty hospitals have had to face is the shortage of sisters and staff nurses owing to demands of the Army. There are as yet only 5000 trained nurses in the whole of India, compared with 105,000 in Great Britain alone and many of the Indian nurses have been trained at small poorly equipped hospitals and possess little in the way of educational qualifications. It is difficult to find sisters qualified to teach pupil nurses. There is great need for a central College of

2. Lubsen, N. *Acta med. scand.* 1942, 110, 465.

1. Annual Report of the National Association for Supplying Medical Aid by Women to the Women of India including the Women's Medical Service. 1941. Government of India Press.



Nursing where Indian sisters might obtain special training in administrative and sister tutor's work. In spite of the gradual breaking down of *purdah* customs it is to women's hospitals and women doctors that Indian women turn for medical relief in increasing numbers, and their need must be met.

### ABSENTEEISM IN INDUSTRY

THE loss of industrial production caused by absenteeism cannot be solved by making demands on a dwindling supply of man-power. It can only be met by concentrating on the problem itself with a view to reducing it to the unavoidable minimum. This is made clear in a recent Ministry of Labour pamphlet (*The Problem of Absenteeism*, P.L. 106/1942, September, 1942) which points out that persistent lateness and absence from work without reasonable excuse are an offence against the law in the case of employment scheduled under the Essential Work Orders, but that the solution of the problem will not be found by exercising external powers of discipline and punishment. The difficulties which workers have to face in war-time, and the sacrifices they are making, must be taken into consideration. The pamphlet mentions the chief causes of absence from work, stresses the importance of assessing absenteeism numerically and indicates ways of dealing with absentees. It presents a method for recording the extent of absenteeism subdivided under headings, and provides a model form for such records. Absenteeism is commonly, though crudely, divided into involuntary (including sickness and accidents) and voluntary (including lateness and absence without reason). The present pamphlet is mainly concerned with the voluntary variety, and will doubtless be useful in providing information on which individual action in a given factory can be based. There is, however, danger that the picture of absenteeism will be distorted in the minds of industrialists by the emphasis laid on "psychological causes," under which the pamphlet includes lack of interest and lack of a sense of urgency. The greater part—about two-thirds—of absenteeism is due to sickness and accidents, not to voluntary causes, and the tendency of recent ministerial pronouncements has been to emphasise this fact. Unfortunately the present pamphlet passes over sickness in a few lines, merely saying that if it is persistently high the firm should take steps to analyse diseases or conditions possibly responsible; it does not state what steps are to be taken and provides no effective scheme of analysis. In the model form sickness is not subdivided by cause, and sickness and accidents are even grouped together; the subdivision of sickness into certified and uncertified, shown in the monthly summary, has no counterpart in the basic form from which the summary is to be obtained. A further general criticism is that entries under the various headings of absenteeism are in hours and include lost overtime and late arrival. This is a case of the best being the enemy of the good, for while such detail may be theoretically desirable and comprehensive, the recording by days instead of hours (ignoring overtime) would have been simpler and would have involved far less clerical work. It is true that lateness could not be measured thus, but would it not be adequate to record the number of times late—i.e., consistent lateness—instead of the exact number of hours lost?

The present pamphlet represents an advance in stimulating and helping employers to log and analyse certain types of absence, chiefly of the voluntary type. What is needed now is to impress on them the relation of health to production, and the predominant importance of sickness and accidents as factors in lost time, by producing a simple scheme for recording and analysing sickness and accident absence to dovetail into the present scheme. We may hope that the recently reconstituted Industrial Health Research Board will undertake this task of social medicine for which its

research experience makes it pre-eminently suitable. It is essential that any scheme should be presented in such a form that the implications will be clear to joint production committees and not merely addressed to employers; guarding the health front is the concern of workers and managements alike.

### JOHN BURNS AND SOCIAL MEDICINE

THE death of John Burns last Sunday in the mellowness of years recalls a great address which he gave almost thirty years ago. The occasion was the 17th International Congress of Medicine in London and it fell to the president of the Local Government Board to review the relationship between medicine and public health. It was the closing meeting of the congress and "Honest John," presenting himself as an artisan turned cabinet minister, began by thanking the medical profession in the name of his fellow working men ("the men who work in the pit, the factory, the mill") for the care they bestowed on the lowly and the weak. He had a special word for the branch of work in which research and scientific diagnosis are commingled and foresaw the day when every doctor should have the opportunity of utilising for every patient the means of accurate diagnosis which medical science provides. The time, he said, was coming—it had already partially come—when the family doctor will be engaged in advising as to means for preventing disease, in dissuading from habits inimical to health, in preventing overwork or laziness ("both serious enemies of mankind"), in reporting external conditions, whether of work or leisure, needing to be amended, and still more often in discovering the early symptoms of illness which if neglected may produce serious disease, and in securing the removal of their cause.

Sir WILLIAM SAVAGE and Mr. CLAUDE FRANKAU have been appointed by the Nuffield Trust to survey the hospital services of East Anglia. This area includes the Soke of Peterborough, the Isle of Ely, and the counties of Cambridge, Huntingdon, Suffolk, Norfolk and probably Bedford.

ROYAL COLLEGE OF PHYSICIANS OF LONDON.—This year's lectures at the college include: Feb. 9 and 11, Prof. M. Greenwood, FRS, medical statisticians from Petty to Farr (Fitz-Patrick lectures); Feb. 23 and 25, Dr. S. A. Henry, the health of the factory worker in war-time (Milroy lectures); March 4, 9 and 11, Prof. R. V. Christie, emphysema (Goulstonian lectures); March 16 and 18, Dr. Geoffrey Evans, arteriosclerotic disease (Lumleian lectures); March 23 and 25, Prof. G. W. Pickering, the circulation in arterial hypertension (Oliver-Sharpey lectures); May 25 and 27, Air-Commodore C. P. Symonds, flying stress (Croonian lectures); Nov. 4, Dr. J. W. Brown, the interauricular septal defect (Bradshaw lecture); Nov. 16, Prof. L. G. Parsons, the prevention of neonatal disease and neonatal death (Charles West lecture). The lectures will be given at the College, Pall Mall East, S.W.1, on the Tuesdays and Thursdays stated at 2.15 PM.

HEALTH EDUCATION AND VENEREAL DISEASES.—The Central Council for Health Education will hold a conference on this subject at BMA House, Tavistock Square, London, W.C.1, on Feb. 26. The Minister of Health and the Archbishop of Canterbury will speak at the morning session which begins at 11 AM, and at the afternoon session the speakers will include Lord Winster, Dr. T. O. Garland and Dr. C. Hamilton Wilkie. Further information may be had from the secretary of the council, Tavistock House, Tavistock Square, W.C.1.

BUCKSTON BROWNE PRIZE.—The council of the Harveian Society of London announce that the subject of the Buckston Browne prize essay for 1943-44 will be the use and abuse of sulphonamides. The essay must be sent to the treasurer of the society, 14, Devonshire Street, W.1, by Oct. 1, 1944. The prize consists of a cheque for £100 and a medal, and is open to graduates of universities of this country and of the Dominions.

## Special Articles

### LAY OR MEDICAL HEAD

HOSPITAL administration has developed on two separate lines: non-medical superintendents or house-governors are usually in charge of voluntary hospitals, while medical superintendents control municipal hospitals. The historical reason for this is that voluntary hospitals, having medical committees, needed a competent administrator to run the business side of the hospital, whereas municipal hospitals with lay visiting committees needed a doctor to take charge of the day-to-day administration of the hospital. Medical superintendents in fact delegate a great deal of the non-medical technical work to the hospital steward, clerk and engineer; while the matron, being in charge of the nursing staff, usually has considerable say in the running of the wards. And whereas the director of a voluntary hospital is captain of an isolated ship, the municipal hospital is one of several under the same local authority, and sails as it were in convoy, the medical superintendent acting mainly on instructions from an admiral in the county offices. The Medical Superintendents Society debated this question at BMA House on Saturday, Jan. 16, but as most of the speakers were either medical or lay superintendents there was bound to be some special pleading.

Thus Mr. F. A. LYON (Seamen's Hospital) thought it a waste of skilled medical men if promotion to the highest posts forced them to become administrators rather than clinicians, since the average medical superintendent has not had time to study all sections of hospital management, and may approach problems with a certain bias; whereas a competent lay administrator, he thought, was less likely to have a prejudiced view.—Dr. J. B. COOK (West Middlesex Hospital), on the other hand, considered that hospital administration was just as definite a part of medicine as public health. There are some problems—for example the common one of consultants arriving two hours late—which he held could only be tackled by a medical man, the layman being too easily hoodwinked. Since he has the assistance of a steward who does much of the work of a house governor, the superintendent should have time to keep up to date in medicine and to coördinate the work of his medical staff.—Mr. J. R. GRIFFITH (Princess Beatrice Hospital) believed that a hospital superintendent should be properly qualified in administration, and (quoting Dr. Johnson's "Must he who drives fat cattle himself be fat?") he doubted whether there were really any situations which could be dealt with only by a medical superintendent. He did not think that dual control—medical superintendent and lay manager—would work in practice, nor the suggested triumvirate of superintendent, matron and steward. There must be one captain, but there should also be a team, and he believed that the solution was for a properly trained administrator (medical or non-medical) to run the unit in close touch with a committee representing the managers and elected representatives of all sections of the staff.—Dr. S. J. FIRTH (Brighton Municipal Hospital) thought a medical superintendent was the only person in a position to keep in touch with the whole staff; and since treatment was the core of all hospital work the person at the head should be medically qualified. Reverting to the nautical, he mentioned that a ship at sea has a sailor as captain; but a later speaker suggested that hospitals were more like ships at anchor with harbour facilities at hand.

Mr. W. MCADAM ECCLES, FRCS (chairman of the International Hospitals Association), suggested that all the staff of a hospital should be represented on one or other of three councils—medical, nursing and lay—and each of these should have a corresponding head, responsible to a specially trained superintendent who might be a medical man or woman, or might be a layman with sufficient relevant medical knowledge, but who would in any case hold a special degree in hospital administration of university standard. He mentioned that such staff councils have already been set up in some hospitals with considerable success.—Mr. H. J. MCCURRICH, FRCS (Royal Sussex County Hospital), found medical superintendents dictatorial and the hierarchic set-up of most municipal hospitals hampering to clinicians.—Dr. HORACE JOULES (Central Middlesex County Hospital) retorted on him as a backwoodsman; nothing like that, said he,

existed in a modern progressive municipal hospital. He agreed with the idea of setting up of medical committees. Such committees should extend through the whole staff, especially among the nurses who were too often dominated by the matron. He suggested that hospitals could best be run by a trinity of heads of departments with a representative "production committee" to coördinate them.—Voluntary hospitals, Prof. H. P. HIMS WORTH (University College Hospital) said, have shown that medical staffs will work well without supervision if free to develop their keenness and initiative; but there is always a different angle between the views of the superintendent, as supervisor, and the medical officers. He thought that Middlesex county attracted medical staff because their medical superintendents exercised so little control over them; a later speaker suggested it was because the pay was better.—Dr. A. G. MAITLAND-JONES (Region VII) did not think it mattered whether hospital administrators were medical or lay provided they were the most suitable persons for the job.—Mr. LEES READ (Guy's Hospital) pointed out that dual control by a doctor and a layman worked in practice at his hospital, and suggested that in a municipal hospital conflict was less likely to arise between the heads of departments than between the medical superintendent and the central authority.

Most of the speakers were medical men, so that it was hardly to be expected that a unanimous prognosis would be achieved; but it was significant that two main points were stressed: that whether medical or lay, man or woman, the hospital administrator should be a specialist in that profession; and that the remnants of any autocratic power he might still possess should be dispersed by the setting up of hospital staff committees.

### DOWN TO FIRST PRINCIPLES

THE British Medical Students Association at their first congress, held in December, made it clear that the principle of preventive medicine has taken deep root in the minds of coming doctors. Prof. J. A. RYLE who spoke on the social obligations of medicine was thus preaching to the converted, but he stirred them by offering some practical lines of approach. Their teachers, he reminded them, required them to know the look of the damaged valves in mitral stenosis, and to recognise a presystolic murmur; but how often did these same teachers point out that there were 200,000 cases of rheumatic heart disease in England and Wales, or that 10,000 people died of it yearly—a preventable disease? Town life and poverty are its godparents; and it is, he said, a problem to tackle not only in the ward but in the field. The same environment operates to spread and maintain tuberculosis. With universal pasteurisation of milk two or three thousand lives could be saved yearly and nearly all joint and gland tuberculosis in children could be abolished; and here we make a sorry contrast with America, Germany, Scandinavia and most of our own Dominions. He talked of peptic ulcers and of teaching which still hovers about the old controversy over surgical and medical methods in treatment, but never asks why people in modern civilised communities are so afflicted. Peptic ulcer has been a big problem in the Forces; and about half the ulcers found in Service men have been present since their civilian days. Those affected are in the 20-50 age-period—the working life, when responsibilities are heaviest. Surely, he said, this disease needs a social rather than an individual attack; and so do fatigue states and neurosis. Their treatment is not by bottles of medicine or even perhaps by psychotherapy; most of them are probably related in some way to industrial conditions and these must be the study of the doctor of the future.

Professor Ryle's audience had no doubt that he was right, and the questions catapulted at him were almost entirely concerned with how to carry out his suggestions. He might have replied with the White Queen "Ah, that is so hard that I fear I'm unable!" but instead he did what could be done just now to indicate ways of bridging the gulf between principle and practice. Students might coöperate in social surveys, and perhaps the medical officers of health would be glad to help them. They might make their own case-notes full reports on the home and industrial life of the patient. They might give up a day at their next congress to listening to experts on tuberculosis, housing and nutrition. To the

modest student who asked whether the medical curriculum might not contain a few lectures on social medicine he replied warmly that he would not be contented for a moment with "a few lectures": he wanted to see the social aspect of medicine an integral part of the curriculum from its earliest stage. Some students wished forthwith to join in the job of educating the public in the care of health by giving lectures in factories; but he reminded them that the most important job of the medical student was to get himself properly educated before he taught others. After all, it is in the hands of these newcomers to make the world in which they can put their principles into practice.

### PROPHYLAXIS OF ACUTE SPECIFIC FEVERS

In the spring quarter our children's wards and hospitals are robbed of their efficiency by the acute specific fevers. Dr. DONALD PATERSON, who as president took the chair at the section of disease in children of the Royal Society of Medicine on Jan. 22, counted whooping-cough as the meanest (in the American sense) of these invaders because it lasted so long. Dr. E. H. R. HARRIES (North Eastern Hospital) suggested that the older methods of prophylaxis must be used until modern methods had been fully tried and standardised. The first step in prevention, he considers, is to provide a satisfactory environment: housing, bedroom space, water-supply and sewage disposal must all be taken into account; abundant safe milk, and the education of parents and teachers, will help us to raise children who can resist infection, and make it possible to postpone the age of attack. In Glasgow, it has been shown that among children of preschool age living in a poor environment there is a greater incidence of measles, and of complications such as bronchopneumonia, than among children living in well-to-do homes. Diphtheria and scarlet fever have both been shown to have an earlier and greater incidence among children living in a crowded environment. The child's environment up to school age is that of its parents; the schoolboy may bring an infection home to younger children, or hand it round his dormitory at school. Early diagnosis may be impossible because the doctor is summoned late, or difficult because signs are equivocal. Dr. Harries would like the doctor to be able to notify suspicious cases to the medical officer of health, and have them transferred to hospital until the diagnosis becomes clear—an opinion in which he was warmly supported by Dr. Paterson. So far isolation has been recognised only as a curative measure but it is really a means of control. A bed in an isolation hospital used late is a bed wasted. These hospitals, he said, can no longer function efficiently without first-class laboratory assistance and this is increasing with the development of the emergency laboratory service. Probably periods in hospital can safely be shortened. He mentioned that when he first reduced the period of isolation for scarlet fever to 3 weeks he used to get abusive letters from parents for letting children out too soon; now, ten years later, he gets abused for keeping them in too long, so it is evidently possible to educate public opinion in these things. Unfortunately the public still cling to the belief that a patient is infectious as long as he is peeling. It is rare, however, to get a positive culture of hæmolytic streptococci from the throat when the child is due for release; but the longer a patient is kept in hospital the more likely he is to become responsible for secondary cases, because he often picks up a new type of secondary infection in the wards and carries it outside. Whooping-cough rarely gives a positive culture of the Bordet-Gengou bacillus four weeks after the onset of the whoop, thus bearing out the opinion of the older physicians, who knew nothing of the bacillus, about the period of infectivity. In diphtheria release cultures are the rule, and it is usual to insist on three negative cultures before the patient is discharged; but probably two negative cultures are sufficient. In enteric infections and bacillary dysentery three negative faecal cultures are necessary and in typhoid or paratyphoid negative cultures should also be obtained from the urine. Even three consecutive negative cultures are not a safeguard in the intestinal group. In Sonne dysentery sulphapyridine shortens the period during which rectal swabs are positive. Cases of supposed intermittency of dysentery infection may be spurious: a patient who is free from infection may get a

fresh infection if allowed to remain in hospital in the society of carriers. At the end of isolation of a fever case, ordinary spring cleaning of the room suffices; school closure and dispersal of contacts have gone by the board, and daily inspection is being substituted. There may be carriers among contacts, of course, or among the school staff. He classified members of the school community as: safe immune; unsafe susceptible; and dangerous (carriers). Schick and Dick negative contacts can be released at once, and carriers and susceptibles should be immunised. In diphtheria, passive and active immunisation can be combined. Passive immunity for scarlet fever rarely lasts longer than 15 days, and should be reserved for Dick-positive cases, who should also be isolated. Active immunisation for scarlet fever is still unsatisfactory, and he thinks the game is seldom worth the candle. Active immunisation against measles by means of intranasal virus is being tried in America; passive immunity can be achieved with convalescent serum and parents' whole blood. There is some risk of hepatitis and jaundice if blood other than a parent's is used. An objection is that the amount of blood injected has to be large—30 c.cm.—and produces a hæmatoma. Dr. Harries deprecates the routine use of sulphonamides in the acute specific fevers because of the risk of agranulocytosis. They are valuable in bronchopneumonia after measles because they lessen the urgent need for sero-prophylaxis. The available supply of serum might be kept for young children, he considers. The results of prophylactic serum in chickenpox and mumps have been disappointing. Convalescent serum is useful for infants exposed to whooping-cough.

Dr. A. W. DOWNIE showed that the incidence of pertussis and diphtheria is about the same though the death-rate from diphtheria is higher. Inoculation against whooping-cough with simple suspensions of dead *Hæmophilus pertussis* has been tried. In the United States it is usual to give 8000 million organisms by 3 or 4 injections at 3-7 day intervals. Lately Dr. Downie had been giving smaller doses in 2 injections at a month's interval, combined with diphtheria prophylactic. The response to the component parts of the combined antigen has been just as good as the response to either separately. He quoted Bell's figures to test the reliability of this vaccine: of 493 inoculated, 51 developed whooping-cough (an incidence of 10.3%); of 432 controls 150 (34.7%) developed it. In measles, chickenpox and mumps, Bell found that the incidence of infection among those inoculated was the same as among controls. Passive immunisation to whooping-cough can be achieved by giving adult or convalescent serum. Lately experiments have been made in America with hyperimmune serum, obtained by giving courses of pertussis inoculations over several years to people who have already had the disease. In one American experiment such hyperimmune serum was given to 44 subjects who had been exposed to infection; only 11 developed pertussis, and several of the cases were mild or very mild, and none worse than moderately severe. He thinks the use of vaccines might be considered for young children (aged a month or more) so as to reduce the incidence and severity of pertussis in the very young; contacts might receive convalescent serum in addition. Dr. R. E. SMITH, medical officer to Rugby School, pointed out that the average boy is almost certain to get measles and chickenpox and likely to get whooping-cough. There is now no quarantine for whooping-cough, mumps, scarlet fever, measles or chickenpox at Rugby. He showed that when the accepted quarantine period was enforced for 128 boys, in one epidemic, 2615 days were wasted, and only 2 got the infection. If those who had had a previous attack had been excluded 1336 days would have been lost. Resistance is probably improved when boys are in good health; and in his experience measles was not a catarrhal disease if the mucous membranes were healthy. In treating Sonne dysentery he sends boys back to school when they are clinically cured, after warning them carefully about washing their hands after using the water-closet. When he immunised the school against diphtheria, a preliminary Schick test showed 440 (82%) to be positive and 97 negative. On retesting 210 of these, 1½ to 4½ years later, he found only 15 (7%) still positive. Good nourishment, healthy mucous membranes, and the absence of rickets are far more effective in preventing infection, he believes, than

artificial methods. Dr. PATERSON doubted whether it would be wise to do away with quarantine for hospital wards, though he agreed that much of the mumbojumbo might be dispensed with in schools. He had advised a school matron who had to look after 500 girls to invite the pupils to put out their tongues at her as they filed out from dinner: those whose tongues were at all furred were to wait and have their temperatures taken. By this simple device she had been able to net nearly all the infectious cases early.

Dr. A. T. SIMEY remarked that Dr. Smith's Rugby boys were selected. The incidence of diphtheria is much higher in LCC schools, especially in the younger group; and among those under the age of 6 there are 10% of carriers of virulent diphtheria. Dick testing, he thought, does not repay the trouble it gives, because it only takes account of the erythrogenic factor. Children with throat infections of the right type of organism can act as carriers. We are only just beginning to get a pool of measles serum; he thought it would be especially useful for infants, with whom it is a difficult matter sometimes to get 30 c.cm. of whole blood into one, two, or even more buttocks. He had given up trying to immunise children on admission to hospital, he said, in favour of the plan of admitting them to small units or single-bedded rooms. Dr. DONALD COURT asked whether immunisation for whooping-cough should be repeated after a period. Some general practitioners, he said, were giving up Schick testing after the first immunisation for diphtheria and instead giving an extra shot of toxoid. Dr. PATERSON mentioned some attempts to inoculate against whooping-cough at Great Ormond Street, in 1922 and 1935. Different vaccines were used but the results were not impressive in either case. He advocated the establishment of an official committee to try out vaccines and order useless ones to be withdrawn from the market. Dr. W. H. BRADLEY described the difficulties which prevented the medical officer of health from learning early that a batch of vaccine was defective. Rumours would gradually leak back to him from general practitioners using it that the product was no good. In a similar way, the practitioners were not aware of the stocks of measles serum supplied by the government to laboratories all over the country. There is evidently good reason to find ways of reinforcing contacts between the MOH and the general practitioner. Dr. R. A. O'BRIEN said that the remedy for the useless commercial brands of vaccines on the market was a change in what the Americans call the English "lovely law of libel." Dr. ELAINE FIELD wanted to be able to send infectious children more readily from her wards into fever hospitals; at present she often has to send them home. Dr. HARRIES in replying mentioned that fever nurses, who were continually exposed to infection, should be immunised as far as possible.

## SCOTLAND

### FITNESS CENTRE FOR MINERS

Gleneagles Hotel was taken over by the Department of Health for Scotland soon after the beginning of the war and converted into an emergency hospital. During the last three years it has dealt with over 10,000 patients. Part of the building will continue to function as a hospital and the whole can rapidly revert to this function, but about two-thirds of the accommodation has now been set aside as a fitness centre for miners with the object of restoring sick and injured men to working standards as quickly as possible. About 200 men can be accommodated but the scheme is to be pursued slowly at first. In speaking of the new centre recently Dr. Andrew Davidson, chief medical officer to the Department of Health, said that the present coal situation lent urgency to the problem of refitting miners for work. Rehabilitation has hitherto been associated with accidents and injuries, but a comprehensive service should take account of other sick people and care for both medical and surgical cases. Gleneagles should prove a good choice for the centre because it offers opportunities for the recovery of health outdoors as well as indoors. Rehabilitation is a branch of social medicine; to be successful, he said, it must achieve three things: it must provide medical and surgical skill of the highest order, organised to ensure a patient's physical recovery; it must preserve and develop those qualities of initiative and will to recover

found in nearly all patients at the start of their illness but so often lost during treatment; and it must establish a close link with the social and industrial background to which each patient returns after treatment. Specialists in surgery and medicine are to be stationed at Gleneagles, and include the professor of surgery at St. Andrews University and the orthopaedic surgeon of the Department of Health, from the orthopaedic centre at Larbert. A team of experts in remedial exercises, massage and occupational therapy have been appointed. Occupational therapy will be supervised by a Canadian woman surgeon. Mr. William Struth, manager of the Rangers Football Club, is to give part-time help. Dr. Davidson feels that Gleneagles will provide the necessary mental tonic to patients; the swimming pool and gymnasium of the hotel will be used in treatment and more gymnasium accommodation is being provided, equipped on modern lines; there will be recreation rooms, a library and a canteen under the auspices of the YMCA. Entertainments, to be held twice weekly, are being planned with the help of the Miners Welfare Commission. Experts on mining will help to assess a man's fitness for a particular occupation or advise what type of work he should be recommended for, and will try to keep in touch with the men when they go back to work. Treatment will be free and the Miners Welfare Commission has agreed to refund rail fares to the centre and to provide the cost of occasional weekends at home. This scheme is a part—an important one—of the wide plan for the maintenance or restoration of health of war-workers. Many EMS hospitals in Scotland have set aside a proportion of their bed accommodation for the investigation and treatment of war-workers whose health has worsened.

## Infectious Disease in England and Wales

WEEK ENDED JAN. 16

*Notifications.*—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1957; whooping-cough, 1504; diphtheria, 764; paratyphoid, 5; typhoid, 4; measles (excluding rubella), 12,323; pneumonia (primary or influenzal), 1194; puerperal pyrexia, 159; cerebrospinal fever, 96; poliomyelitis, 8; polio-encephalitis, 0; encephalitis lethargica, 2; dysentery, 96; ophthalmia neonatorum, 87. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Jan. 6 was 2116, including scarlet fever, 643; diphtheria, 279; measles, 464; whooping-cough, 200; enteritis, 94; chicken-pox, 90; erysipelas, 31; mumps, 44; poliomyelitis, 3; dysentery, 30; cerebrospinal fever, 12; puerperal sepsis, 15; enteric fevers, 10; german measles, 9.

*Deaths.*—In 126 great towns there were no deaths from scarlet fever, 1 (0) from an enteric fever, 16 (0) from measles, 10 (0) from whooping-cough, 27 (0) from diphtheria, 41 (3) from diarrhoea and enteritis under two years, and 89 (4) from influenza. The figures in parentheses are those for London itself.

Crosby reported the fatal case of enteric fever. Sunderland had 10 deaths from influenza, Birmingham 9, Wolverhampton 6, no other great town more than 5.

The number of stillbirths notified during the week was 238 (corresponding to a rate of 35 per thousand total births), including 28 in London.

*FIRST-AID IN INDIA.*—A little pamphlet prepared under the direction of the Director of Medical Services in India (*First Aid on Active Service*. Simla. Pp. 23) aims at teaching first-aid simply to soldiers, and it should succeed. Whoever wrote it has a fresh outlook; he discards without compunction traditional methods in first-aid teaching where they seem to be unsuitable for the conditions of modern war. The distinction between arterial and venous bleeding is replaced by a distinction between capillary bleeding and bleeding from large vessels. Pressure points are not taught. The case of fractures is simplified and the treatment of shock is well done. There are two small errors—one in the amount of salt required to make saline, and the other in the position of the hands in Schafer's artificial respiration. In other respects this is one of the most useful pamphlets of its kind now available.

## In England Now

### *A Running Commentary by Peripatetic Correspondents*

THEY also plan who only stand and wait, so, having a few moments to spare, I think I'll try my hand at the popular pastime and like the curate's first sermon put the world aright. The only thing that can make this war worth while will be the emergence of a world state; defence, economics and colonies to be the exclusive field of the central government, while the federal governments get on with their social security, nutrition and education schemes, and other parochialisms. I wonder if man is ready for that yet, ready to scrap traditions and hereditary loyalties and antagonisms for security; or will it take a few more bloody affrays to convince him that this must be the ultimate and logical form of human archy? The bulk of the opposition would be self-interested, but, of course, nobly rationalised like that of the approved societies to the Beveridge report. History shows that even conquered nations contribute something to the resultant peace, probably because no side is ever wholly in the right or wrong, and I think a spot of Fascicity and Nazi-ism will be necessary in our new world. It is already being adumbrated by forecasts of continued rationing, uniform education for all, nationalisation of the land, and so on. If there is unemployment it would be logical to ration work too ("The Minister of Swat announces that work for the next week will be limited to 28 coupons of one hour each"). A certain amount of discipline is necessary in modern society, especially for the rich and the uneducated. After all there is nothing new in this for us; it would be hard to conceive a more Nazi-fied system than our press, the bulk of which is controlled by two or three men. A necessary preliminary to any improvement is the better education of our legislators. I suggest a course of ten years, for they seem to think they are twice as knowledgeable as doctors. The first year's subjects should be elementary science, geography, physiology, natural history, and economics. The second year should be spent in cooking, house-keeping, including bed-making, shopping, mending and washing-up, and work in a mine, factory, bus, trains, store and sewer. Then they should spend a year each on the land, in industry, and at sea; exams yearly. During the second five years they must earn their living unaided. They can then sit for their LCC (Licentiate of College of Candidates) without which they can't stand for Parliament. Of course the hereditary principle in the House of Lords, the jest of the geneticists, for which not a single soldier in the British Army would raise a finger, is a silly medieval monstrosity, and should have gone years ago. On my next leave I should like to deal with the reformation of the Law and the Church, the setting up of Litigation and Soul Centres, and (Yes, I dare say you would!—Ed.)

As you say in your annotation of Jan. 23, every dentist who has been long in practice has his stories about transplanted teeth. When I was a young man of 25 playing Rugby football a friend received a kick in the mouth which practically knocked out his upper four front teeth. He was carried to the side where I pushed the teeth, which were hanging quite loose, back into the sockets and applied a fourtail bandage. After the match I visited him at his home, took a model of his mouth with the front teeth in situ, and sat up all night making a splint, which I fixed on Sunday morning. These teeth remained in his head for 29 years—in fact, they were almost the last teeth to be extracted. In the course of time one was crowned, and two root-filled, the other remained whole and healthy and apparently the operation was a great success. But that is not the whole picture; I think these teeth became a focus of infection. He lost many of the other teeth from pyorrhœa, and moreover although a wealthy man he never married. Who knows? If I had extracted these loose teeth, he might not have lost the others from pyorrhœa, and might have married happily and had a family. My old tutor told me of a man who had been married and remained childless for years. He hadn't many teeth and what he had were mostly carious. His dentist cleared them all out and made him a full set of dentures. Seven

years later he brought the teeth back and said that, though he had no other complaint to make, since having them his family had grown one a year and seven was all he could afford. Removal of septic teeth in a woman is often, I am sure, a cure for childlessness—the friendly societies are well aware that maternity benefit often follows dental benefit. And I think there is more in it than improved appearance and removal of smell in the breath. As Leonard Mackay of Birmingham once asked in a paper on focal infection: "What doth it profit a man if he gain a crown—or a whole mouthful of crowns—and lose his own gall-bladder?"

When I was a final year student I made friends with a lift girl in a large dress store. I had an ulterior motive, for she operated the fastest lift in town. I had become fascinated with the mechanics of that abdominal sensation experienced under the action of vertically downward acceleration—that sinking feeling. The dynamics seem simple, for if a weight  $X$  rests on a platform which is falling the pressure of  $X$  on the platform varies inversely with the acceleration. I argued that the abdominal viscera are supported in part by the pelvic basin and the abdominal wall, and in part by the mesentery. During downward acceleration the pressure on the pelvis must diminish, but since the mass does not alter there must be a corresponding pull on the mesentery. Neither anatomical nor physiological textbooks provided any ready evidence for such sensory mechanism in the human mesentery, though it is well known that the cat's mesentery is generously studded with paccinian corpuscles. But there is nothing like experiment, and the obvious test was to stand on one's head in a descending lift. This would eliminate the mesenteric pull and so there should be no sinking feeling. Hence the cultivation of the lift girl, and believe me, I had to prepare the ground very carefully before making any suggestions as I did not want to be thought quite daft. Eventually she consented, and after many foiled attempts to have the lift to ourselves we reached the top floor. I stood on my hands and she started the lift. Unfortunately there was a lot of glass about the structure which was enclosed in an open grill, and the experiment came under the direct observations of the head floor walker, who forgot the decorum of his caste and let out a peculiar sound which I could only diagnose as a howl compounded of surprise, anger and dismay. My co-experimenter pressed the safety button bringing the lift and the experiment to a sudden stop—just as I thought that I was almost convinced. The subsequent explanations to the floor walker were difficult, and it was only by the exercise of all my forensic talent that I saved the lassie from serious trouble.

Somehow the ignominious conclusion of this experiment prevented my repeating it, but there was another line of attack. Necessity dictated a hernioplasty which the surgeon consented to do under a local. During the operation I had him pull (very gently please!) on the mesentery. I certainly felt a sinking feeling, but the sensation was confused with some degree of pain, and the effect of a quarter of morphia. It was personally convincing yet inconclusive. (By the way I can think of more pleasant ways of spending half an hour or so than having a hernioplasty under a local.)

It may be wondered why an incomplete experiment and a speculation of this kind should be included in this column. It is, however, a topical appeal in its application to aviation physiology. Under modern flying conditions the importance of  $g$  (gravitational field, if you happen to have forgotten your dynamics) is of first importance, and a good part of the odd and often damaging sensations experienced by pilots of fast machines is due to it. It may well be that my speculation is a familiar matter to the flying physiologists. Still, I would like to think it is new to some of them, and I contemplate with pleasure the mental picture of some senior MO's in Air Ministry travelling up and down the lifts of that building standing on their hands.

After hearing a boy violinist brilliantly soaring through a concerto while grey-bearded conductor and orchestra hang on his notes, or after reading J. D. Beresford's *The Hampdenshire Wonder*, I find myself ruminating on the

wisdom of the General Medical Council. Supposing there were no restrictions on the age at which medical education could be started or qualifications completed, then we would have the horror of the medical prodigy. We would first learn of him from the enormous bill-boards outside the hospital, advertising his coming performance (proceeds in aid of the new X-ray block), and from the fantastic accounts of his prowess which his publicity agent had got into the press.

Yahoodi Aesculapioff taking London by storm. Fresh from New York triumph. Twenty cases of uncertain diagnosis solved in ten minutes by 8-year-old wonder-child. Aesculapioff asked for patella hammer at age of 2. At 3 passed 2nd MB with gold medal and diagnosed his mother as pernicious anæmia. Aged 8, had acquired all possible medical degrees, and amazed the Royal College of Physicians by describing a disease unknown to Professor Parkes-Weber.

Then there would be the humiliation of attending his demonstrations. Like other prodigies, he would be completely childish outside his subject, and would have to be accompanied by his father. "Now, sonny, let me hold your Teddy-bear while you look at this man: these doctors want you to tell them what is wrong with him. Sister, can you bring a chair for him to stand on, and we'll give him a nice new puff-puff if he's good, won't we?" "Oh, Daddy, his blood-pressure's dreadfully low and I fink vere's a weeny bit of pigmentation in the mouf vey haven't seen. What is ve blood sodium and potassium?" "Say 'please,' sonny . . . that's right." "Daddy" (bursting into tears), "Vey haven't done ve 17-keto-steroids in his wee-wee: booh hoo, I want to go home." Wouldn't it be abominable? Let those who wish to lower the age of qualification be careful.

\* \* \*

## TO MY DAUGHTER'S APPENDIX

Vestigial relic of a bygone age  
Ere apes had tried, and failed, to walk erect like me,  
When cellulose was all the dietetic rage,  
And steak and chips had not appeared for tea.  
In those far distant days, what was your measure?  
How did your lining membrane then appear?  
What enzymes met, in simple pleasure,  
The grassy food that entered in your sphere?  
That was the heyday of your powers;  
Those were the times your arrows of desire  
Traversed at will the grasses, shrubs and flowers  
By peristalsis sent from regions higher.  
But now, from icy North to sunny South Sea strand,  
Dwindled and shrunk to but a thready tube,  
Serving alone to mark the cæcal band,  
You vainly writhe, poor undigesting boob!  
The sport of surgeons, target of their knife,  
Inflamed, obstructed, sometimes black  
From unsuspected gangrene; so your life  
And ours may twine to ruin and to wrack.  
Cannot you get you gone in embryo?  
Be like the notochord—no ill to adult man.  
Vestigialise yourself away for good, and so  
Fulfil in part the great developmental plan.

\* \* \*

I am always interested to know why people take on the jobs they do. No doubt economic necessity furnishes the usual answer. But what prompts a man to become a dental spittoon-maker, for instance? I asked an old friend and fellow GP what decided him to take up medicine. He smiled ruefully before replying. "Well, it's rather funny, and in a way rather pathetic," he said. "As you know I was always pretty idle as a boy—I didn't like work much. So I thought I'd choose a job where I could take a holiday whenever I felt like it. And I picked on this!"

\* \* \*

How could the *Lancet* allow St. Denis<sup>1</sup> to claim credit for Mme du Deffand's remark. It was to the ecclesiastic who claimed credit for St. Denis in transporting his head in his hands such a long way that the lady said "dans des telles affaires ce n'est que le premier pas qui coûte." I think apology should be made to the lady: I'm sure St. Denis would wish it.

1. *Lancet*, Jan. 16, p. 81.

## Parliament

## ON THE FLOOR OF THE HOUSE

MEDICUS MP

A NEW Royal Warrant for retired pay and pensions of persons in the military forces and the Tomlinson report on the rehabilitation and resettlement of disabled persons have been published during the last few days. Add these to the Beveridge report and we get an indication of the increasing attention likely to be paid to the medical side of social security in the future.

The House of Commons this last week have been occupied with a general statement on the war delivered by Mr. Attlee as Deputy Prime Minister and by two days obscured in the mystery of a secret debate on man power and woman power. The Workmen's Compensation Bill, which was held up because of differences in the trade-union movement, is to be passed very shortly and the Government are asking for the passage in three days of the Minister of Town and Country Planning Bill, which may greatly affect the whole policy of post-war reconstruction.

We are speeding up on the home front and although the House of Commons found no time for it the House of Lords last week discussed war pensions and rehabilitation. Lord Nathan said 1943 might well be a year of heavy casualties and we should provide for even more than in the last war. There are still about 400,000 war-pensioners from the last war but no close estimate can be made of what there will be when the shooting war ceases this time. What was not mentioned in the debate was the great improvement in methods of medical and surgical treatment on the field and at base hospitals, in this war as compared with the last. A large proportion of all casualties are not only being kept alive but restored to normal function. And this is often true of severe injuries. The House of Lords referred to rehabilitation beginning when hospital treatment was finished and chronologically that is true. But the principles of rehabilitation have invaded the hospital and the prevention of the deterioration of disabilities has, under Army auspices, received attention in three centres at Kingston, Skegness and Dunblane. These war experiments are noted in the Tomlinson report and with the Clyde basin scheme merit study and imitation.

The medical problems to be faced at the time of the armistice will come up for debate before long. We have had a foretaste of them in North Africa, where lack of food and clothing among the civilian population compels attention even in the rising tide of battle. But reliable reports from France, Greece and other parts of the continent make it clear that the problem of starvation and disease in Europe will be more widespread than in 1918. That is not to say that disease will necessarily be greater or get out of control, although that may happen. Typhus, though it has spread far westwards in Germany, has abated in Spain and other areas and is more susceptible now to both prevention and treatment. But with partial famine conditions so widespread the shape of epidemic things to come can hardly be predicted with accuracy, which is an additional and urgent reason for finishing off the war in 1943.

## QUESTION TIME

## Ingredients of the National Loaf

Mr. W. MABANE, replying to a question, stated that apart from yeast, salt, and the various improvers which are the recognised adjuncts of bread-baking, the permitted ingredients of national flour for making the present national loaf are wheat flour of 85% extraction, imported white flour, oats products, barley, rye, milk powder, and calcium, in the proportions authorised. In addition the baker may use a proportion of white flour as permitted in article 20 of the Flour Order, 1943, and potatoes and potato flour as permitted in the Bread (Control and Maximum Prices) Order, 1943. The composition of national flour and consequently of national bread is not, and will not be, standardised over the whole country, but the best possible use is being and will continue to be made of home-grown cereals having regard to the point of supply and the need for the maximum economy of transport. The proportion of diluents, although it may vary slightly in different areas, does not at present in general exceed 5%.

The decision to fortify national flour with dried milk, he added, was taken with the approval of the Minister of Health. The preliminary experimental work was carried out under the direction of the scientific and technical officers of the ministry with the advice and assistance of officers with experience of both the flour milling and baking industries.

#### No Immediate Bread Rationing

Mr. MABANE informed Mr. R. W. SORENSSEN that while the minister is anxious that home-produced foods (especially potatoes) should, whenever practicable, be consumed in the place of imported foods (especially wheat), there is no present intention of rationing bread.

#### Ingredients of Food Substitutes

Sir ALFRED KNOX asked the Minister of Health if he would issue an order under the Food and Drugs Act, 1938, requiring the ingredients of food substitutes to be stated on the outside of the container in which they were offered for sale.—Mr. E. BROWN replied: I am in consultation with the Minister of Food upon the subject of measures to deal with the labelling and description of food, but I am not yet in a position to make any further statement.

#### Mines Medical Service

Mr. JAMES GRIFFITHS asked the Minister of Fuel and Power what progress had been made with the establishment of a medical service in the regions.—Major LLOYD GEORGE replied: A selected number of candidates from the long list of applicants for regional posts in the mines medical service are being interviewed this week and appointments will be made as soon as possible. Meanwhile, the Miners Welfare Commission, in consultation with the Ministry of Health and the district welfare committees, has been engaged in the search for suitable buildings for miners' rehabilitation centres. A centre in Scotland to accommodate 200 miners was opened on Jan. 11, and the rehabilitation centre at Berry Hill has been taken over by the Miners Welfare Commission from the Mutual Indemnity Company. Negotiations are in progress for the acquisition of buildings elsewhere and good progress is being made generally in the other work involved in setting up centres to cover all the chief coalfields.

Mr. RHYNS DAVIES: Is the Minister aware that he can be congratulated upon finding so many doctors for this purpose when the Minister of Pensions declares that he is unable to find doctors for his pensions tribunals?—Dr. HADEN GUEST: How many doctors are being appointed?—Major LLOYD GEORGE: I think eight will be appointed in the regions and one at headquarters—nine altogether.

#### Doctors for Pensions Appeal Tribunals

Sir LEONARD LYLE asked the Minister of Pensions the number of doctors required to enable the suggested appeal tribunals to operate; and what was the latest date on which the British Medical Association was asked for advice.—Sir W. WOMERSLEY replied: Including the additional appointments which would have to be made to my own staff, it is estimated that between 35 and 55 whole-time doctors would be required for the purpose in question. The British Medical Association was last consulted on Nov. 27, 1942.

#### Medical Referees

Miss I. WARD asked the Minister of Labour whether he would consider appointing independent medical referees to whom application could be made for a decision where there was a difference of opinion between a panel doctor and a works doctor on the physical ability of a worker to continue in employment.—Mr. E. BEVIN replied: After consultation with the British Medical Association and local medical war committees, I have appointed independent medical referees who, among other things, examine workers who seek permission on medical grounds to leave employment which is scheduled under an Essential Work Order but cannot produce satisfactory medical evidence. I am arranging also for these medical referees to examine workers in certain circumstances where the employers wish to discharge them on medical grounds.

#### Protection of Panel Practices

Sir ERNEST GRAHAM-LITTLE asked the Minister of Health if he would investigate the case in which the County of London Insurance Committee had informed insured persons that, in the absence of their own doctor and of any specified locum tenens, they could not obtain treatment from a NHI practitioner who was not a member of the protection of practices scheme

conducted by the British Medical Association; and was he aware that some insured persons had had to wait some months before getting treatment from the practitioner of their choice and had in the meantime had to pay private fees for medical attention near their homes.—Mr. E. BROWN replied: I am informed that insured persons on the lists of absentee practitioners who are participants in the London Protection of Practices Scheme are not directed to go to any particular doctor, but are informed that they can apply to other participating doctors the nearer of whom are named. Doctors who participate in the scheme and are on service have agreed to accept other participating doctors as their deputies during absence, and the regulations provide that an insured person on the list of a practitioner who has appointed a deputy can transfer to another practitioner only at the end of a quarter and after a prescribed length of notice, except where the former practitioner agrees to an earlier transfer.

#### Assessments for Deafness

Mr. T. J. BROOKS asked the Minister of Pensions whether he proposed to take any action to remove the disparity between the assessments for deafness in great war and new war cases.—Sir W. WOMERSLEY replied: I have decided that application may be made for a great war assessment for deafness to be revised on the basis of the new war assessment. Each applicant will be medically examined and, if his present degree of disablement arising from his great war service would warrant an increased assessment under the provisions for the present war, an increased award will be made on the basis of that assessment with effect from the date of application.

#### Artificial Limbs for Housewives

Miss WARD asked the Minister of Health if he would state the qualifying conditions under which a housewife might share in the arrangements which extended the facilities of Ministry of Pensions hospitals and limb fitting services to certain classes of civilians who suffered amputations.—Mr. E. BROWN replied: A housewife is subject to the same conditions as other persons under the recently extended war-time scheme for the provision of artificial limbs on a contributory basis to those who suffer amputation from any cause. The principal condition is that the woman must be certified to be capable, if supplied with an artificial limb, of carrying on her duties as a housewife.

#### Hospital Treatment of Cancer Cases

Mr. T. E. HARVÉY asked the Minister of Health whether, in view of the fact that free maintenance in hospital has been extended to tuberculous patients and of the importance of encouraging sufferers from cancer to seek early treatment, a similar provision could be made in their case.—Mr. BROWN replied: The distinction in regard to payment for hospital treatment between infectious diseases (of which tuberculosis is one) and non-infectious diseases (of which cancer is one) is a matter of statutory requirement. In deciding whether any charge should be made in an individual case of the latter type local authorities are authorised to have regard to the financial circumstances of the individual and I have no reason to suppose that individuals are deterred from undertaking treatment by any difficulties on this account.

#### Vaccination Deaths

Six deaths were registered in England and Wales during 1941 in respect of which the causes were certified as vaccination, vaccinia or other sequelæ of vaccination. The sexes and ages of the deceased were three males aged 5 months, 19 years and 30 years, and three females aged 9 weeks, 5 months and 2 years. In addition, inquiries resulted in one other death certified as due to meningo-encephalitis being classed to vaccinia. The deceased was a male aged 29 years. (Mr. BROWN replying to Mr. A. EDWARDS.)

#### Doctors for African Colonies

Mr. HARVEY asked the Secretary of State for the Colonies whether, in view of the urgent need for an increase in the medical services in the African colonies, he would consider creating scholarships to enable students from these colonies to acquire professional training in medicine in this country; and whether the Colonial Welfare and Development Fund was available for this purpose.—Mr. OLIVER STANLEY replied: I agree that some action of this kind will be necessary in order to strengthen the medical services in the African Colonies. I should certainly be prepared to consider making a scheme under the Colonial Development and Welfare Act to finance any practicable measures which may be devised.

Mr. HARVEY: Is the Minister aware that the United Africa Company has already provided two scholarships of £300 a year for four years in Nigeria and the Gold Coast, and could not that example be followed by the Government?—Mr. STANLEY: That is so, but I think the matter requires great consideration.—Mr. SORENSEN: Could the Minister not see also that any Africans trained in medicine in this country have the same status when practising in their own country as any appointments which are British? Mr. STANLEY: That is another question.

#### Colonial Medical Service

Wing-Commander N. J. HULBERT asked the Minister what steps were being taken for ensuring that an adequate number of doctors were recruited for the Colonial Medical Service during the war.—Mr. STANLEY replied: Under arrangements made with the Central Medical War Committee a sufficient number of suitable candidates has hitherto been forthcoming

to fill declared vacancies for medical officers in the service. A scheme for the building-up of a reserve of medical officers is under consideration.

#### Medical Service in Jamaica

Mr. DAVID ADAMS asked the Minister whether he is aware of the discontent and numerous resignations of doctors from the public hospitals and services of Jamaica, petitions of nurses against mismanagement resulting in overwork and under-payment and the alleged neglect of patients and inability of hospitals to give proper attention to serious cases; and will he accede to the public demand for an impartial and comprehensive inquiry with a view to remedying the grievances and inefficiency in these services?—Mr. STANLEY: I am aware that some dissatisfaction exists in the Jamaica government medical service. I understand that the pay conditions in that service have been investigated by the local public service committee, and I am awaiting its report with the governor's recommendations.

### Letters to the Editor

#### REHABILITATION

SIR,—The Tomlinson report rightly emphasises that rehabilitation in its widest sense is a continuous process, partly in medical and partly in social and industrial spheres. But as a matter of administrative convenience its authors suggest a distinction between "medical" and "post-hospital" rehabilitation which is a little disquieting. It is undoubtedly true that hospital treatment has too often been aimed at the disease rather than the patient, with the result that many have been discharged from hospital in no fit state to return to work. So long as this continues to be so, the problem at the post-hospital stage must be correspondingly serious and extensive, and it is very necessary that it should have more attention than hitherto.

But the report seems to me to contain signs of an excessive swing of the pendulum away from the medical side of rehabilitation. While it recognises the necessity for co-operation between health and industrial services throughout the whole process, it contemplates that in the post-hospital phase medical advice should be provided on call, rather than in a supervisory capacity. True, it recognises that heart cases may demand special care in the selection of employment—sometimes under sheltered conditions—and that medical supervision may be needed for them; but it does not think that full-time medical supervision will be necessary at Fitness Centres, though it believes that these centres should be linked with a hospital for the benefit of individuals requiring special examination or treatment, and that medical advice should be made available "as required." There is obvious danger in having a potentially over-zealous lay supervisor to decide whether or not medical advice will be useful in any particular case. To be successful, the whole process of rehabilitation should be based upon skilled and continuing medical evaluation of the needs of the patients, and any failure to recognise this fact is liable to cause trouble later—especially perhaps in medical as distinct from surgical cases. The term "post-medical rehabilitation," used in the Beveridge report, strikes me as particularly unfortunate.

As for the special qualifications required by doctors undertaking such work, it is perhaps worth considering whether the subject should not be regarded as part of the wider problem of industrial health. Instead of holding a diploma in rehabilitation it might be better for them to acquire a diploma in industrial health; for to be really useful a specialist in this field of medicine must be familiar with many interrelations of health and work.

Finally, may I refer to one other topic not mentioned in your leading article? In general the difficulties of disabled men increase with age, and it is all the more important on that account to ascertain disability, and institute constructive action, at the earliest possible moment. Surely any outline of post-war policy for the care of the disabled should have had much to say on provision for early ascertainment, for it has been the experience of Scandinavian countries that the secret of successful rehabilitation of the disabled in civil life lies in this early approach. Denmark had for some years

before the war a successful system of notification of "invalidity," and potential invalidity, and a Government department charged with the welfare of the disabled. It is unjustifiable to leave a physically handicapped child to gravitate at school-leaving age from the care of an education authority to public assistance.

The proposals of the Tomlinson Committee mark a notable advance. Their call for the immediate creation of a co-ordinating committee to formulate machinery is timely. Breadth of vision and approach must be preserved; to allow sound proposals "to be whittled down by the mere fear of action on a scale commensurate with the need is to miss a great opportunity." While it is doubtless correct, as the committee say, that their proposals are capable of standing alone without reference to the other provisions of the Beveridge report, there is much to be said for regarding rehabilitation not as a self-contained entity but as an essential part of the wider pattern of social welfare. Rehabilitation is indeed an essential complement to health services, and one from which medicine cannot be divorced.

NEMO.

#### "PEDIATRIC GYNECOLOGY"

SIR,—In your kindly treatment of my text (*Lancet*, Aug. 15, 1942, p. 188) one slight misunderstanding seems to have arisen. It seems, the review suggests, that American workers have been disappointed with sulphonamides given by mouth. But I would point to the statement on page 143 as follows: "Oral medication with sulfathiazole or sulfapyridine is now confidently advanced as the best treatment of vaginal infection in infants and children"; and again on page 145, "Granted equal results on a firmly established basis, the swing to chemotherapy should be immediate and complete." I am writing to fortify the impression which I meant to give to the effect that, other things being equal, the present treatment of election is by sulfathiazole by mouth.

Portland, Ore.

GOODRICH C. SCHAUFFLER.

#### INGUINAL HERNIA

SIR,—The present treatment of inguinal hernia, as shown by recent articles and correspondence, is far from satisfactory. This would seem to be due quite often to many surgeons not being interested or patient enough to make the "longer effort" and pay the "greater attention to detail" mentioned by Mr. Harold Dodd. It is still put on the end of the list as one for the HS! While not sufficiently spectacular and exciting to attract the interest of students, it causes discomfort and invalidism for the victims. In most cases a satisfactory operation and rapid return to work are vitally important, and each recurrence makes these more difficult to achieve. I would go further than Brigadier Edwards and say that any distorting operation in any subject at any age increases the risk of recurrence. Rearrangement or distortion of the musculature under tension will, by preventing normal action, weaken rather than strengthen the region.

Dealing carefully with the sac and adding some extra support is the only satisfactory method. Repair of the transversalis fascia may be worth while, but it is a flimsy layer at best, and unlikely if unsupported to stand up to even a good cough. As the musculature has failed to prevent a hernia developing in the preformed sac, I feel



that it is inadequate to prevent a recurrence, even after removal of the sac. Some support must be added, but fascial strips or flaps are bad as they rarely remain alive, are often inadequate, usually cause a bulky lumpy wound, and always leave a weakness elsewhere for fresh herniation—robbing Peter to pay Paul! Twisted silk is not always tolerated, but floss silk is most satisfactory provided it is properly prepared and sepsis avoided. Important points to be observed are:

1. Careful skin preparation the day before and again immediately before operation, on a par with an orthopædic "prep."
2. Careful application of tetra-towels so that the surface to be uppermost during operation does not touch the skin during application.
3. Gentle handling of tissues with scrupulous hæmorrhage.
4. Swabbing the wound and skin with proflavine before closing, in order to remove organisms brought to the surface by sweating during the operation.
5. When much silk is used for large recurrent hernias, sulphaniilamide powder is left in the wound.
6. Firm pressure over the dressing with a spica bandage, and firm support for the scrotum for at least a fortnight to prevent effusion of blood or œdema.

Since adopting these precautions in a large series of cases I have had no "silk intolerance" and no recurrence. Even if the former occur it is merely an inconvenience; recurrence of the hernia might well be a tragedy.

The Ogilvie type of silk repair operation must be performed with minute attention to detail, which makes it a somewhat long and tedious job for the impatient surgeon. Speed impresses students, but it should be tempered with care and gentle handling, for with the wide choice of modern anaesthesia there is no place for slick, slapdash surgery. Let us aim at the thorough execution of quick methods, remembering that we are handling living tissue.

Mr. Dodd condemns fixation of the neck of the sac as trying to improve on nature's arrangement, yet indulges in far more drastic rearrangement which alters the design of the whole region. While a "snug apposition" may be obtained in atonic anaesthetised muscles, how they will strain to regain nature's arrangement later on! To restore as closely as possible to normal is the way to get the best results.

Graduated exercises in bed after operation are important for rapid convalescence; I begin in the first week and get patients back to full work in seven to eight weeks at most from operation. As there is no distortion and no suturing under tension, there is no risk of recurrence from resumption of too early function. Gradually increasing muscular activity of the whole body, short of producing pain, can do nothing but good. By this means we can prevent the pot-belly with its attendant ills and avoid the abdominal belt. This should be reserved for inoperable hernias or incurably weak muscles, not used for neglected or lazy muscles which will never improve if a belt does their job for them. Abdominal rehabilitation stimulates the morale which is so essential for a cure. High morale is incompatible with a pot-belly!

Mount Vernon Hospital, Northwood. ALAN SHORTER.

## PROFLAVINE OLEATE DRESSINGS FOR BURNS

SIR,—From the experiences of Muir and Porritt with burns in mobile warfare reported in Muir's article and your leader of Jan. 2, we note: (a) that nine out of ten burns arrived late and septic (Porritt); (b) that "the use of tannic-acid jelly as a first-aid dressing is now generally deprecated," for "tanning methods . . . are as a rule unsuitable in the forward area unless optimum facilities are present and adequate time for careful cleansing"; and (c) that "treatment by moist dressings is difficult where long lines of evacuation are present and some form of sulphonamide vaseline dressing has much to commend it" (Muir); but there is the danger of severe reaction following sulphaniilamide absorption, especially after burns (Porritt).

Our short experience of the use of new emollient proflavine dressings suggests that they are applicable as first-aid measures for the second-degree burns of mobile warfare as they conform to the requirements mentioned by Muir and Porritt. The severe reaction attending the use of sulphonamide vaseline dressings over very large areas is avoided, while adequate oral and limited local

treatment with sulphonamides is not precluded. If the dressings do not become soaked in pus they can be left until they drop off, but if infection occurs they are easily removed and renewed. They are excellent as a preparation for skin-grafting, and for the earlier and more extensive dressing a proflavine-vaseline gauze roll can be speedily applied. Since proflavine seems to have no inhibitory action on fibroblastic activity and epithelialisation in the healing process (*Lancet*, 1942, ii, 527) when so used, these are excellent depôt-dressings of that anti-septic. The dressings have yielded results equal to those obtained with proflavine in the buffered isotonic water-phase of the oil-in-water emulsions used for infected burns during the past 2½ years (see our paper, *Ibid*, 1942, i, 347). A report on these new emollient proflavine applications with case-records of the last year is in preparation. We have used a non-irritant synthetic detergent for cleansing, but adequate cleansing of burns sustained in forward areas is not always possible.

*Cleansing.*—For cleansing the burned area and marginal skin we use a warm 10% watery solution of 'Sulphonated Lorol Liquid TA' (Roßsheim and Moore), preceded and followed by warm normal saline. The shock-increasing effects of spirit and ether soaps are thus avoided and the cleansing or detergent effect of these and of ordinary yellow soap and water are far surpassed by this synthetic detergent (SLLTA). The commercial product is a 50% solution in water of triethanolamine lauryl sulphate mixed with smaller percentages of homologous alkyl sulphates and sodium sulphate formed in situ. SLLTA is miscible in all proportions with water and serum and has usually a pH of about 6-6.5. It removes the transient bacteria and reduces the resident ones; in infected burns, it allows pus, small sloughs and crusts to be easily removed. We have not found it to possess (in vitro) the exceedingly powerful and rapid antiseptic qualities of the cationic detergents 'CTAB' or 'Zephiran'; but the antiseptic qualities of these detergents are at a discount in the presence of the serous exudate of burned areas initially and of granulating areas later, for they are sensitive to protein (Albert, *Ibid*, 1942, ii, 632) and do not sterilise infected granulations (Barnes, *Ibid*, 1942, ii, 531). As a cleansing agent SLLTA is probably better than CTAB or zephiran because it is more surface-active.

*Marginal skin* is always treated with triple dye, for the undamaged skin margins form a common source of auto-infection in war burns (*Ibid*, 1942, ii, 664). Crystal violet and brilliant green are more rapidly bacteriostatic and bactericidal than proflavine. The resident bacteria, first reduced by cleansing, are much further reduced by the triple dye treatment, while the remainder are effectively dealt with by the relatively slower acting proflavine of the depôt-dressing.

### Proflavine oleate preparations.

1. Proflavine oleate 1% in liquid paraffin 40  
Cod-liver oil . . . . . 30  
Yellow soft paraffin . . . . . 30 parts.  
(In hot climates, hard paraffin, q.s.)
2. Proflavine oleate 1% in liquid paraffin 60  
Yellow soft paraffin . . . . . 40 parts.

These bases are easily prepared and conveniently used as in tullegras, with curtain net of 2-3 mm. mesh, cut up into pieces 4 in. square and 4 × 8 in., contained in tape-sealed tins and sterilised. They are equally suited for similar incorporation in a wide gauze roll. Application is simple and further dressing may either be free or in plaster in the case of limb burns. The dressings are left undisturbed as long as possible, until healing is complete or until infection is manifest, when 10% sulphonated lorol liquid TA is very helpful in cleansing before fresh application.

Most of our cases have been infected burns a few days old, and the technique described, using the second preparation of proflavine oleate, very occasionally combined with simultaneous local and/or oral administration of sulphathiazole, has proved effective. Results in the smaller number of cases treated with the proflavine oleate cod-liver oil preparation as a first-aid and final dressing have been better than expected and this leads us to suggest it for use in the field as a first-aid dressing, after the maximum possible preliminary cleansing. If this cleansing is minimal or absent, then resulting infection would be expected to be reduced in degree and incidence when compared with the results reported with

tanning methods in desert war burns (90% infected), for the proflavine will continue to diffuse from the depôt-dressing and yield a concentration of about 0.2-0.25% during the 2-4 days period of evacuation.

Wakefield.

R. M. HEGGIE.  
E. M. ABBOTT.

## Obituary

### WILLIAM ARBUTHNOT LANE

BT, CB, MS LOND, FRCS

Sir Wm. Arbuthnot Lane, consulting surgeon to Guy's Hospital and the Hospital for Sick Children, Great Ormond Street, died at his London home on Jan. 16 in his 87th year. C. H. Fagge, presenting Lane's portrait to Guy's on behalf of his old house-surgeons, hailed him



Ellott & Fry

as a man of great originality of ideas, of unusual mechanical sense and of remarkable technical dexterity. Indeed he was a great surgeon because of his superb craftsmanship; he had been as a student an admirer of Arthur Durham, and this was the aspect of surgery that appealed to him. It also appealed to his fellows, for we are told of a private medical dinner, at which nearly all the guests were surgeons, and they all agreed that Lane was the man they would choose to operate on them. "No-one who saw him operate," writes H. M. M. W., "can ever forget the superlative magic of his technique, and when the Mayo brothers came from America they described that technique as the finest in Europe. Everything with him seemed so easy, he was never at a loss. I remember saying to him once 'When a surgeon does a difficult operation one says how wonderfully he did it, but when you operate one says how easy it looks.'"

Lane was born at Fort George, Inverness, in 1856, the son of Brigade-Surgeon Benjamin Lane, LRCSI, and was educated at Stanley House, Bridge of Allan. He qualified from Guy's when he was only 21 and less than ten years later was appointed surgeon to Great Ormond Street and a few years later to the staff of Guy's. When he first qualified he was demonstrator of anatomy with his life-long friend Hale-White, and together they published observations of their work in the dissecting-room, especially how occupations influenced the skeleton. His first surgical innovation was to excise a piece of rib when treating an empyema, his next was to operate for cleft palate early in life, but he soon became known for his practice of screwing or plating every fracture of a long bone when accurate apposition of the fragments could not be obtained by other means. He was satisfied only with perfection—his skill and patience in dealing with a comminuted fracture of the femur were amazing—and his *Operative Treatment of Fractures* (2nd ed. 1914) is a matchless record of 22 years experience of this method. And these results, be it remembered, were achieved without mechanical table or apparatus, only a relay of powerful dressers to overcome muscular spasm. In all his operative work he practised strict asepsis with a rigorous no-touch technique. In the early years of this century he began to put forward the view that most of the ills of the flesh were due to faulty emptying of the colon and consequent absorption of toxins. For this chronic stasis he found an explanation in the mechanics of the large bowel where it crosses the brim of the pelvis on the left side. Here in early life the bowel was apt to develop a kink, accentuated by the erect attitude and by the overloading of the colon above with unsuitable food and over-frequent meals. But this was only the last of a series of kinks in the alimentary canal for the relief of which he devised measures set out with missionary fervour in his *Operative Treatment of Chronic Constipation* (1909). The retort that the kink was in his own mind was always met with perfect good humour and the witness of lives saved or brightened; later he founded

the New Health Society to support his hygienic gospel. During the last war he was inevitably attracted to the new science of plastic surgery. He served as a colonel in the AMS and founded at Sidcup a special hospital for the treatment of facial injuries.

Lane was interested in his craft rather than his profession. He was for instance a teacher but not an examiner, and he attended societies only to address them. He inspired his students with enthusiasm and devotion, but he gave them dogmatic statements rather than reasoned expositions. He gave his patients meticulous care and exacted—with courtesy—punctuality and attention to detail from his assistants. His loyalty was unswerving and he remained true to his friends—and to his own ideas. Speaking at his memorial service in Guy's chapel on Jan. 21, Mr. E. G. Slesinger said: "Lane would follow the line he had laid down for himself, utterly uninfluenced by opposition or criticism. Indeed, he thrived on opposition, and I have often heard him say what a blessing it was to have enemies, because their opposition was so stimulating. He himself was a hard hitting and vigorous opponent on any matter of professional controversy, but personally he was the most kind-hearted and gentle of men, loyal to a degree to those who had gained his affection."

Lane married in 1884 Miss Charlotte Briscoe and they had three daughters and a son who succeeds to the baronetcy awarded to his father in 1913. On her decease he married in 1935 Miss Jane Mutch.

### JAMES LANGFORD BROWNRIGG MACFARLANE

M R C S ; SURGEON LIEUTENANT R N V R

James MacFarlane, who was killed in action during December while serving in HMS *Achates*, went to school at Dean Close, Cheltenham, and began his medical career as a student at St. Mary's Hospital, Paddington, where he qualified during 1941.

He started his clinical work as ENT house-surgeon at Park Prewett Hospital, where he proved as efficient in his duties as he had been popular among his fellow students. His colleagues there remember his successful efforts to make the Christmas of 1941 as cheerful as possible for everyone—he was a keen musician and played the cello—and one of them writes: "When MacFarlane went to join the Navy in following February he left a gap among the residents which was never completely filled, and we were always glad to see him again whenever he visited us while on leave. He came down to Park Prewett only a few weeks before he met his death, and appeared as cheerful and as keen on his new life as ever." Shortly after joining the Navy he became engaged to Miss Mollie Sargeant of Skegness. He was 28 years of age.



### DAVID WALTON FELL

M B LOND ; LIEUTENANT R A M C

Lieutenant David Fell, who has died in North Africa at the age of 27, was the third son of Dr. A. Nolan Fell of Colchester. He was educated at Haileybury and,



joining his elder brother at St. Mary's Hospital, qualified in 1938, taking his London MB the same year. After holding a house appointment at St. Mary's he entered the EMS and spent over two years as surgical registrar at St. Bernard's Hospital, Southall. He joined the R.A.M.C. in February of last year. He married Miss Peggy White of Chiswick and leaves her with a young son. G. H. C. O. writes: "David was as delightful and cheerful in his leisure as he was reliable and efficient at his work. His zest and enthusiasm stimulated all with whom he came in contact and his joie de vivre, combined with the personal interest he felt for those under his care, reflected itself in the

confidence he inspired. Surgery was always his main love, but he had many other interests. He had a wide knowledge of the arts, more especially music and literature; he represented his hospital at rugger and swimming, and he was never happier than when spending a yachting holiday on the East Coast."

### CLINICAL INSTINCT IN DIAGNOSIS

S. WATSON SMITH, M D EDIN, F R C P

CONSULTING PHYSICIAN, ROYAL VICTORIA AND WEST HANTS HOSPITAL, BOURNEMOUTH

"What act proves all its thought had been?"

IN those engaged in the practice of clinical medicine there is an attribute possessed and applied subconsciously by the few rather than by the many which has been termed clinical instinct—a quality characterised by a retentive, responsive memory with an unusual mobility of intellect, being the fruit of unapparent painstaking. The words "tact," "instinct," "intuition" do not define the quality; in fact, the definition does not come ready to hand; but it is embraced by Xenophon's translated description of the almost indefinable kind of quickness and rightness of perception possessed by Socrates, an amazing quality he termed "tact," shown by this wisest of men in all circumstances and situations, believed by Socrates himself to be the result of divine inspiration and guidance. Here it is: "a quick exercise of judgment, informed by knowledge of the subject, trained by experience, and inferring from cause to effect without consciousness of the process."

This faculty of clinical instinct is looked upon among clinicians as a right and valuable possession, being utilised in diagnosis, though made use of too in the art of prognosis. Those who have acquired skill in its use are usually old to the ways of clinical medicine, who have profited by experience and by previous error: it is not found except in the thinker, being rare as the practice of thinking itself; the fortunate possessor is the physician who can see with the seeing, understanding eye. However, it is a talent which, unless exercised, can become stunted and withered. He who would acquire it must have a something more than experience. Walter Bagehot wrote: "to a great experience one thing is essential, an *experiencing nature*. . . . Some occasions come to all men; but to many they are of little use, and to some they are none." And this is true: one comes across those who profit more by experience in a few years than others do in a professional life-time.

Seldom is the faculty to be found in other than the daily bedside worker among doctors. The merely clever may, mistakenly, seem to have it, being apt and ready at the guess diagnosis; but, failing to see the wood for the trees, will achieve a due medical humility and skill only if profiting by past misinterpretations.

The practitioner gifted with this accomplishment is alive and quick-thinking, has a wide knowledge of his subject, laboriously acquired and sifted, and a good memory for individual, similar cases seen: he has the happy knack of bringing an unprejudiced mind fresh to any new problem, refusing to approach it in any narrow sense or to countenance irrelevancy; but addressing himself to the problem in hand with a logical mind, riveted upon the subject, working with speed and concentration, keeping a proper sense of mental perspective. To quote from William Hazlitt's *Table Talk*: "reason and knowledge, when at their height, return into a kind of instinct."

It has been said that first impressions are often right; they are certainly the clearest and most lasting; in clinical practice, they seem to linger round some one or other symptom or physical sign, not necessarily a prominent or leading one, enabling a provisional diagnosis to be made, more often than not to be confirmed by subsequent findings. Perhaps the sense most made use of here is that of sight: a knowledge of appearances that accompany disease is indispensable to it; in fact, clinical instinct can be acquired and cultivated by the exercise of intellect and memory stimulated by the pictorial art, of which more use ought to be made in medical literature and practice than it presently is. The mind's eye is daily of help at the bedside as well as in the consulting-room, offering suggestion or information in a

flash to be utilised in reasoning by logical induction from one or other presenting symptom or sign, then by deduction, so to lay the foundation of a correct diagnosis. It is the rule that, other things being equal, the good logician is the better diagnostician.

Although a presenting sign may mean more to one clinician than to another, there are several which come to mind as signalling particular diseases, such as: the petechiæ of acute infective endocarditis, and the Osler's nodes that characterise the subacute form of the disease; the characteristic, periodic temperature of the Pel-Ebstein type of lymphadenoma; the few rose-pink papules which, when present, constitute the distinctive eruption of typhoid fever; the collapsed eyeball of diabetic coma; the telangiectasia of the face in coarse hepatic cirrhosis; the rigid, expressionless, greasy face of parkinsonism—these to mention only a few examples of picked signs that speak volumes.

But, of course, the possession of clinical instinct is not enough: method and order in examination that is at the same time speedy and complete is of the very essence of success in diagnosis.

### Notes and News

#### TRAFFIC IN BABIES

It seems that babies are being banded about rather freely just now, and the National Children Adoption Association has for some time taken a serious view of practices which are gaining currency. In the *Times* of Aug. 10 last year, Lady Caldecote, chairman of the association, drew attention to the mushroom adoption agencies springing up since the outbreak of war, many of which were promoting indiscriminate and hasty adoptions; an article appearing in the next day's issue quoted evidence justifying this uneasiness. A case was mentioned in which an adoption society appealed for funds in a letter inviting people to attend the annual meeting without giving any place or date, or enclosing a financial statement. The president and founders, whose names appeared on the letter head, were all dead; and recipients were asked to send a donation if they could not attend the meeting. Cases have also been known where advertisements offering babies for adoption have appeared, and when replies have come in the advertiser has set about finding the babies. It is perhaps significant that women with young children, whether their own or adopted, escape the call-up. Many babies offered for adoption are illegitimate, and the mother after the first impulsive action may wish to have her child back. She may fancy that because she has filled in a form for an adoption society she has no right to it; whereas, in fact, no-one has a legal right to take a child from its mother until a court order has been made. Lately the National Council for the Unmarried Mother and her Child has also expressed concern about casual adoptions, and has protested against adoptions arranged by private people such as doctors, midwives, nurses, health visitors and workers in citizens' advice bureaux. The council feel that though these people may be full of goodwill they have not had enough experience in choosing appropriate homes. This seems a less serious menace, however, than the possibility of traffic in unwanted children for gain, which the Adoption Association fears. Under the Adoption of Children (Regulation) Act 1939, which should have been put into force in 1940, it would have been an offence for any body of people to arrange adoptions unless it had been registered; and notices advertising adoptions would have been prohibited. The act now in force prohibits money being given or received by the parties to the adoption, but there is nothing to prevent a third party, who has arranged the adoption, from getting payment. An obvious safeguard seems to be to put the new act into force as soon as possible. In the House of Lords last week Lord Davies asked that this should be done, but the Earl of Munster pleaded the need to economise administrative staff at the present time.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

Dr. T. WILSON PARRY has published a small book of verses with the title of *The Spirit of 'This England.'* They are not, as one might fear from such a title, concerned with guns and grimness, but are fanciful, gentle and often graceful, preoccupied with the natural beauties of seashore and countryside. The peaceful spirit which they breathe can probably be more fairly attributed to Dr. Parry than to this England just now; but he is to be congratulated on keeping intact his deep feeling for what England was and will be again.

#### University of Oxford

The Rockefeller Foundation has given the University £1200 for biochemical investigations of penicillin under the direction of Prof. H. W. Florey. The foundation has also made a further grant of £3500 towards the initial equipment of the nutritional survey.

#### University of Cambridge

On Jan. 22 the following degrees were conferred :

**MD.**—H. H. Bayley and C. W. C. Karran (by proxy).  
**MB, B Chir.**—A. E. Howarth, A. D. Barlow, J. F. B. Carter, D. S. G. Genge, R. N. Jones, T. G. E. Loosemore, R. D. Slack, H. C. Still, J. K. F. Mason, W. N. Coombes, R. K. Reid, J. H. Simpson, R. N. Ticehurst, W. H. Trethowan, O. B. Appleyard, N. A. Campbell, J. A. H. Collins, R. V. Peters, Watson Rogers, M. C. Connell, P. H. N. Matthews, J. P. Neil, D. W. H. Griffiths, M. C. Mundle, B. P. Webber, J. H. C. Phillips, A. P. H. Randle, W. A. dos Santos, A. G. Harrold, A. G. Richards, P. F. Early, F. W. Blacklay, E. F. Carr, W. K. Douglas, H. L. Pierce, H. R. Jolly, M. G. P. Stoker and B. C. Welshman (by proxy); H. W. A. Baron and J. V. T. Gostling (in person).

#### National University of Ireland

At recent examinations at University College, Cork, the following were successful :

B. J. O'Driscoll.

MD

FINAL EXAMINATION FOR MB, B CH, BAO

F. D. Thomas, K. V. J. Kearney, W. P. F. Kearney, P. J. Galvin (with first-class honours): A. J. Beckett, Eugene Breen, John Burke, Thomas Burke, M. F. Cahill, M. J. Collins, P. F. Corkery, M. J. Cosgrave, D. J. Dinan, R. J. Fitzgerald, Rose MacAuliffe, Michael McCarthy, M. B. Millerick, Denis Moroney, J. D. Morrissey, E. D. Murphy, Cornelius O'Brien, Geraldine O'Callaghan, Maureen O'Driscoll, Denis Ollivero, John Osborne, H. P. J. O'Shea, R. F. O'Sullivan, Eileen M. Ring, J. R. Ryan, D. B. Sheehan, W. J. Shinkwin, M. J. Twomey, and Mary T. Woods.

DPH

Abina T. O'Connor.

DPM

Thomas McCracken.

#### Society of Apothecaries of London

At a recent meeting of the court of assistants, with Sir Stanley Woodwork, the master, presiding, Brigadier Harold Clifford Edwards, examiner, and Alison George Selborne Bailey, licentiate, were admitted to the freedom of the society by redemption. Ralph Jordan Dodds was bound apprentice to Prof. E. C. Dodds for seven years.

The diploma of the society was granted to the following: J. A. Dryden, C. E. P. Grocott, E. R. Jones, E. E. Lieber, M. V. Matthew, W. C. Salter, C. E. C. Wells, R. A. Bush, and L. N. Yhap.

#### RAF Awards

The following awards to officers of the medical branch of the RAF were made in connexion with the New Year honour list :

**OBE**—Wing-Commander D. M. Wallace.

**AFC**—Flight-Lieutenant B. J. O. Winfield.

*Mentioned in Despatches.*—Air-Commodore T. J. Kelly, Group-Captain R. W. White, Wing-Commanders H. D. Brinton, G. P. O'Connell, L. C. Palmer-Jones, H. Penman, A. A. Townsend, H. H. S. Brown, E. W. R. Fairley, Squadron-Leaders J. B. Murphy, R. G. E. Richmond, H. J. Riley, A. Wilson, E. O. Evans, J. H. P. Gauvain, G. B. Grayling, G. R. Gunn, H. G. Magill, J. R. O'Dowd, J. C. St. C. Polson, C. G. Rob, T. E. Whitby, Medical Officer (relative Squadron Leader) Miss A. C. Gillan, Flight-Lieutenants J. R. Caldwell, T. M. Prosser, P. J. Blaxland, P. M. Davies, H. F. M. Finzel, J. E. La Frenais, A. J. Nimmo, W. L. Price, A. A. Smith, C. E. Waterman, and O. T. Brown.

#### Royal Society of Medicine

The section of orthopaedics of this society will hold a meeting on Tuesday, Feb. 2, at 2 PM, when short papers will be read. Prof. Royal Whitman will speak on the emancipation of orthopaedic surgery, Mr. A. S. Blundell Bankart on spinal arthritis and sciatica, Mr. B. H. Burns on diastasis of

the lower tibiofibular joint, and Mr. W. Sayle Creer on modified subtaloid arthrodesis. Afterwards Mr. K. H. Pridie will show a coloured film of fractures of the shaft of the femur. On Feb. 3, at 2.30 PM, at the section of history of medicine, Dr. H. P. Bayon will deliver a paper on disease as a determining factor in warfare. At the same hour the sections of surgery and urology will hold a joint discussion on non-specific epididymitis when the openers are to be Mr. E. G. Slesinger, Mr. Donald McGavin and Mr. R. H. O. B. Robinson. At 10.30 AM, on Feb. 5, at the section of otology, Dr. Martha Henning, Mr. A. W. G. Ewing, PhD, and Mrs. Irene Ewing will open a discussion on deaf-mutism. There will be a clinico-pathological meeting at the section of laryngology at 2.15 PM on the same day, and at 2.30 PM, at the section of anaesthetics, Colonel B. C. Leech, will describe RCAMC anaesthetic experiences among the Dieppe casualties.

#### Prisoners of War

The following RAMC officers have been posted as prisoners of war: Lieut.-colonel Cyril Armstrong, MBE, MB DURH.; Captain A. E. Brewer, MRCS; WS/Captain A. H. R. Coombes, MRCS; and Major H. M. Marks, MB SYDNEY. Captain E. D. H. Williams, MB LOND., previously missing at Singapore, is now reported to be a prisoner in Malaya.

**VITAMINS FOR THE UNDER FIVES.**—Dr. Tyrer's letter last week (p. 126) was written before the announcement by the Ministry of Food of a greatly simplified procedure for obtaining vitamins, which meets his point about special coupons in green ration books.

## Appointments

**BARSBY, BERYL, MD LOND., DCH:** temp. physician to the East Ham Memorial Hospital.

**CURTIS, ALAN, MB LPOOL, FRCSE:** medical superintendent at Hexham Hospital, Northumberland.

**GEDDES, J. E., MD GLASG.:** chief clinical TO for Birmingham and medical superintendent of Yardley Green Road Sanatorium.

**GIBSON, ROBERT, MD GLASG., DPM:** deputy medical superintendent at the Derbyshire Mental Hospital, Mickleover.

**VANES, FATHIA, MRCS:** temp. asst. MO for Surrey.

## Births, Marriages and Deaths

### BIRTHS

**CONTE-MENDOZA.**—On Jan. 20, at Guildford, the wife of Dr. H. Conte-Mendoza—a son.

**DAWES.**—On Jan. 17, at Wotton-under-Edge, the wife of Dr. W. A. Dawes—a daughter.

**HARRISON.**—On Jan. 21, at Wisbech, the wife of Dr. L. T. Harrison—a son.

**LEAKEY.**—On Jan. 2, at Nairobi, the wife of Dr. L. S. B. Leakey—a daughter.

**MYLECHREEST.**—On Jan. 21, at Ambleside, the wife of Captain W. H. Mylechreest, RAMC—a daughter.

**SAMBROOK.**—On Jan. 15, at Gloucester, the wife of Mr. Denys Sambrook, FRCS—a son.

### MARRIAGES

**SUCHET—JARCHE.**—On Jan. 23, in London, Jack Suchet, MRCS, to Joan Patricia Jarché.

### DEATHS

**AUSTEN.**—On Jan. 22, at Aldeburgh, Harold William Colmer Austen, MD LOND.

**BUCHANAN.**—On Jan. 18, at Eltham Hill, London, S.E.9, Donald Buchanan, MD ABERD., FRCSE, DPH, of Earsary, Isle of Barra.

**COUPLAND.**—On Jan. 22, in London, William Henry Coupland, LRCP, late medical superintendent, Royal Albert Asylum, Lancaster, aged 73.

**JEUDWINE.**—On Jan. 22, at Eastcote, Middlesex, Wilfrid Wynne Jeudwine, CMG, MD CAMB., FRCSE, lieut.-colonel IMS ret'd.

**KEAY.**—On Jan. 21, at Beaminster, John Keay, CBE, MD GLASG., FRCPE, aged 83.

**MACNISH.**—On Jan. 21, at Prestatyn, North Wales, David MacNish, MD EDIN., J.P., aged 82.

**PARRY.**—On Friday, Jan. 22, at Putney Heath, S.W.15, Robert Henry Parry, FRCSE, FRFP.

**WATTS.**—On Jan. 23, at Broadstairs, Alexander Minter Watts, MD DURH., DPH.

**WINTERBOTHAM.**—On Jan. 18, at Eastbourne, Lauriston Leonard Winterbotham, MRCS, formerly of South Lambeth Road, aged 65.

**WOOLLS.**—On Jan. 21, in London, Richard Curzon Woolls, MRCS, aged 29.

## DIAGNOSIS AND THE PATIENT

LESLIE COLE, M.D. CAMB, F.R.C.P.

PHYSICIAN TO ADDENBROOKE'S HOSPITAL, CAMBRIDGE

To some doctors the war brought a sabbatical year; a chance to review past work at leisure from fresh surroundings with the hope of many years of active practice still ahead; a chance to take stock, read and make fresh plans.

When I qualified 20 years ago I felt disappointed with the results of medical treatment. In a medical ward few patients seemed likely to benefit from it, and the most that could be hoped for the majority was that they might struggle on, sympathetically supported but never actively helped by doctors. Medicine then seemed to consist of endless questioning, examining and investigating, until eventually a diagnosis was made; and then nothing very much came of it. Comparatively little was said about treatment, either then or later, and the diagnosis seemed to be the goal. A short time before Sir Clifford Allbutt had told us that if as doctors we were right in 70% of our diagnoses we might consider ourselves fortunate. This, with little to do at the end of it, seemed a bleak outlook.

Such a view was absurd, but it contained a grain of truth; and we do well to remember that whatever the interest of medicine its practical aim is to help patients to the uttermost. With the advances of the last 20 years I still wonder how far diagnostic methods are rightly applied, how far the patient gets full benefit from the elaborate machinery of diagnosis, and whether there are general reasons why treatment is not as good as it might be.

## RELATION OF DIAGNOSIS TO TREATMENT

Treatment depends on diagnosis; for if a doctor does not know what his patient is suffering from he will be lucky if he treats him correctly. To make a diagnosis which is a basis for treatment it is necessary to gain exact knowledge not only of the pathological processes at work but also of the patient himself and his environment. Only after studying these three together can appropriate treatment be given.

The methods available are: history-taking, clinical examination and special investigation—usually in this order. The history provides the only direct evidence of how and under what conditions an illness has developed, and should therefore be careful and detailed. The actual state of a lesion may be more accurately shown either by special methods or by clinical examination. Both should be used, but the clinical first. Parkinson<sup>1</sup> has shown that clinical estimates of the size of the heart are often proved by X rays to be wrong. On the other hand, clinical methods often find disease which is missed by other methods. A carcinoma low down in the rectum may be found by the finger and missed by barium enema. The most that can be said of any special investigation is that it is a valuable and often essential addition to a complete clinical study. Special investigations are confined to some particular aspect, function or organ of the body and their results must finally be interpreted in relation to the whole patient and his environment.

Theoretically, since any information, however trivial or apparently irrelevant, may prove useful, it might be an advantage if all possible investigations were done on every patient regardless of symptoms. This line of approach is most nearly followed in America, where many investigations, such as blood-counts, and blood-sugar and X-ray examinations, may be made before the patient has been fully investigated clinically. Naturally this procedure will sometimes yield unexpected and valuable findings. But even if it were looked on as the ideal it would be difficult to carry out in the hospitals of this country and impossible in private practice; and so here special investigations are limited to those suggested by clinical examination. After such examination a doctor has to decide in difficult cases what special tests are necessary and whether the trouble and discomfort involved are likely to be justified. Such decisions are among the most important he ever has to make and they are particularly important when special investigations

have to be restricted to essentials. Before he asks for an investigation he should always carefully consider, on the basis of his clinical findings, exactly how it will help him to help his patient. Reasons for the same test differ in different cases and it is worth keeping in mind the common occasions for special tests. These are:

1. To confirm and record an almost certain clinical diagnosis—e.g., blood-count in clinical pernicious anæmia, blood-sugar estimation in clinical diabetes, barium meal in typical peptic ulcer.
2. To control progress and treatment.—e.g., occult-blood tests after hæmatemesis from gastric ulcer.
3. As a guide to prognosis only—e.g., blood-urea in severe chronic nephritis.
4. To make a diagnosis when the clinical signs are inadequate—e.g., radiography of chest in a patient losing weight.
5. To reassure a nervous patient—e.g., barium meal in nervous dyspepsia.
6. For the physician's scientific interest—e.g., liver-function tests in carcinoma of liver.
7. At the patient's or relations' request—e.g., electrocardiogram in supposed cardiac disease.

The same test may be used for different reasons in the same disease. In typical clinical pernicious anæmia a full blood-count is desirable to confirm the diagnosis before the clinical signs are masked by treatment; because a time may come when the original diagnosis is doubted—perhaps when the patient is seen by another doctor—and lack of definite evidence may lead to cessation of treatment and relapse. In less typical cases a full blood-count will be necessary for actual diagnosis. If the blood-count is inconclusive, other investigations such as fractional test-meal, reticulocyte-count after liver treatment, occult-blood tests on stools, and radiography of stomach may be needed for confirmation. The importance of these ancillaries varies: with a classical clinical picture and blood-count they are superfluous for diagnosis, but where the diagnosis is uncertain any one of them may provide the decisive evidence on which treatment depends. Special investigations may also be required to assess progress and control treatment. The need for these varies according to clinical progress. For example, in a case of pernicious anæmia in which the clinical response to liver therapy has been good and the full blood-count has become normal, regular observation of the hæmoglobin and red-cell count will suffice provided no abnormal signs or symptoms develop and these readings remain normal; but if clinical progress is not perfectly satisfactory; or if these readings become subnormal, then other investigations are desirable.

## CLINICAL AND TECHNICAL EVIDENCE

With the growth in number and efficiency of technical methods, clinical methods of investigation have been driven into the background. They are less systematically made and less carefully considered. The idea is prevalent that clinical evidence must be less important than that obtained by technical methods. This is often but by no means always so. A patient with a clinical history suggestive of duodenal ulcer culminating in a definite melaena should be diagnosed and treated as having a duodenal ulcer, even if radiography a few weeks afterwards shows no evidence of one.

To many accuracy in diagnosis is synonymous with multiplicity of special investigations. These are demanded without much regard for the clinical findings and the results are given undue weight in the final diagnosis. The frequency of requests for unnecessarily elaborate investigations shows failure to appreciate the real significance of special methods. Most workers in laboratories and special departments of large hospitals will confirm this. If a patient has a history suggestive of diabetes mellitus and large quantities of sugar are found in the urine, it is unnecessary to ask for a complete sugar-tolerance curve, which will yield no more useful information than that gained by a single blood-sugar reading taken 2 hours after a dose of glucose or a carbohydrate meal. The tolerance curve is required rather for recognising the mild cases in which a single blood-sugar may not reveal the abnormality. It is often forgotten, too, that the results of tests may be modified

1. Parkinson, J. *Lancet*, 1936, 1, 1337.

by previous treatment; thus Himsworth<sup>2</sup> has shown that carbohydrate tolerance may be reduced by starvation or limitation of carbohydrate.

Taken by themselves, special investigations give about as reliable an idea of the state of a patient as the pronouncements of a politician give of the state of his country. Results can be correctly interpreted only in the clinical context. For example, a blood-sugar reading of 0.3% has a different clinical significance in a boy of 18 and a man of 58, in a fat man and a thin man, in a man with pneumonia and a man without, and so on. To appreciate the clinical significance of the reading it must be considered with the whole clinical findings and the combination then compared with other patients who are as nearly as possible clinically and biochemically similar. In the interpretation of any test, factors are introduced which cannot be as accurately controlled as the test itself, and when these increase there comes a point when the test ceases to be trustworthy because the potential sources of error are too great. As a further example, consider the estimation of basal metabolism by means of the Douglas bag. The normal for the patient may be well outside the accepted average, but how much is not known. The various conditions which alter basal metabolism are not clearly defined, true basal conditions and normal breathing are difficult to obtain and the gas analysis itself gives scope for error. Allowing for all these possible sources of error in technique and interpretation, it is clear that a single test can have only very limited value, although this will increase as the clinical conditions under which it is done are made more stringent and the technical errors reduced to a minimum. In intelligence tests errors are even more difficult to control and interpretation is correspondingly less reliable.

The rigging of a sailing ship is designed to combine the maximum reliability with the greatest simplicity, and in all the complications of medical diagnosis this ideal should be kept in sight.

#### EXPLAINING TO THE PATIENT

A part of diagnosis which makes for success or failure in treatment is the interpretation conveyed to the patient. His future mental attitude to his complaint, whether he has organic disease or not, depends largely on how this is done. A patient with a gastric ulcer suffers from its physical effects, such as pain, inability to take food, and loss of blood. But in addition he is affected—to a greater or lesser extent according to his nervous make-up—by the knowledge that he has an ulcer. This nervous factor varies greatly in different people under different conditions and may account for anything up to 100% of their disability. In a man who is working at a job he likes a gastric ulcer may cause only mild indigestion. But if the same man spends six months under conditions of unhappiness or boredom it may cause severe pain and vomiting.

The extent to which the functional element develops depends to begin with on the method of approach and management by the physician. It is the same or more so with patients who have functional troubles only: the fears that are often the basis of their symptoms can be banished if they are dealt with in the right way, especially at the outset. Patients know that the diagnosis is based on the examination; and many have great faith in the powers of special diagnostic aids such as X rays, cardiograms or blood examinations. It follows that the more thorough an examination, the more extensive the investigations, the greater can be the influence of the final summing-up. There is perhaps no part of treatment in which serious mistakes are more commonly made or harder to set right. It is difficult to formulate rules as to what a patient should be told, and still more how he should be told; but the question is too often lightly dismissed and is worth considering from a general aspect.

With reservations, the aim should be to tell the truth, or at least as much as is compatible with comfort and hope. This should be done with conviction and without hesitation, and to do this the physician must have confidence in himself. True confidence is based on knowledge; so this is the first essential. Lack of self-confidence in a doctor is communicated to his patient

in the same way as nervousness in a rider is communicated to his horse. The results in both cases are often disastrous. To admit that every patient should, within limits, be told the truth is only a beginning. Sometimes the literal truth can be told only in scientific language unintelligible to those with no knowledge of medicine—and it is a mixed blessing that these are getting fewer. Here the facts must be expressed in altered and simplified terms adjusted to the understanding and capacity of the patient, and this may be extremely difficult.

The second aim should be to tell a patient nothing that is likely to frighten him either directly or by evasion. Very little is ever gained by doing this; and yet it is perhaps the cause of more distress and illness than all the other mistakes in medicine and surgery put together. Patients are frightened in many ways, occasionally deliberately, sometimes by mere thoughtlessness or clumsy expression but most often by half-truths, hints or even silence. The realisation that a patient should not be frightened, combined with a clear explanation of the facts, will prevent much unhappiness.

A careful history and clinical examination are important not only for diagnosis but because they give a doctor an opportunity to know and understand his patient and by their very thoroughness establish confidence. The weight the patient attaches to any subsequent pronouncement depends on this confidence, and it follows that a casual and ill-expressed opinion given with the weight of a thorough examination behind it may be more harmful than if the examination itself had been casual. Similarly, a correct opinion given without an examination to back it up is often looked on with suspicion or ignored.

An only child was taken to a physician because he was backward. As the child was taken into the room the physician said: "Your child is a mongol. He will be happy and fond of music but will always be backward." The parents left incredulous and angry, and very soon found another physician who after a thorough examination gave an incorrect and hopeful prognosis and suggested a line of treatment. The first was right, the second was believed because his manner of approach was the right one.

Pitfalls increase with the use of more elaborate means of diagnosis such as X rays; for to the lay mind such procedures carry a suggestion of infallibility and so have a greater potential power either for truth or to mislead if they are not explained. The answers given by investigations of this kind are often indefinite, and if it is mishandled an uncertain result has immense power to raise doubt and create anxiety. An indefinite deformity of a duodenal cap may be worse than an ulcer if badly interpreted to a patient of an anxious temperament, and the dangers of allowing patients to know that they have a slightly raised blood-pressure or a movable kidney are well known. That findings by special methods are often mishandled and wrongly interpreted is shown by the fact that patients often consult physicians not for signs or symptoms but because they wish to know whether their T wave is still inverted, whether the basal metabolism is keeping normal or whether radiologically their stomach is too low and slow in emptying. It may be argued that such patients would be introspective anyway and that whether their attention is focused on an inverted T wave or a full sensation in the stomach does not matter very much. Introspection is however a habit which with many might be avoided altogether, if their troubles were clearly explained to them at the time a diagnosis is made; and an inverted T wave is merely another trouble. If in the first instance the idea conveyed is wrong, it may take root and be difficult to eradicate later. These arguments can suitably be illustrated in relation to disorders of the cardiovascular system.

#### THE PATIENT AND HIS HEART

Physically the heart can be looked on as the most important organ of the body and it symbolises the emotions of courage and love. Because of its pre-eminence in the mind of man any suggestion of weakness or disease is liable to evoke a profound emotional response, as general practitioners and heart specialists are well aware. In consulting practice it is a common finding that patients with supposed heart disease or "heart" symptoms have no detectable organic disease.

2. Himsworth, H. P. *Clinical Sci.* 1935, ii, 67.

*Imaginary heart trouble.*—The many symptoms not of cardiac origin which are commonly referred to the heart include pain or discomfort due to fibrositis or dyspepsia, alteration in the cardiac rate or rhythm, and symptoms such as breathlessness, fainting attacks or general weakness. The state of mind in which the patient thinks about his heart, and consciously or unconsciously refers his symptoms to it, may arise in various ways; but the underlying cause is fear—often subconscious and induced by indefinite statements, casual contact with illness in others, unwise reading or foolish conversation. Such indefinite statements are sometimes made by a doctor, perhaps because he himself is not certain whether the heart is healthy and wants to cover himself against having given a clean bill of health to a person with heart disease. He says to the patient: "no, nothing much, but go a bit slow"; or "a slight murmur, take it easy"; or "no actual disease but just a little dilated"; or (that most masterly of all specifics) "don't do too much." Sometimes he may be more definite and admit "slight trouble" and stop "violent games"; sometimes he is merely (to the patient significantly) silent. Such pronouncements have one thing in common—that they are vague and leave nervous patients with an uncomfortable sense of doubt which tends to increase. Sometimes the weight of further medical opinion is added when the patient consults another doctor. He may explain that he has been told that his heart is slightly weak and may again fail to receive any certain reassurance or confirmation. Gradually he adjusts himself to the idea that he is a man with a "weak heart" and he leads a quieter life than he would do normally—perhaps even an invalid life. His loss of happiness and efficiency depends on his temperament and environment, but it may be very great.

*Emotional concomitants of organic disease.*—When the heart is in fact diseased the same problems have to be dealt with, but they are often more difficult. The patient must for his own sake be warned that he has heart trouble, and this knowledge if not imparted in the right way can induce additional or accentuated symptoms. In some people these may be out of all proportion to the actual disease and may lead, if they are not recognised and controlled, to needless curtailment of activities. To prevent these secondary nervous effects the diagnosis must be properly expounded and in doing this the same principles should be observed as in purely functional cases. When the diagnosis has been made it is important to explain, in language which the patient can understand, what the trouble is caused by, how severe it is, what is likely to be its effect and what line of treatment is necessary, and to do this without frightening him. Obviously, certain reservations will sometimes be inevitable. When the outlook is very bad it is nearly always unwise to tell the whole truth, and it should be restricted to what is essential for welfare and if possible to encouragement. In describing the condition there are certain common medical terms which should be avoided or carefully explained because for many patients they have become charged with fear—"polarised," as Wendell Holmes has put it. These include "angina," "valvular disease," "failure" and even "D.A.H." Patients when they know that they have heart trouble are often secretly afraid of sudden death; if this is suspected, an assurance that it is highly improbable often lifts a weight of anxiety. In others, particularly the old, it is wiser not to mention the heart at all unless trouble is already suspected there, when frankness may be best. Some examples will make this clearer.

If a patient has angina of effort, anxiety is often best allayed by saying that the blood-supply to the heart is not as good as it ought to be, and that, because of this, pain comes on when activity is too great. He is told therefore to look on the pain as a signal to rest and afterwards to take things more easily. If the word "angina" is mentioned, a simple explanation of its meaning is invariably required. When justifiable, reassurance that it is likely to be relieved by treatment should also be given, and the final emphasis should be on details of regime and treatment. The word "angina," because of its associations in the lay mind, should be avoided, and even such a term as "angina innocens" is dangerous. The patient is more likely to be alarmed by the "angina" than reassured by the "innocens." In valvular disease and failure the explanation that symptoms arise from some weakness of the heart muscle usually causes less anxiety. It

may be advisable to explain that breathlessness on exertion is caused by some weakness of the heart muscle and that it is a signal to do less. In old people with increasing breathlessness due to myocardial degeneration it is often unnecessary to mention the heart specifically, merely telling the patient that he is not as young as he was and must do less in the future. Exact instructions should then follow. If the patient mentions the heart, it may suffice to say that while there is no actual disease the organ is not as young as it was.

Explanations have to be adapted to different patients according to their fortitude and intelligence, and management on these lines will often prevent anxiety and abolish fears which may be more disabling than the disease itself.

High blood-pressure is another condition which induces anxiety. To many it is better not to mention blood-pressure at all, and whenever in a routine examination the pressure is taken and found to be normal it is sensible to tell the patient so. When it is only slightly raised it may be well to say nothing about it unless management and treatment make this essential. When definite hypertonia is present this should not be made too much of, and figures should not be given to the patient. It is sometimes an advantage to explain that blood-pressure varies in different people under different conditions and that some feel their best only when it is raised. Emphasis should not be laid on the importance of reducing pressure but rather on the particular regime advised and the fulfilment of instructions. It is often wise to tell a patient that his blood-pressure is likely to remain raised with the assurance that this in itself need not worry him if he obeys certain rules. If he is allowed to become interested in actual figures he may become a slave to the sphygmomanometer and drift into a vicious circle of increasing anxiety and increasing blood-pressure—a circle that is difficult to break. Discussions with patients as to what is a normal blood-pressure should be avoided, for competition by the patient with a hypothetical normal is highly undesirable. "Low blood-pressure" can almost always be dismissed by reassurance plus appropriate general treatment. By sympathetic management on these lines many of the terrors and inhibitions which make life a burden to the "blood-pressure" patient may be laid. The sooner he can be educated to take a matter-of-fact attitude to his disease the less will be his disability and the happier and more useful his life.

*Residual disability.*—The third group of cardiac patients who need special consideration are those who have had organic heart disease which has become quiescent. Examples of such are: rheumatic carditis, pericarditis and coronary thrombosis. In some the residual damage may be so slight that the cardiac reserve is hardly affected; in others the patient can live an active life if he is careful to avoid extremes of effort. It is important to tell such patients clearly the capabilities of their hearts and to let them know whether they have any remaining weakness and to what extent they must limit their activities. They should be told what precautions to take to avoid a recurrence of active trouble, such as avoiding damp and infections if they have had rheumatic fever. It should be made clear to them within what bounds they may regard their hearts as normal and may live like other people. When this is not done they go through life full of vague fears and self-imposed restrictions. For introspective patients neglect of such simple instructions may be disastrous; for although the heart has recovered completely they remain invalids. The longer unnecessary restrictions are allowed to continue after a heart has become normal or almost normal the more difficult is return to activity. In time physical capabilities become fixed within the limits imposed and the mental outlook is focused on illness rather than health. This state sometimes develops because it is not fully realised that the state of profound physical weakness which follows a severe heart illness, particularly in older people, can only be recovered from slowly. Confidence and muscle tone are at a low ebb, and only persistent reassurance, combined with a sufficiently gradual re-education of the whole muscular and circulatory system, can restore mental and bodily health. If the pace is too quick relapse may follow; and the reason for such relapse is not always recognised. The following is an example

of organic heart disease with superimposed functional symptoms:

A man of 41 who worked as a baker had a coronary thrombosis and was treated by rest in bed for 2 months; 3 months after the attack he started to work again but found that it made him so breathless that he could not manage it. For the next 5 years he complained of breathlessness on exertion and did no work at all. At the end of this period, as the symptoms persisted, he was thoroughly examined and no objective evidence of cardiac disease could be found; the heart was normal in size radiologically and the electrocardiogram was normal. He was very worried about his heart, which he regarded as severely and permanently damaged, and he had all the classical symptoms of effort syndrome. With reassurance and graduated exercises he responded well, so that in a few months he was able to walk several miles without difficulty.

In this case the weakness and breathlessness on exertion when the patient first tried to get up led to the fear that his heart was still damaged and that he would not be able to get back to work. If he had been reassured and moved on more slowly he would probably have been back at work within 6 months of the attack. After 5 years not only was it harder to restore confidence but his job had gone.

*Abnormal pulses.*—A fourth group comprises those with cardiac irregularities but no other symptoms or signs of cardiac disease. These include: extrasystoles, paroxysmal tachycardia, and fibrillation. They require careful management, for they have a natural tendency to get anxious about their hearts and to imagine something seriously wrong. The problem is not made easier by the fact that paroxysmal tachycardia and fibrillation are often associated with organic disease, their actual relation to it not being quite clear. Cowan<sup>3</sup> has expressed the view that many of these irregularities do not indicate organic disease, and it is more and more widely recognised that they may be produced by external influences acting indirectly through nervous or chemical action on a heart which is itself quite healthy.

Before Mackenzie differentiated the various forms of cardiac arrhythmia, sinus arrhythmia and extrasystoles were regarded as evidence of heart disease and restrictions were imposed for them. Since then, however, it has gradually been realised that paroxysmal tachycardia and fibrillation can occur in otherwise normal hearts, and that provided care is taken during an attack the heart is not permanently affected. When the subject of such attacks, after thorough examination and observation, shows no evidence of organic disease it is important to tell him that there is no reason to suppose that he has heart disease. In such patients a thorough history, general clinic examination, cardiogram and radiography are usually necessary—the sooner after the onset the better—and in some cases these should be followed by a period of observation before a final opinion is given. The final view should then be explained clearly to the patient so that no doubts are left in his mind. Such conditions have been compared to neuromuscular incoördination in other organs—for example, in stammering and nervous frequency of micturition—and these views may sometimes be passed on to the patient with advantage. Reassurance should be combined with emphasis on any steps necessary to reduce the frequency of attacks. Management on these lines, especially in the early stages, may prevent much secondary anxiety and disability.

#### CONCLUSION

Accurate diagnosis is essential, not only because it is the only basis from which to treat organic or functional disease but also because the knowledge that a diagnosis is correct is the only foundation from which a doctor can speak with confidence and conviction. All the processes involved in making a diagnosis are a part of treatment, because the explanation of what is done and found can influence a patient's attitude to his illness. Further, while investigations are being made mutual understanding should be established and the doctor should gain a knowledge of his patient's psychological make-up which prevents his making mistakes when he gives his final opinion.

3. Cowan, *J. Brit. Heart J.* 1930, 1, 3.

The answer to my initial question—how far are diagnostic methods rightly applied?—may now be summarised as follows. (1) It is too often forgotten that special investigations reveal only a certain aspect of an organ or test a certain function, and that the results cannot be interpreted correctly except in relation to the whole patient and his environment. (2) The reasons for making special investigations, the conditions under which they are made and the discomfort (relative to possible benefit) they cause to the patient are insufficiently considered. (3) Not enough allowance is made for the variation in significance of the same test in different people. (4) Reliance is too often placed on special investigations when clinical findings are more important. (5) The results of special investigations are allowed to become a source of anxiety.

The complexity and interest of special diagnostic methods has led to emphasis on the technical rather than the human side of medicine and the patient as a human being is apt to be left in the background. Most important of all, it is commonly forgotten that when the diagnosis is made its appropriate explanation and interpretation to the patient determine his future mental attitude to his health or disease—the state of mind that favours success on the one hand or failure on the other. Doubts should be dispelled before they have time to become anxieties.

Such statements are platitudes; but the machinery of diagnosis has become so complicated that the simple needs of the patient, as a person, are obscured. A sense of proportion in medicine was never more needed, never more difficult to acquire, and never harder to retain than it is today.

## ORCHIDECTOMY IN CANCER OF PROSTATE

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As long ago as 1893 White claimed that castration had a beneficial effect in prostatic obstruction. Though his work was confirmed by Cabot (1896) it was rapidly overshadowed by the development of suprapubic prostatectomy by Fuller (1895) and Freyer (1900). In recent times hormone therapy has been used in the treatment of prostatic disease with spectacular effects in carcinoma of the gland. Herrold (1941) and others have used synthetic oestrogen; Munger (1941), radiological castration; and Huggins and his colleagues (1941b), double orchidectomy.

Huggins bases his work on the fact noted by Kutscher and Wolbergs (1935) that a phosphatase which manifests its maximum activity at pH 5 is present in prostatic tissue in larger amounts than any phosphatase in any other tissue. Examination of sections of prostatic cancers for acid phosphatase showed large amounts of the enzyme in the malignant epithelium. Moreover, since the growth of normal prostatic epithelium is influenced by male sex-hormone, it seems reasonable to expect that the cancer cell developed from it may be similarly influenced. The readiest and surest way of shutting off the supply of hormone is obviously by castration.

On this theoretical basis Huggins and his colleagues (1941b) employed double orchidectomy on a series of 21 patients suffering from advanced prostatic cancer; many of these patients, they found, improved considerably in general health, and in some the prostate became normal or improved in consistence and mobility; there was striking and rapid relief from pain due to secondary growths in bone. A fall in the acid phosphatase content of the blood was noted and radiography of the bone lesions suggested retrogression. Injection of testosterone propionate caused an increase of pain and an increase of the acid phosphatase of the serum. Insufficient time had elapsed for the permanence of benefit to be evaluated.

#### RESULTS ATTAINED

I now have 6 months' experience of the effects of castration in 23 cases of carcinoma of the prostate, many of them advanced but not all with metastases. My excuse for early publication is the extraordinary immediate benefits of the operation. The relief from severe pain



due to metastases is rapid—often coming on within a day or two—and complete. In a considerable proportion of cases, consistence and mobility of the prostate are apparently restored to normal or much improved. The general health is commonly benefited. Blood acid-phosphatase estimations, made by Prof. W. J. E. Jessop, showed high readings ranging from 23 to 77.5 units per 100 c.cm. in patients with X-ray evidence of bone metastases. This series of patients were all suffering from urinary retention which was relieved by a Gershom Thompson punch resection. Many of the tissues obtained at operation were high on Broder's scale.

Complete failures were encountered in 2. Both patients were over 60; both had retention and hard, fixed, nodular prostates, the entire gland being involved; neither had bone metastases. At cystoscopy in both cases the trigone was partially involved. On rectal examination the lesion, in each case, seemed to be a primary prostatic carcinoma, but cystoscopy suggested that it might really be a vesical cancer involving the prostate. Punch resection was used to relieve obstruction and histological examination showed the tissue removed to be malignant. Double orchidectomy was carried out. No benefit resulted from castration in either patient. A second review of the slides suggested that in case 1 the carcinoma was of bladder origin. In case 2 the malignant foci had not the appearance of bladder carcinoma, the cells tending to form pseudo-acini; but the malignant areas were somewhat unlike ordinary prostatic carcinoma. Case 1 has just completed a course of deep X-ray treatment by Dr. J. A. Geraghty; case 2 went rapidly downhill and died within 6 weeks of orchidectomy, the liver presenting evidence of secondary deposits a fortnight before death.

Possibly these cancers arose from the epithelium lining the prostatic ducts, or more probably from the sub-mucosal glands of Albarron.

CASE 3.—This patient had widespread bone involvement, the right acetabulum being particularly severely affected. He suffered badly from pain and had persistent flexion deformity of his hip. Orchidectomy gave rapid relief; free movement was restored to the right hip in a few weeks, and in 2 months X rays showed unequivocal evidence of retrogression and repair.

The fact that the blood phosphatase is raised in carcinoma of the prostate with metastases simplifies the correct interpretation of osteoblastic and osteoclastic changes in the pelvic bones and lumbar spines of men of cancer age. Post-orchidectomy estimation of the blood phosphatase is likely to prove useful in the management of these cases. Huggins and his colleagues (1941a) suggest that when the acid phosphatase of serum does not reach a low level after castration, androgens are presumably being produced outside the testis in significant amounts; and they regard this as an indication for oestrogen therapy. Experience is still too short to decide whether the changes are permanent; they consider at present "that the elimination of the androgens does not cure prostatic cancer," but reviewing their 18 months experience of orchidectomy in 21 cases of advanced cancer of the prostate (Huggins et al. 1941b) they claim that surviving cases have fared better than would have been possible by any other means.

#### CONCLUSIONS

Six months' experience in 23 cases strongly confirms the claims advanced by Huggins and his associates as to the immediate beneficial effects of orchidectomy in cancer of the prostate. Whether treatment with oestrogen alone will prove equally effective, whether we will be able to dispense with punch resection in all cases suffering from obstruction, and whether the benefits of orchidectomy are permanent, remains to be decided.

I wish to thank Dr. Gershom Thompson, Dr. Geraghty, Professor Jessop and Prof. John McGrath for their help.

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## SOCIAL EFFECTS OF NEUROSIS

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THE Army discharges some neurotic soldiers who are no longer of use to it. In the civilian community, which then receives them again, they should be of at least as much use and as healthy as they were before they joined the Army. It has been doubtful whether this is so. The following inquiry, carried out between March, 1941, and June, 1942, was designed to find out what had become of a group of such ex-soldiers.

It concerns 120 soldiers treated in a neurosis centre, who had to be discharged from the Army by a medical board under para. 390 (XVI) KR 1940. All of the men had their home in London; they were selected solely on this account so that a personal visit could be paid to ascertain how they were getting on. Their ages ranged between 18 and 51. The average age was 27; 29 of the men were over 30, including 10 who were over 40 years of age. The visits were paid by competent psychiatric social workers (mostly students in training), and the findings discussed in each case with the writer and with Miss Margaret Ashdown, MA, the mental health tutor. The interval since discharge from the Army was in no case less than 4 months or more than 12; the average interval was 6½ months. The points on which specific information was sought in each case were: nature of present job; number of changes of job; delay before getting work; total duration of unemployment; health and medical treatment; domestic relations (to family). All of these were compared with pre-enlistment data obtained from the man's medical records.

The preservice occupations ranged from pedlar or casual unskilled labourer to pharmacist, lawyer, senior civil servant. The occupational groups were represented as follows: professional and managerial 8; clerical and sales 20; domestic and personal service 13; Regular Army 5; skilled 17; semiskilled 37; unskilled 20. The civilian occupational record of 36 men had not been satisfactory, as judged by unduly frequent changes of occupation or much unemployment. If there had been more than 10 changes of employment in the last 5 years before enlistment, or if the man had spent altogether 9 months or longer out of work during the last 7 years, it was considered unsatisfactory; but there were many special cases (e.g., a refugee who had been interned before joining the Pioneer Corps) and the criteria were therefore not applied rigidly.

When the inquiry was made 15 of the men were unemployed; (1 of these had become a voluntary patient in a mental hospital); 11 had been unemployed ever since they left hospital. The total duration of unemployment for the whole group was 273 months (average 2.3 months: standard deviation 2.2), which was a third of the total period (801 months) since they were discharged. For 147 of these unemployed months, 26 men were responsible. In other words, a third of the potential working period for this group has not been utilised; and 22% of the men account for 55% of the loss. These 26 men had been investigated at the same interval after discharge as the rest of the group; the total period since discharge was in their case 185 months—i.e., 23% of the total period for the whole group, corresponding closely to their numerical proportion. Their responsibility for so much of the unemployment in the whole group is therefore not a fallacious inference in a selected group who had been "at risk" for longer than the rest. Their age-distribution did not differ materially from that of the whole group. Only 9 of them had an unsatisfactory previous occupational record—no higher a proportion than was found in the whole group of 120. There was, indeed, no common factor detectable, except that a majority of the 26 had shown pronounced hypochondriacal psychopathy before their enlistment. For years, often since childhood, they had been excessively concerned about their physical health: in some cases their hearts, in others their lungs or their stomach had been the object of solicitude and fear. They had, to use the current phrase, been prone to "psychosomatic illness." This is illustrated by the greater proportion

of patients with "effort syndrome" among them than there were in the whole group of 120 men.

The average interval between leaving hospital and starting work was 1.3 months (standard deviation 1.3): only 33 men had started work during the 4 weeks they were on military pay after discharge from the hospital, and 24 had not obtained employment within the first 3 months after discharge; 38 had returned to the same employer and the same job as before enlistment: these resumed work promptly on discharge; 16 had gone back to the same sort of work as before, but under a different employer.

In all, 53 were now earning less than before enlistment. In a few the descent in earning capacity was emphatic; thus a tobacconist who had built up and owned a flourishing little business now "potted round for an hour or two in the afternoons"; in most cases the man who had formerly earned between £3 and £6 a week had sunk to three-quarters or half of his previous income. Of 105 men who were employed at the time of inquiry 44 were doing only very light or partial work (e.g., taking 2 or 3 days off a week), and the commonest occupations among these were as messenger, handyman, sweeper, cleaner, porter; 7 of them were working for a relative (father or father-in-law). Several patients were leading an idle life, getting up about midday as a rule and putting in only 2-3 hours of desultory work.

The remainder has continued at much the same level as before enlistment, sometimes benefiting, in the semi-skilled and skilled trades, by the rise in wage rates. A few had taken less skilled work than formerly (from French polisher to odd job man in hotel) without any fall in income, but in most cases where there had been an economic descent there was an industrial descent too. As compared with the proportions already quoted, there are now 4 in the professional and managerial occupations; 19 clerical and sales; 14 personal and domestic service; 7 in ARP; 14 skilled; 25 semiskilled; 22 unskilled; 15 unemployed.

There are other measures of social adequacy besides work, but it is more difficult to inquire about them. An investigator cannot knock at the door and ask whether the patient has been illtreating his wife, neglecting his children, drinking, or committing crimes. It says a great deal for the tact and training of the psychiatric social workers who conducted the follow-up inquiries, that without prying or giving offence they did sometimes obtain information of this kind. There were 39 patients whom one could not call socially satisfactory, apart from their work record; the commonest defect consisted in violent outbursts of temper or constant irritability which made it difficult to live in the same house with the man (e.g., "he seldom goes out now, very irritable in the house," "he gets very irritable, nagging and morose; he picks up plates to throw them at his wife, is sorry for it, but says he can't help it; is often 'hateful' to his four young children"). Two of the patients are vagrants now, living chiefly by scarcely concealed begging; another has been stealing, even from his own family, and has been in the hands of the police.

The health of these men after discharge has an obvious bearing on their social adjustment. Almost all of them still had some neurotic symptoms at the time of the inquiry, but these were often trivial. Sixty-two seemed worse than before their enlistment; either they had been apparently free from neurosis then or their symptoms had been less severe. Because of the method of inquiry and the nature of neurosis, however, these figures are not necessarily to be taken at face value. Since leaving the Army 63 had attended a general practitioner for their neurosis, but only 15 had been to a hospital, though they live in London which is relatively well provided with psychiatric outpatient clinics. In a few instances it seemed that psychiatric considerations had not weighed sufficiently in the medical advice subsequently given to the patient: thus an anxious hypochondriac with effort syndrome was "soon after discharge kept in bed 3 weeks by his doctor for heart trouble." This man had been self-supporting before enlistment, but now his work consists in handing tools to other men, receiving only a few shillings a week for it. Another who was treated for postconcussive symptoms was not allowed by his doctor to take up work for 6 months after his discharge from the Army. Some

of these patients, of course, are not disposed to accept medical advice, unless it accords with their own inclinations.

In many cases the likelihood that the patient's illness would lead to such a social situation as he is in after discharge, had been plain: the chronic hypochondriac, the constitutional psychopath, the postmeningitis invalid, the hysteric whose compensation claims for an accident it had taken two years to settle before this war—in them the diagnosis was relevant to the social outcome. But the chief purpose of this inquiry was to ascertain some of the effects of neurotic illness, not to analyse the multiple causes leading to these social effects. It may be said here that the word "neurotic" is used throughout this paper as a convenient epithet to describe men whose mental disturbance is in the main unlikely to demand treatment in a mental hospital in the immediate future; many of the men exhibited, as do some of the population of any neurosis centre, an affective disorder in which the endogenous constitutional causes were as prominent, or more prominent, than the recent environmental ones, and in some men the possibility of later melancholia had to be taken into account in the remote prognosis.

#### POSTAL INQUIRIES

Since conditions in London may not be comparable with those in other parts of the country, a separate inquiry was made by letter about the subsequent history of 95 men who were discharged from the Army between Dec. 18, 1941, and March 26, 1942, to homes outside the London area. This postal method is of course less satisfactory than a personal visit and the information is less reliable, but it can be a serviceable check. The personal hand-written letter from Miss Freeman-Browne (one of the psychiatric social workers of the hospital) was answered by 67; in the letter she referred to the interview she had had with them to discuss plans for their future the day before they left hospital, and asked them about their work and health. Of the 67 who answered the inquiry, 51 said they were now more or less satisfactorily at work; 25 of these had returned to their former employment; 7 men wrote that they had jobs but were unsettled and thinking of changing; 4 considered their work was too heavy for them; 1 was doing only a part-time job, and 4 were unemployed. Fifteen complained that their health was not good, they had been under medical treatment; 8 on the other hand stated they were in better health and happier than ever before. Particulars were later obtained about 11 of the 28 who had not answered the inquiry; 3 of these have passed through a Government training centre; 4 returned forthwith to their former employment; 9 are now at work, though 3 of these are doing only light work.

A further postal inquiry was made, addressed to the labour exchanges of the districts to which another group of men had returned. When the military board at the hospital has decided that a man must be discharged from the Army on medical grounds, an official from the nearby employment exchange sees him at the hospital and completes a form on which the psychiatrist has also entered particulars and recommendations; the form is then sent to the employment exchange nearest the man's home. It seemed likely therefore that the postal inquiry would be more productive than if it had been sent before this procedure of notification was instituted. To 97 inquiries about men discharged between April 2 and May 7, 1942, 66 replies were received; 31 of these men had returned to their former employment, though 2 of them later changed their jobs; 5 others have taken up their old occupation under a different employer; and 23 more are at work, making in all 59 who are employed; 4 have left the district or are otherwise beyond the ken of the employment exchange, another is in hospital, 1 is at a training centre, and a third is unemployed.

#### DISCUSSION

What has been found is not a salutary state of affairs. If the investigation had been limited to postal inquiry, a fairly reassuring picture would have been disclosed, but postal inquiries are often specious and deceptive when used for a psychiatric follow-up. The far more reliable home inquiry by psychiatric social workers showed a disturbing situation. The men had gone downhill as a group: they were less usefully employed than before,

earning less, less contented, less tolerable to live with, less healthy.

There were among them some—rather more than a quarter of the group—whose occupational record had been poor before enlistment. These were mostly unstable men of psychopathic predisposition, and it might seem proper to assume that they would have more than the usual difficulty in adjusting themselves again to their responsibilities and difficulties as civilians. But the difficulties in the way of getting employment are now much less than before; there has been a conspicuous fall in the amount of unemployment since the beginning of the war. The number of men aged 18 years or over who were wholly unemployed in August, 1939, was 730,000; and of those temporarily unemployed 129,000; there were also 52,000 unemployed casual workers. The corresponding figures for June, 1942, were 54,000, 2000, and 3000. The weighted average wage-rate for July, 1942, expressed as a percentage of that for August, 1939, was 130 (Bowley 1942): for London occupations it would appear to have been between 120 and 125. Although the rise in employment (and presumably in ease of obtaining employment) as well as in wage-rates and weekly earnings was not quite so high as this during the period covered by the investigation, it is certain that if the patients were then earning less and drifting into lower-grade occupations than before the war, it was not the state of the labour market that compelled this descent. Changes in the men themselves were responsible.

They were as a group men predisposed to neurotic illness with its social consequences; the changes in their environment and way of life enforced by military service led to the overt exhibition of what had previously been only neurotic tendencies or to the aggravation of their previous neurotic symptoms. Whatever views one may have about the moral worth or character of some of these psychopathic men, it is clearly inept to suppose that their neurosis has simply been a device to evade unwelcome duties, and that it must therefore disappear when they are sure they are absolved from such duties. Moreover, apart from the distressful state in which many of them are, they upset their families (as has been found in this inquiry), and impoverish the community by their reduced capacity. Prevention and remedy are therefore called for unless these disorders are past mending.

Prevention, as a practical war-time measure, would consist in avoiding as far as possible the enlistment of men whose previous history, and condition at the time of initial medical examination, indicate that they are very unlikely on psychiatric grounds to be useful soldiers. This is not easy, and it would be a mistake to shut out from the Army every man with pronounced neurotic tendencies or even symptoms, since some such men make valuable soldiers; but there are many (represented in this series of 120 by the men with decidedly unsatisfactory records in work and health, in social and personal adjustment) who could be spotted as decidedly unsuitable by any instructed doctor to whom the facts were disclosed. It is not merely a question of saving the Army the trouble of giving a training that proves fruitless; the ensuing aggravation of the man's neurotic attributes may impair his health and his social adjustment for a long time after recognition of his military uselessness has brought about his discharge from the Army.

What can be done while he is in the Army to prevent and to remedy neurotic illness needs no discussion here; it is common knowledge that many effective measures to this end have been introduced. Moreover, in neurosis centres and psychiatric hospitals the social and vocational aspects of treatment receive as much attention as the more obviously psychological ones. Most of the men in the Army who have neurotic symptoms are not discharged as unfit, they continue to perform their military duty. The "category E" cases here investigated from an EMS neurosis centre represent only a minority of the soldiers treated there; but still they are not a negligible minority.

What can be done after the man has been discharged from the Army? He can receive further treatment in an EMS neurosis centre if this is considered necessary in order to restore him to his pre-enlistment level of health. In many of these men, however, further hospital care would be useless or harmful. They must re-enter civilian industry and resume family life; their success

in doing so will have an important effect on their health, as was seen in an earlier study (Galloway 1937). It is easier to remember that illness can prevent work than that work can prevent neurotic illness—if only the work is well chosen. This is one of the major problems of psychiatric rehabilitation. The Joint Parliamentary Secretary to the Ministry of Labour has lately said (*Hansard*, Oct. 22, 1942): "all diseases which lead to disability—and there are many—must be brought under review if the picture [of rehabilitation] is to be complete. . . . In consultation with the medical experts, they [the social and industrial experts] should determine whether the patient can return to his former occupation, and if not what other kind of occupation would ensure his making the greatest contribution in the field of productive effort"—and, he might have added, ensure the man's mental health, as far as may be. The chief difficulty, however, is one that was often apparent in the cases here studied. "One of the difficulties about rehabilitation in wartime is that manpower is at a premium, and economic circumstances are such that the individual can obtain a job, whether he is fit or not, and the consequence is that he will perhaps take on a job which is not suitable to him." The unsuitability of the job may even consist in its being beneath his powers: he could do better at something different but more difficult.

The present arrangements sponsored by the Ministry of Labour, the Ministry of Pensions and the Ministry of Health provide for coöperation between doctor and employment exchange officer in arranging training for the handicapped when they wish it, and in helping their return to suitable work. These arrangements are a remarkable advance, but they apply too exclusively to the phase just after departure from hospital. There is much less possibility of collaboration between psychiatrist and employment exchange officer once the patient has been put into his first civilian job after discharge; there may then be no psychiatrist at hand to consult, and the EMS psychiatrist who treated the man in the neurosis centre is hundreds of miles away. Sometimes the general practitioner may be in a position to give valuable guidance, but in the series of cases here reported the doctor had not, as far as could be ascertained, usually taken an active part in advising on the industrial and social problems involved in the man's treatment.

The improved medical and industrial arrangements for rehabilitation, and the readiness with which a man can now get employment of some sort however handicapped he may be, probably account for an improvement in the state of affairs disclosed by the follow-up at different periods since it was begun. The findings in August, 1941, were more unsatisfactory than later on. By that time 60 of the 120 men had been visited. The duration of unemployment in the group was then half the period of potential employment since discharge from hospital; 13 of the 60 were unemployed, and only 12 had been in constant employment since leaving hospital; 30 were employed at a lower occupational or economic level than before enlistment; only 21 could be regarded as socially satisfactory. As the figures for the whole 120 show, the social condition of discharged neurotic soldiers has improved since then, and if any credence is to be given to the results of the postal inquiry is still improving. It is still far from satisfactory, but further development of the arrangements for coöperation between psychiatric and social, especially industrial, agencies would be likely to bring about further improvement.

Appropriate occupation is not, of course, the only means of improving or maintaining the mental health of these men, any more than their occupational level is the only criterion of whether their neurosis is still troublesome. The occupational level has been used for the latter purpose here because it has proved the best objective guide as to the social effects of the men's neurotic illness (Lewis 1935); and suitably selected occupation can be a more potent factor than psychotherapy or drugs in furthering mental health. Good advice cannot be given about a suitable occupation unless the adviser considers the whole of the man's psychological and social situation: the tangled skein of causes that led to his illness; the financial, domestic or sexual aspects of his life; his present wishes, interests and necessities. In short, treatment will be appropriate to

the individual, and not limited to a single remedy. But of all the remedies and preventive measures, occupational adjustment will, under present conditions and for such a group, be the most potent, critical and urgent, both from the standpoint of the individual's well-being and of the community's needs. These are hardly separable, since the satisfactions of the individual depend in some measure on his knowledge of the part he is playing in serving the needs of the community. Considerations of this sort, hitherto more familiar to students of industrial psychology than to doctors, have lately become matters for public discussion. "In wartime almost everybody can rely upon having the elementary social satisfaction, which no insurance payments were able to give the unemployed, of taking a useful part in the activities of his social group. . . . As in so many social problems, the economic factors, because they are tangible and easy to formulate, create a screen which masks subtler psychological preoccupations" (*Times*, Nov. 19, 1942). The working conditions, both material and psychological, which are good for normal healthy workers (Viteles 1933, Wyatt and Langdon 1937, Collier 1940, Roethlisberger and Dickson 1939) are those which benefit the neurotic worker too; but the penalties for ignoring the sound principles of industrial psychology are more quickly and plainly made evident in the men with neurotic traits or symptoms. These principles can best be put into effect when the doctor (especially the psychiatrist), and the occupational adviser or administrator (especially the officer of the employment exchange and the personnel manager), work in conjunction making the most of the necessarily limited facilities at present for appropriate placement or transfer of workers.

## SUMMARY

A series of 120 soldiers discharged from the Army on account of neurotic illness were investigated by personal visits to their homes, which were in London. The average interval since their discharge into civilian life was 6½ months.

Their pre-service occupations had been: professional and managerial 8; clerical and sales 20; domestic and personal service 13; Regular Army 5; skilled 17; semiskilled 37; unskilled 20.

Their occupations at the time of the inquiry were professional and managerial 4; clerical and sales 19; domestic and personal service 14; ARP 7; skilled 14; semiskilled 25; unskilled 22; 15 were unemployed.

Of the 15 unemployed, 11 had done no work at all since leaving the hospital. The total duration of unemployment for the whole group was a third of the total period since their discharge; part of this was accounted for by the period of 1 month on pay which is allowed to category E men after leaving hospital; 22% of the men were responsible for 55% of the total duration of unemployment of the whole group; 24 of the men had not obtained any work within the first 3 months after discharge.

In spite of the general rise in wage-rates and earnings, 53 of the men are now earning less than they did before enlistment.

Of the 105 in employment, 44 are doing only light or desultory work.

There was evidence that 39 patients were socially unsatisfactory otherwise than in their occupations; they had been guilty of minor delinquency or were inordinately irritable and quarrelsome.

Their relatives considered 58 men to be in as good health as before enlistment; 63 had attended a general practitioner since discharge; 15 had been to a hospital.

An inquiry by letter was sent to another group of men discharged from the Army on account of neurosis whose homes were in the Provinces or in Wales. To 95 inquiries there were 67 answers; 4 wrote that they were unemployed, and 12 that their work was not satisfactory. The other 51 are working; 15 of these reported that their health was not good, and 8 that they were in better health than ever.

A postal inquiry on the same lines was sent to the labour exchanges of the districts to which 97 ex-soldiers with homes elsewhere than in London, had returned; 68 replies were received; 59 of the men are at work.

The number of men who returned to the same sort of work under the same employer is high in all three groups.

Of the 120 Londoners, 39 did this; of the 67 in the Provinces who replied to a personal letter; 25; and of the 66 reported on by the labour exchange, 31.

Comparison of the findings at different periods between March, 1941, and June, 1942, shows that the proportion of these men who could be classed as socially satisfactory since discharge had risen. In August, 1941, when inquiries had been made about 60 of the 120 men, 22% were unemployed, and only 35% could be classed as socially satisfactory in respect of work and otherwise; by June, 1942, when the whole 120 had been visited, the corresponding figures were 12% and 50%. Such percentages cannot be used for exact comparison because of the somewhat arbitrary nature of any judgment as to whether a man is socially satisfactory, but they show a decided trend, here attributed to the increasing demand for labour, and to the introduction of an official scheme of rehabilitation in which the doctor and the employment exchange can cooperate in all cases.

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## ERYTHROPOIESIS IN SCURVY

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ANÆMIA is a classical feature of scurvy, but the changes in the bone-marrow that accompany this anæmia are less well known. The standard textbooks describe the bone-marrow as hypoplastic or fibrotic, and Harris (1927-28), in a full description of the morbid anatomy of infantile scurvy-rickets, described formation of a gelatinous marrow with failure of normal erythropoiesis. Mettler, Minot and Townsend (1930) examined the marrow obtained by sternal biopsy in an adult patient with typical scurvy; before treatment they found a moderate hyperplasia with scattered small groups of erythroblasts and no fibrosis; after treatment cellularity was not much changed, but there were more erythroblasts and mitotic figures were seen among them. This observation was interpreted by Witts (1932) as suggesting that ascorbic acid (vitamin C) was one of the factors important for proper maturation of red blood-cells from normoblasts. Parsons and Smallwood (1935) disagreed; they argued that increased mitosis indicated merely increased production rather than maturation, and in their opinion slowing down of the whole process of erythropoiesis was the cardinal feature of scurvy; but they did not support this thesis by describing any observations of their own on the marrow changes. Jennings and Glazebrook (1938) carried out sternal punctures on two cases of typical adult scurvy; in one the marrow picture was complicated by the coincidence of pernicious anæmia, in the other patient there were 18% of erythroblasts of various types, which is within normal limits. They did not mention the cellularity of the marrow nor did they repeat the punctures after treatment. In the present paper the results obtained on three patients with typical scurvy are given; blood-counts and sternal marrow punctures were carried out before treatment, and the time when the patients were excreting not less than 50% of a test oral dose of ascorbic acid within 24 hours was taken as a convenient point for repetition of these investigations.

## CASE-RECORDS

CASE 1.—A commercial traveller, aged 57, was admitted to hospital on April 27, 1941, complaining of extensive and persistent bruising and disability of the left ankle following a "sprain" 8 weeks previously. He also had had for about 10 days swollen and bleeding gums and a foul taste in the mouth. On examination the gums were swollen and purple; the teeth carious, blackened and loose. His complexion was sallow and mucous membranes pale. The region of the left ankle-joint was swollen, tender and discoloured; there was a purpuric rash on the leg from knee to ankle and a

BLOOD AND BONE-MARROW COUNTS IN SCURVY  
Differential counts represent percentages of total nucleated cells

	CASE 1		CASE 2		CASE 3	
	Treatment		Treatment		Treatment	
	Before	After	Before	After	Before	After
<b>BLOOD</b>						
Red cells *	3-050	4-600	3-160	4-320	4-010	4-420
Hæmoglobin †	57	90	68	86	70	82
Colour-index	0-95	0-95	1-06	1-00	0-87	0-93
White cells ‡	5200	7200	5600	5600	8300	5400
Polymorphs %	61-0	61-0	53-0	60-0	71-0	62-5
Eosinophils %	1-5	2-5	1-5	3-0	1-5	0
Basophils %	0	0	0	1-0	0	0
Lymphocytes %	35-0	31-0	39-5	31-0	24-0	33-5
Monocytes %	2-5	5-5	6-0	5-0	3-5	4-0
<b>BONE-MARROW (cells %)</b>						
Hæmocyto blasts	0	0-8	0	0	0	0
Pro-erythroblasts	0	1-8	0-6	1-6	2-4	3-2
Normoblasts (total)	7-4	41-0	2-0	33-2	39-4	44-6
Early	1-0	3-4	0	5-0	2-4	2-8
Intermediate	3-6	20-2	1-4	19-0	22-0	29-0
Late	2-8	17-4	0-6	9-2	15-0	12-8
Polymorphs	56-0	20-0	56-6	21-2	15-2	20-0
Eosinophils	1-0	2-0	0-6	1-8	1-6	1-0
Basophils	0-4	0-2	0-6	0-4	0-6	0
Metamyelocytes	3-4	14-0	13-4	16-0	12-2	12-4
Myelocytes	2-4	12-0	2-6	14-0	15-2	12-6
Myelo blasts	1-6	0-8	0	1-0	0-6	0-6
Lymphocytes	26-0	4-2	22-6	9-6	8-2	3-2
Plasma cells	1-2	2-4	0-6	1-2	3-6	2-4
Monocytes	0-6	0-8	0-4	0	1-0	0
Cellularity	Dim.	Incr.	Dim.	Norm.	Norm.	Norm.

\* Millions per c.mm. † Per cent. Haldane. ‡ Per c.mm.

No megaloblasts seen in any specimen.

"After treatment" indicates ascorbic acid given to the point where about 50% of a test oral dose was excreted within 24 hours. Nomenclature of marrow cells according to Israëls (1941).

similarly distributed rash was also present on the right leg. Nothing specially unusual was found on examination of the heart, lungs, abdomen or central nervous system. His diet consisted mainly of puddings, eggs and bacon; no vegetables or fruit had been taken for at least 12 months.

The urinary excretion of ascorbic acid was very small and the blood ascorbic acid was less than 0-1 mg. per 100 c.cm. Ascorbic acid was given by mouth and 6500 mg. was needed to raise the urinary excretion to 50% and the blood ascorbic acid to 2 mg. per 100 c.cm. The blood-count showed a normocytic anæmia and the sternal marrow was hypoplastic, the erythroblasts and granulocytes being particularly depressed. After treatment with ascorbic acid the anæmia disappeared; there was greatly increased activity of the erythropoietic marrow, many normoblasts were now present and quite a few showed early hæmoglobinisation. Figures are given in the table. No iron or liver was given with the ascorbic acid. The clinical signs and symptoms rapidly cleared, except for the ankle which remained stiff and rather painful for some weeks.

CASE 2.—A worker in a rubber factory, aged 47, had noticed pain and swelling of his right ankle for about 10 weeks before coming to hospital. Two weeks later a dark-blue patch appeared on the inner side of the left knee which spread round the joint; movement of the joint became painful. Further discoloured areas appeared on the left thigh and leg and also on the right leg. There was no affection of the mouth. His appetite was good but he had always disliked fresh fruit and vegetables; in 1930 he had "gastritis" and since then had restricted his diet. His work was carried on in a hot and dusty atmosphere, but he took little alcohol. On examination the left lower limb showed ecchymoses of varying size all over from the gluteal fold to the ankle; the left knee was discoloured and swollen and movement was painful. The right ankle was swollen and tender and the skin over it was reddish; there was a large ecchymosis on the outer side of the right knee. The gums were unaffected.

The urinary excretion of ascorbic acid was very small and the blood ascorbic acid was 0-15 mg. per 100 c.cm.; an oral dose of 5500 mg. ascorbic acid was needed before excretion rose to 50%, and the blood ascorbic acid was then 2-1 mg. per 100 c.cm. The blood-count showed a normocytic anæmia; the marrow was less cellular than normal, erythroblasts were particularly depressed. After treatment with ascorbic acid

the anæmia improved rapidly and the marrow regained its normal cellularity, considerable erythropoietic activity being visible. Figures are given in the table. No iron or liver treatment was given. The clinical signs and symptoms also rapidly improved, though some residual pain in the affected joints persisted for some weeks.

CASE 3.—A capworker, aged 66, was sent by his panel doctor on account of bruising and a hæmorrhagic rash on the legs which had been getting worse for 6 weeks; the right knee in particular was swollen and painful. On examination both legs showed petechiæ and ecchymoses; the right knee was discoloured and swollen posteriorly, and movement was painful. The gums were swollen and discoloured and there were a few hæmorrhagic spots; the remaining teeth were carious and dirty. The skin of the lower abdomen showed typical follicular hyperkeratosis. He was rather pale. No exceptional signs were found in the other systems. His diet consisted chiefly of bread, tea, margarine and his meat ration; he lived mostly alone and had no facilities for proper cooking.

The urinary excretion of ascorbic acid was very small and the blood ascorbic acid was 0-08 mg. per 100 c.cm. For saturation to 50% excretion point 3200 mg. of ascorbic acid was required, and the blood ascorbic acid was then 1-85 mg. per 100 c.cm. The blood-count showed a mild microcytic anæmia, and in this patient the bone-marrow was practically normal; cellularity was not diminished and normoblasts were 39-4%. Treatment with ascorbic acid was followed by increased hæmoglobin in the blood; the marrow became more cellular, and although the proportion of normoblasts was not significantly increased there were signs of enhanced erythropoietic activity such as the presence of many mitotic figures and early hæmoglobinisation. Figures are in the table. After treatment the hæmorrhages soon faded, the hyperkeratosis disappeared, and the general condition improved. A maintenance dose of 50 mg. ascorbic acid was given daily; no iron or liver was given at any time.

#### DISCUSSION

In two of the patients the marrow showed the diminished cellularity and failure of erythropoiesis classically associated with scurvy; case 3 showed changes resembling the patient of Mettler and others (1930). The erythroblasts showed no evidence of failure of maturation at any particular stage of development such as distortion or failure of hæmoglobinisation; in cases 1 and 2 they were simply fewer than usual. The marrow in the recovery phase presented the usual picture of response to loss of blood-cells. It is difficult to eliminate failure of maturation, but evidently it is not a primary cause of the anæmia of scurvy; as Parsons and Smallwood (1935) said, slowing down of erythropoiesis is the main factor.

That lack of ascorbic acid in the diet may eventually lead to depression of erythropoiesis and consequent anæmia should be borne in mind, especially under present conditions of dietary restriction. Recent work has justifiably drawn attention to the increased incidence of anæmia, particularly among pregnant women, and inadequacy of iron in the diet has been suggested as the cause (Kay and Alston 1941, and see *Lancet*, 1942 and 1943). Present-day diets, particularly in winter, are also deficient in ascorbic acid; the evidence given here shows that this may well be a contributory cause of this anæmia, and ascorbic acid should be given to any patient whose anæmia does not respond satisfactorily to iron.

#### SUMMARY

The bone-marrow changes in three cases of scurvy with anæmia, before and after ascorbic acid treatment, are described. In two patients there was evidence of diminished erythropoiesis, in the third erythropoiesis was not significantly abnormal.

After ascorbic acid treatment the marrow showed increased erythropoiesis in all the patients. The anæmia also rapidly improved without any specific anti-anæmic treatment.

The effect of ascorbic acid deficiency seems to be more a depression of erythropoiesis than a failure of maturation at any particular stage.

The possible relation of the present shortage of ascorbic acid in the diet to the increased incidence of anæmia is mentioned.

I am indebted to the Director-General of Medical Services, RAF, for permission to publish this paper. This work was

carried out in the Department of Clinical Investigation and Research, University and Royal Infirmary, Manchester, and the patients studied were under the care of Dr. John F. Wilkinson, the director. I am grateful to Dr. G. Kohn for the ascorbic acid determinations.

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## BONE AND JOINT INJURIES \*

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By the impetus of war, promoting the development of surgery and of medicine, more suffering has been saved than was inflicted by all the wars of history. In pre-Listerian days a compound fracture was no less deadly than bubonic plague; and since that day, despite increasing violence, despite the multiplicity of wounds and the gravity of contamination, the mortality of compound fractures has been steadily reduced by the development of surgical skill to 70 or 80% in the early months of the last world war, to 10% in the concluding months of that war, to a fraction of 1% in the recent Spanish war, and a similar proportion in the war upon which we are now engaged. Not only lives but limbs are saved. Dominique Jean Larrey who died in 1842 is reported to have amputated 200 limbs in a single day: the casualty surgeon of 1943 is unlikely to amputate so many in the whole of his surgical career. No limb is amputated unless there is irretrievable destruction of the main blood-vessels. In a series of Royal Air Force base hospitals the incidence of late amputation for spreading infection, gas gangrene, secondary hæmorrhage and other sequelæ of wound infection was 0.1%—one amputation per 1000 severe limb injuries including infected wounds and compound fractures.

Gas gangrene has almost disappeared from the infection of wounds, and I do not hesitate to predict that, when the organisation of casualty services is so perfected that every wound is excised within a few hours, it will disappear altogether. In a series of 600 casualties from a recent action treated in Canadian base hospitals in the South there was an average time-interval of 31 hours between wounding and surgical intervention; and gas gangrene was recognised on admission in 2.2% of cases; but there was not a single instance of postoperative gas gangrene in cases submitted to wound excision and debridement. In my experience of casualty surgery in bombed cities, where despite the gravity of crushing and explosive injuries most wounds can be treated within a few hours, I have yet to see my first civilian case of gas gangrene in this war.

Not only are lives saved, not only are limbs saved, but function is saved. The malunion and non-union which were so common in former years have almost disappeared. Pseudarthrosis will soon be deleted from the list of complications of fractures. It is true that the principle of complete and continuous immobilisation has recently been subjected to another attack. Nevertheless, whether you agree with me in securing as complete an immobilisation as possible, or whether you accept a sort of homœopathic doctrine that whereas much movement is bad, little movement is good, there can be but one answer to the question "How long should this fracture be immobilised?" and the answer is "Until the fracture is united." Every fracture with an ossifiable medium between the fragments will unite if it is immobilised long enough—and this applies to closed fractures, open fractures and infected fractures. Infection is a cause of slow union, but not of non-union. In a consecutive series of 500 fractures of the shafts of the femur and tibia recently treated by many surgeons in RAF hospitals, despite a high incidence of contaminated infected and grossly comminuted fractures, there was not a single case of established non-union.

\* Extracts from the John Burns lecture delivered before the Glasgow Faculty on Jan. 13, to appear in full in the *Glasgow Medical Journal*.

The control of infection is within sight, and the day may not be far distant when a chemotherapeutic agent is available for every pathogenic organism, including, I trust, the tubercle bacillus and the viruses of poliomyelitis, influenza and other infections. In the treatment of shock, hæmorrhage and the crush syndrome and the practice of blood and plasma transfusion, great progress has been made. Pioneer work in the treatment of burns recently developed in this city is already gaining recognition. Operative technique and manual dexterity which Professor Illingworth described only two months ago, in a most excellent textbook, as "the hallmark of surgical craftsmanship" has gained impetus from metallurgical research adapted to the internal fixation of fractures and the technique of bone grafting. Casualty and accident services are being organised—and the cities of Scotland may yet gain a lead over the capital city of England. Rehabilitation, reconditioning and vocational retraining are being developed. Never was surgery more full of promise; never was there greater hope of future progress; never since the days of Hippocrates could a young surgeon say with greater conviction "this is the age I would have chosen."

## DANGERS OF TOURNIQUETS

"More limbs and lives have been lost by the improper use of the tourniquet than have been saved by its proper use."

In teaching first-aid workers, hours are devoted to a consideration of pressure points and tourniquets. Yet if a tourniquet is not applied tightly enough, the veins are obstructed but not the arteries; we all have memories of operating on limbs when the tourniquet has slipped, and gaining relief from hæmorrhage for the first time when the tourniquet was removed. I have vivid recollections of a child who for this reason almost bled to death; the tourniquet had been far more perilous than the wound. On the other hand if the unfortunate ambulance worker applies the tourniquet too tightly he is more than likely to cause traumatic arterial spasm and gangrene. It is not enough to remove the tourniquet at intervals, for if spasm is once induced it continues whether the tourniquet is removed or not and many cases of ischæmic contracture and gangrene have been recorded. The danger arises from the force with which the tourniquet is applied, just as much as the length of time that it is in position, and how is the inexperienced ambulance worker to judge with precision between the danger of applying a tourniquet too tightly and the still greater danger of not applying it tightly enough? There is yet another danger: the defence of the wound against infection, and particularly against anaerobic infection, depends upon the vitality, the blood-supply and the oxygenation of tissues; if wounds already devitalised are completely cut off from their blood-supply for half an hour or more they are rendered anaerobic, they become a suitable medium for the growth of anaerobic organisms, and a vicious circle is set up—infection, tension, devitalisation, therefore more infection, more tension and so on.

The dangers associated with the application of tourniquets by amateurs are so real that I suggest re-consideration of the question as to whether tourniquets are ever necessary in first-aid treatment. John Hunter gave us the answer: "An amputation below the knee in most cases would not kill by its hæmorrhage even if left to itself." When he divided the blood-vessels in the thigh of a boar bleeding ceased before the animal weakened. After exposure of the posterior tibial artery of a dog, he found the vessel so contracted as to prevent the blood from passing through, and when divided the blood only oozed from the orifice. Hunter's experimental work was the first recognition of segmentary spasm of arteries—or as it was subsequently called Kroh's arterial spasm or "stupeur arterielle"—the reflex vasoconstriction which protects against rapid and complete exsanguination. Animals do not bleed to death from complete division of an artery; neither does man. In the last war Makins recorded cases of large arteries severed by bullets without external hæmorrhage or hæmatoma formation. In this war an airman's foot was severed by the propeller blade of an aircraft and with no tourniquet having been applied he was admitted to hospital in excellent condition having suffered little

loss of blood. A commando soldier under training sustained a severe hyperextension strain of the knee and complained of tearing pain in the popliteal space; operation disclosed a complete rupture of the artery with little more than an ounce of blood in surrounding tissues. A few weeks ago F. W. Holdsworth reported two cases of avulsion of the whole upper limb including the clavicle and scapula in which there was no arterial bleeding.

A completely severed artery is controlled by traumatic arterial spasm even more effectively than it is controlled by a tourniquet. The only danger of continued hæmorrhage is from a partly severed vessel where the hole cannot be sealed by spasm; but it can be sealed by firm pressure over the wound. There can be no doubt that limbs and lives are being destroyed by leaving tourniquets in the hands of unskilled first-aid workers. Let us remove tourniquets from first-aid equipment, and teach ambulance men the methods of pressure bandaging.

#### WOUND EXCISION

"Behold, a sower went forth to sow. And it came to pass as he sowed that some fell on stony ground, where it had not much earth. And when the sun was up, because it had no root, it withered away. And other fell on good ground and sprang up and brought forth some thirty, some sixty and some an hundred."

The seed was equally sown—it was the soil that was important; and so it is with a wound. The stony ground in which the seed cannot take root is the wound with vascular pulsating walls of living cells from which all foreign matter and dead tissue has been excised. Such a wound is aerobic for the tissues are oxygenated with their own blood-supply, and gas gangrene bacilli cannot survive. An essential step is the free division of deep fascia in order to permit subsequent swelling of muscles without strangulation and ischæmia; and in no circumstances is it permissible to suture fascia, muscles, periosteum or other deep layers of the wound. Similarly—with the very few exceptions of sucking wounds of the chest, open wounds of the brain and some penetrating wounds of joints—the skin should not be sutured. Only two purposes are served by suture of the skin; to occlude the wound and prevent secondary infection; and to gain a neater scar. Occlusion can be secured no less effectively and much more safely by a plaster cast. The neatness of the scar is to be balanced against the risks of infection: tension within a sutured wound causes spreading infection, possibly gas gangrene, amputation or death. Is any surgeon justified in gambling when the stakes are a neat scar against an amputated limb? It is no part of the technique to *pack* the wound with gauze: *pack* is an unfortunate word, implying a degree of pressure far in excess of that with which "one holds the hand of a lady when one greets her"—the estimate originally made by Gamgee, and quoted with such gallantry by Trueta. Gauze is lightly laid between the walls of the wound, the skin is protected with soft paraffin, and plaster is applied. The experience of Gamgee of Birmingham, Winnett Orr of Nebraska, Trueta of Barcelona, and many other surgeons who have employed this method for over ten years has contributed to the safety and success of the closed plaster vaseline gauze technique.

#### REHABILITATION

"This is the greatest error in the treatment of sickness, that there are physicians for the body and physicians for the soul, and yet the two are one and indivisible."

The principle of rehabilitation was thus enunciated 2000 years ago by Plato. Rehabilitation is not the speciality of physiotherapists, electrotherapists or occupational therapists; it is not the speciality of physical training instructors or medical gymnasts; still less is it the speciality of a newly created body of experts which will surely arise if the Royal Colleges misguidedly accept the recent Tomlinson recommendation and institute diplomas in rehabilitation. It is true that masseuses, occupational therapists and physical training instructors as well as physicians, specialists and surgeons must be trained. But they must be trained to treat the whole disability and not just part of it. Take, for example, the application of rehabilitation to the treatment of bone and joint injuries, which I have been advocating for nearly ten years through the deliberations of British Medical Association, Trades Union Congress, British Orthopaedic

Association and many other fracture and rehabilitation committees. We were content to treat the fracture, and expected the patient in his ignorance to treat the wasted muscle and stiff joint, though he had no medical training to discriminate between the pain of a stretching adhesion which called for exercise, and the pain of an unexpected complication which called for rest; a patient who had broken his leg was discharged from hospital as "cured" when no-one had any idea whether he could run, whether he had learnt to jump, or whether he could climb stairs. It is astonishing that so little attempt was made to explain to a patient the nature of his disability and to relieve his natural fears and misgivings. Physical treatment was but half completed; psychological treatment was wholly neglected. And when a patient drew the apparently obvious conclusion that there was a residual and permanent disability, and turned to the only refuge he knew—the refuge of litigation and lump sum settlement—we blamed him and called him a malingerer. Was there ever greater injustice? Malingerers are made, not born. Malingering is a complication of fracture treatment no less certainly under the control of the surgeon than mal-union and non-union. But though a part of the technique of rehabilitation is to teach the patient to walk, run and jump, and to arrange for active exercises, graduated stresses, occupational activities, games and recreations the principle is more profound. John Buchan put it in these words: "It is not enough to have specialists for psychological diseases and specialists for physical diseases; the same man must in a sense be both. A good doctor should be, and indeed always has been, something of a psychologist." A good nurse, a good masseuse, a good medical gymnast is also something of a psychologist; the whole team is trained in rehabilitation. We must not perpetuate the 2000 year old error—we must not separate rehabilitation from medicine and surgery. Above all we must not train "rehabilitationists." When the surgeon himself, with the aid of every member of his team, gives the patient confidence, explains his problems, anticipates his fears, reassures his mind, and completes his treatment, then he becomes a physician of the body and the soul. He leaves the ranks of "physicians doomed to the practice of surgery"; he joins the ranks of surgeons dedicated to the practice of medicine of the soul.

## SECONDARY AGRANULOCYTIC ANGINA

C. MCGIBBON

F. GLYN-HUGHES, M D LPOOL

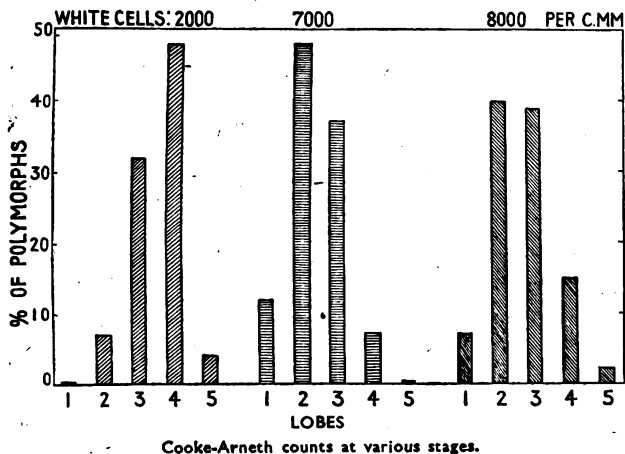
M B LPOOL ASSISTANT DERMATOLOGIST TO THE CORPORATION OF LIVERPOOL SENIOR DERMATOLOGIST TO THE CORPORATION AND SENIOR HONORARY DERMATOLOGIST TO THE RADIUM INSTITUTE AND THE HOSPITAL FOR SKIN DISEASES, LIVERPOOL

IN agranulocytic angina there is considerable decrease in the number of granulocytes circulating in the bloodstream, associated with a severe throat infection in a patient who is gravely ill. A primary and a secondary type of this disease have been described, the primary being of unknown ætiology and the secondary being due to some known poison, such as the sulphonamide or nearsphenamine group of drugs. The case described here developed during a course of antisyphilitic treatment with nearsphenamine and bismuth and was ascribed to the toxic effect of the arsenical drug on the leucopoietic tissues.

#### CASE-HISTORY

A previously healthy young man of 24 presented himself with a papulosquamous syphilide of 2 weeks' duration. He gave neither history nor evidence of a primary sore, but the Wassermann reaction of the blood was strongly positive. The rash was considered to be of the early secondary type. Treatment consisted of alternating doses of 0.3 and 0.45 g. of nearsphenamine, with bismuth 0.1 g., injected at intervals of 3 and 4 days respectively. The arsenic was dissolved in 10 c.c.m. of 10% sodium thiosulphate. No ill effect was observed until the eighth injection when the patient developed a "cold"; 2 days later he complained of a sore throat. The tonsils were large, there was a mild pyrexia and he was given aspirin, gr. 20 three times daily, potassium chlorate and myrrh as a gargle, and kaolin poultice locally. Since his condition remained good he was given a ninth injection, after which he complained of increased dysphagia. The temperature rose to 102° F., but fell to normal next day, while the

tonsils remained large but clean. His clinical condition improved and it was decided to give the tenth injection. He then complained of headache, vomiting and cough and there was an exacerbation of throat symptoms. Examination now revealed a grey slough on the right tonsil. The gums were normal, there was no cervical adenitis, nor evidence of general lymphadenopathy, the spleen was not enlarged, and the liver seemed normal on palpation. The temperature was now 103.6° F. A raised respiration-rate and a few scattered rhonchi were the only chest findings. A specimen of urine contained a small amount of albumin, occasional red cells and granular casts. The clinical condition, however, had deteriorated rapidly and the outstanding symptom appeared to be extreme exhaustion. White count: 3000 per c.mm.,



Cooke-Arneth counts at various stages.

consisting of 2270 small mononuclears, 120 large mononuclears and 600 polymorphs per c.mm. Agranulocytosis was diagnosed.

Blood-transfusion was given immediately: 1000 c.cm. of citrated bottled whole blood was transfused within about 3 hours of bleeding. The same evening 10 c.cm. of sodium pentose nucleotide was given and next morning a white count showed that the total leucocytes had dropped to 2000, polymorphs 350, large mononuclears 40, and small mononuclears 1600 per c.mm. The clinical condition, however, was much more encouraging. The temperature had fallen to 101° F., the pulse was less full and less rapid, and the patient was definitely brighter and less exhausted. Sodium pentose nucleotide 10 c.cm. was given three times that day. Next day an effort was made to determine if there was any fluctuation in numbers of white cells during the day. Counts were made in the morning, at midday and in the late afternoon. Total count in the morning: 2600; falling at midday to 2400 and in the afternoon to 2000; throughout the day, the polymorphs remained at approximately 500. A watch was kept for immature white cells, but none was seen and the polymorphs were mainly of the three- and four-lobed type. As the temperature had once again risen to 103.6° F. the dose of sodium pentose nucleotide was increased to 50 c.cm. daily and 2 c.cm. of 'Anahamin' (BDH) was added. Next morning showed a remarkable change. The patient was bright and the pulse calm. The throat condition was much easier and the temperature fell to normal during the next 12 hours. White count: 7000, with 3600 polymorphs; a high percentage of one- and two-lobed polymorphs, but still no immature cells. Again there was a slight fall in count, to 6000 cells, towards evening. The urine still contained a trace of albumin, and hyaline and granular casts. Similar white-cell counts were obtained on the fourth day, except that the polymorphs were of the three- and four-lobed variety. Sodium pentose nucleotide 20 c.cm. only, was given for a further day, and no more injections. On the seventh day the polymorphs were 7000 and the total count 10,000. During the next few days the polymorphs gradually fell until they were stabilised at 4000 with a total white count of 7000 per c.mm. The patient was sent to a convalescent home for a fortnight. On his return a few weeks later he reported that he was perfectly well and is performing his full duties as a seaman.

#### DISCUSSION

It may be argued that it was unwise to continue treatment after it was evident that the administration

of arsenic was at least causing some reaction. The symptoms were not severe in the beginning, however, and could fairly be ascribed to a common cold. Further it was essential that the course of arsenical therapy should not be interrupted except for symptoms more serious than those exhibited by the patient. In our experience interruption of this first course of arsenic may be disastrous, in spite of efficient treatment later, since the patient may remain Wassermann-fast. In view of the experience derived from this case it seems advisable that, despite the prevalence of hospital throat, routine white-cell counts should be done on every patient who exhibits throat symptoms during a course of arsenical therapy.

Blood-transfusion in the treatment of agranulocytosis has been criticised on the grounds that a lowering of white-cell count may follow the transfusion, as happened in this case, but the blood given had been withdrawn from the donor some 3-5 hours earlier, and it seems reasonable to suggest that the granulocytes had lost their motility during this time and were rapidly disintegrated when they re-entered the blood-stream. Moreover, presumably the most mature white cells in withdrawn blood are already near the end of their life-history. The further decrease in white cells on the day after the transfusion may thus have been relative only and not absolute. Certainly the rapid downhill progress of the patient was arrested and there was an undoubted improvement in his general condition within a few hours of the transfusion. Our experience with sodium pentose nucleotide agrees with that of other workers. There was a definite reaction, shown by dyspnoea and perspiration, but it was transient and required no treatment except reassurance.

Cooke-Arneth counts performed on the blood before, during and after treatment gave interesting results. Before treatment there was a considerable shift to the right—an exceedingly unusual finding. Treadgold (1920) noticed that a slight shift to the right was commoner than was supposed by either Arneth (1904) or Cooke (1914). He found it in some cases of leprosy, ankylostomiasis and dysentery, and occasionally in syphilis. In none of his cases was the shift nearly so definite as in the case under discussion. It seems probable that except in cases where the formation of young polymorphs is prevented a considerable shift to the right can never occur. Here, then, is an exceptional case where a severe toxæmia was not reflected in the Arneth count. During treatment, the count showed a shift to the left although the patient was improving in health—an apparent anomaly. After treatment there was a slight shift to the right as the leucopoietic tissues recovered and the count returned to normal (see figure).

It was important to consider the future administration of antisiphilitic remedies in this patient. If agranulocytosis had not arisen the patient would have received a second similar course of treatment after 3 months rest, and a third course after 6 months interval. The further administration of arsenic in the form of neoarsphenamine would obviously have been attended by grave risk. Goldberg (1939) describes a case of agranulocytic angina in a pregnant woman during a course of neoarsphenamine therapy; it was essential for her to receive arsenic in some form to prevent the transmission of syphilis to the foetus. He successfully instituted a course of 'Mapharside' therapy 3 days after the white count returned to normal. In view of the additional risk of pregnancy in conjunction with the agranulocytosis and the successful institution of mapharside therapy it seemed justifiable to proceed with this form of arsenic in our own case at a later date, and in fact he has since had twelve injections of mapharside in bi-weekly dosages of 0.04 g. and 0.06 g. White counts have been done twice weekly, and remained constant at 7000. Further treatment was given in hospital where his blood-picture could be carefully followed. Some English observers have not been impressed with the value of mapharside, but in our experience it has been successfully exhibited in cases with a recent history of arsenical dermatitis and jaundice.

#### SUMMARY

In a case of agranulocytosis arising during neoarsphenamine administration recovery followed treatment with blood-transfusion and sodium pentose nucleotide.



White-cell counts should be carried out in all patients developing sore throat during arsenical treatment.

It is suggested that agranulocytosis in patients undergoing arsenical treatment need not contra-indicate further arsenical administration if mapharside is used and a careful watch is kept on the white-cell count.

We wish to thank Mr. A. L. Saul, Mr. R. J. Ousby and Mr. W. Smith for their help.

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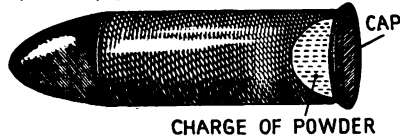
## CANNON-SHELL INJURIES

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CANNON-SHELL injuries are likely to form a high percentage of the total casualties admitted after a raid by low-flying aeroplanes. The precise action and purpose of some types of cannon shell are unknown, but speaking generally four types are used—high-explosive, incendiary, armour-piercing, and tracer shells, all consisting of a nose-piece surrounding a charge of explosive with a metal cap fitting over the base (see figure). The details vary with the type of shell.

← --- NOSEPIECE --- →



The bore of a cannon shell is about 1 in. and its velocity in the neighbourhood of 3000 feet per sec. Such a missile is likely to cause a

host of different injuries, but with at least two exceptions they are similar to those found in casualties from bombing raids. The degree of penetration and destruction of tissue from high-explosive shell fragments after impact does not differ from that caused by bomb shrapnel. All limb wounds are likely to show either gross comminution of bone or severance of nerves and vessels, or both, owing to the size of the shell. Results in direct hits of abdomen, thorax and chest cannot be predicted.

## THEORIES OF BEHAVIOUR OF SHELLS

One exceptional type of injury caused by cannon fire is described as a theoretical possibility in the aetiology of a dangerous form of penetrating wound. The aluminium cap at the base of the cannon-shell, fitting over the end of the nose-piece, has been found in the tissues as a foreign body in 5 casualties resulting from "hit and run" raids. After disintegration of the nose-piece the cap continues to go forward with considerable velocity as shown by its depth of penetration into the tissues. The term "disintegration of the nose-piece" covers fragmentation on impact and self disintegration of the tracer type of shell. Between the moment of disintegration of the shell and impact with the body, the cap takes the form of a flat disc-like missile with no stream-lining, carrying before it therefore a zone of compressed air and the remnants of the recently exploded charge between it and the nose-piece. The cap, on impact with a clothed limb for instance, may carry in clothes to the greatest depth, then gunpowder and air under pressure, the cap itself acting as a plug and preventing the escape of air back along the track. In 4 of the 5 cases so far seen removal of this plug has been followed by a small cloud of smoke smelling strongly of gunpowder, and deeper exploration has revealed pieces of clothing. This is only seen, of course, when the wound has not been through and through and when the missile has hit a clothed portion of the body.

This conception of air being carried in under pressure has been criticised. In the first place it is suggested that disintegration of the nose-piece, particularly if explosive, would tend to drive the cap backwards. The exact mechanism whereby the cap becomes a free object is not certain and some types of cannon-shell may carry only a small explosive charge if any at all. With the exceedingly high muzzle velocity the cap would still have a forward movement even if deflected from its initial path. Apart from this, its depth of penetration is a measure of its resultant forward velocity. Again, it is held that if

a zone of high pressure develops in front of this missile it should be present with all types; and it is true that to a greater or lesser extent a zone of high pressure is produced by all types of missile or bullet. Air in the superficial tissues is not uncommonly found with wounds from fire-arms. The diameter, slightly concave surface and momentum of this particular missile raises the air pressure in front of it to a high level. On physical principles this must be so if it travels forward for even a short distance with its width exposed to the air. Finally it is suggested that the high pressure is dispersed between the skin edges and the cap at the moment of impact. This may be so; smoke is carried in and it is conceivable that a small central column of air is pushed in by the cap in addition. Two of the casualties had entrance wounds which were unduly large, gaping and out of proportion to the size of the cap, suggesting a bursting as the initial break in continuity of the skin. They resembled in some ways the wounds caused at a much lower velocity by the wadding of an ordinary blank cartridge.

The zone of high pressure is due entirely to the shape of the cap, and naturally is not found to the same extent in the thin tapered machine-gun bullet, fragments of bomb shrapnel or pieces of glass. The cap is made more dangerous still by its high velocity, jagged rim and the presence of the recently exploded powder in front. When it finally comes to rest in the tissues, the condition at the site of lodgment is one of air and gunpowder plugged in by the cap and partially surrounded in its deepest aspect by skin organisms, dirty clothing and contused muscle. Unfortunately with this particular weapon experimental wounds (which could be examined by X rays for air in the tissues) cannot be inflicted.

## CASES DISCUSSED

Once the missile has come to rest, the dangerous potentialities of this type of wound are obvious. In addition to damage to vital structures the air carried and plugged in by the cap decompresses itself into the tissues. Muscle planes opened up by the missile are infiltrated by the air, either as an intramuscular "blast" or as a slow leak. A condition of interstitial surgical emphysema arises, and in some cases later an anaerobically infected surgical emphysema, a result of infection from particles of clothing and skin organisms driven in at the time of impact. A case will illustrate this point.

CASE 1.—A labourer, aged 72, was hit "by cannon fire" in the outer side of his right leg. The foreign body, on removal found to be a cannon-shell cap, traversed the calf and ended up deep in the calf muscles behind the inner side of the tibia. An X ray taken 1½ hours after the injury revealed the foreign body and bubbles of air in the tissues; the air was distal to the site of lodgment of the cap in the calf, was bounded on the inner side by the deep fascia and had been forced, partly by muscular contractions, into the muscle planes for at least 2½ in. up and down the leg. Removal of the foreign body was followed by an ooze of smoke from the entrance wound. In the depths of the track were several small pieces of trouser. The track, particularly in the first inch, was discoloured with powder. The wound was excised and the track irrigated with hydrogen peroxide; prophylactic ATS and sulphanilamide were given. For the first few days the wound was quiet, but gas gangrene developed in all the muscle groups of the calf after 5 days.

The gas gangrene may well have had its origin in the infected surgical emphysema produced by the entry of the missile and the subsequent leak of the high-pressure zone into the muscles, over a short period, the anaerobes being carried well clear of the area of devitalised muscles included in the excision. As in other wounds the dangerous areas (those where dispersion could be widest) would be the legs, thighs and buttocks. If events follow this course, treatment of the wound is needed urgently. It should be excised earlier than wounds from other missiles; the deepest part of the track should be most widely excised with incision of the skin surface nearest to the foreign body. Where the entrance wounds are perpendicular to the surface in buttocks or shoulders, the entry wound should be prolonged and excision should include the widest limit of the air in the tissues. The affected limb should be moved as little as possible before operation so as to delay dispersal of the air.

The second type of exceptional injury is that due to an unexploded shell embedding itself in the tissues. The

injury is a curiosity but not unique. In addition to the uncertain behaviour of the shell, its size and velocity is sufficient to cause extensive injury. The removal of this particular type of foreign body is imperative, which is not the case with most others. There is of course a possibility of phosphorus contamination from the incendiary type of shell. Presumably if a blunt-nosed, truly high-explosive shell is present it must be a dud; otherwise it would disintegrate on impact with the body. Only very hard impact will explode the sharp-nosed armour-piercing type, so that the danger of their removal is negligible. The blunt- and sharp-nosed kinds can easily be differentiated by X rays. In the case described below the armour-piercing shell entered the base (i.e., cap) first, and its point had not therefore met any resistance from the limb.

CASE 2.—A man was admitted to hospital with injuries to the right leg, a result of cannon-shell fire. The shell had passed through an open window into the room in which he was sheltering. Examination of the leg half an hour later showed an entrance wound 1 in. wide,  $3\frac{1}{2}$  in. above the patella

on the anterior aspect of the right thigh, with no exit wound. A large hard object was felt on the inner side of the knee lying superficially, and was at first thought to be a piece of shrapnel or a fragment of the internal condyle of the femur. There was no fluid in the joint and a probable diagnosis of compound supracondylar fracture was made. A preoperative X ray showed the shell lying across the lower end of the femur, clear of the femoral vessels; it had entered the limb base first. At operation the suprapatellar pouch was found to have been opened and the quadriceps torn across. The pointed end of the shell was seen, and it was lifted out nose first. The wound was then treated on the usual lines and no ill effects resulted.

This shell was not of the blunt-nosed type; it had a smooth grey steel nose-piece and aluminium cap. Its dimensions were 82 mm. by 20 mm. The cap was indented in the centre by the detonation at the breech of the cannon, and the nose-piece was intact.

I wish to thank Mr. G. W. Beresford for permission to publish this case and Mr. J. R. H. Turton for permission to quote the first case.

## Reviews of Books

### Psychology of Early Childhood

C. W. VALENTINE, professor of education in the University of Birmingham. London: Methuen. Pp. 547. 22s. 6d.

THOSE whose teaching is the direct outcome of their clinical observation put us deeply in their debt. Valentine not only has a keen eye for detail, but has subjugated his parental feelings to the extent of making a series of unbiased studies of the mental and physical growth of his own children. Fortunately for everybody, the five subjects remained active, varied in their responses, and eagerly intelligent in spite of being used as clinical material so early and for so long. The result, in the author's words, "seeks to deal with the very foundation of child psychology," and will rank with the studies of Stern, Gesell, Piaget and Isaacs. The work is perhaps more catholic in scope than others, and considers standards of development, as well as the personal and temperamental variations shown by the different children. Valentine's views, however, are somewhat uncompromisingly anti-Freudian, and in some parts he yields unduly to his desire to impose academic and scientific criteria on material which will hardly bear it. Freudian views are stated almost naively and at their face value, and an attempt is made to refute them on a scientific basis from the replies of 16 friends to a questionnaire; these replies, though not lacking in clinical interest have little scientific value. The book throws little new light on the variety of emotional response in early childhood, but the careful and minute observation of the details of development are exceedingly valuable. The healthy child is seen in line with other young animals, experimenting with mind and body, gradually building up a series of responses, which in time form the pattern of individual behaviour. The extent to which personality is a mosaic of such patterns is probably far greater than the interpretive schools of psychology would have us think; hence, this work will remain a standard of reference likely to survive many fashions in the philosophy of childhood.

### Short History of Cardiology

JAMES B. HERRICK, emeritus professor of medicine, Rush Medical College, Chicago. London: Baillière, Tindall and Cox. Pp. 258. 19s.

THIS labour of love by the doyen of American cardiology is welcome; Professor Herrick, now in his eighty-second year, has produced no impersonal list of facts but a careful judicial survey of the development of cardiology from the days of Harvey to the end of last century. Mainly composed of sketches of the outstanding contributors to the subject, it concludes with chapters on the development of our knowledge of inflammation of the heart, affections of the myocardium, syphilis of the heart and aorta, and the coronary artery and its diseases; and the last of these is the most illuminating of all. Throughout the work his sense of proportion leads him to assess the work of different men in relation to the medical background of the day and the contributions of their contemporaries. Such outstanding cardiologists as Wenckebach, Vaquez, Mackenzie and Allbutt perhaps

deserved fuller treatment: the rather sketchy chapter on the period before Harvey might have been omitted in their favour. But the medical historian, the cardiologist and the general physician will all find much to captivate them in this short history, the inevitable defect of which is that it does not pay sufficient tribute to the work of J. B. Herrick.

### 1942 Year Book of Radiology

Editors: C. A. WATERS, MD; W. B. FIORR, MD; I. A. KAPLAN, MD. Chicago: Year Book Publishers; London: H. K. Lewis. Pp. 496. 30s.

THE only effect of war on the 1942 Year Book is the absence of Continental abstracts. The size has not been reduced and the quality maintains the old high standard. A selection of abstracts on intervertebral disc rupture and war fractures is timely. In the chest section all the important work on mass radiography is represented and new advances in medical knowledge—such as the relationship between thymic tumours and myasthenia gravis—find a prominent place. The gastro-intestinal section has many abstracts on the vexed question of the radiological diagnosis of gastritis and duodenitis. Gutierrez's superbly illustrated paper on solitary cysts of the kidney takes pride of place in the genito-urinary section and the editors have not stinted themselves on illustrations. Dr. Kaplan contributes his usual introduction to the therapy section, in itself a reliable guide to the year's work on radiotherapy. There are some notable papers on the use of cyclotron-produced radioactive phosphorus,  $P^{32}$ , for the treatment of leukæmias, lymphosarcoma and bone tumours. Radiation treatment of acute infections is given prominence and the promising work of Huggins, Hodges and Balch on the effect of orchidectomy on prostatic metastases (mentioned in our leader columns) is the subject of 3 long abstracts. This is the tenth issue and radiologists will be glad to know that a consolidated index of all ten volumes has appeared in America and should be available here soon.

### Introduction to Clinical Perimetry

(4th ed.) H. M. TRAQUAIR, MD Edin., FRCSE. London: Henry Kimpton. Pp. 332. 30s.

A NEW edition of this work appears every four years and it has always taken its place as the ultimate reference book on its subject. The value of an examination of the visual fields was only slowly grasped by neurosurgeons, but the days are now gone when all their patients were sent to the eye department for perimetry. Much of this is now performed by the neurosurgeon himself, and he could have no better guide than Traquair. He gives a complete account, and his rich experience is illustrated by carefully condensed and selected case-reports. The reader will be seriously misled only once—by the title: this book is much more than an introduction. Traquair discusses cases of sinus disease sent to the oculist for examination of visual fields because a contracture of the field or an enlarged blind spot is supposed to be confirmatory evidence of such disease; and he hints that such defects do not result from disease of the sinuses. He would have had the support and even the grateful thanks of most ophthalmologists had he said so outright.

# THE LANCET

LONDON: SATURDAY, FEBRUARY 6, 1943

## PROSTATIC CANCER AND CASTRATION

AMONG the many difficulties in treating cancer of the prostate are its insidious onset, the anatomical obstacles to radical extirpation, and its high resistance to X rays. Lately HUGGINS<sup>1</sup> in Chicago has advocated castration in these cases, especially when metastases are present in the bones. The operation is not claimed as a cure, but is said to relieve pain and perhaps to retard tumour growth. The claim is rational and based on physiological knowledge, apart from case-histories, and is supported by other surgeons,<sup>2</sup> including LANE in this issue.

About 150 years ago JOHN HUNTER pointed out that the prostate owes its activity and perhaps its existence to the testicles, removal of which causes atrophy of the gland. Furthermore it is recognised that cancer cells may be sufficiently differentiated to produce hormones like those naturally formed in health or to respond to hormonal stimulation in the same way as normal cells; the prostate exemplifies both these propositions. In response to testicular hormones the healthy adult prostate forms considerable amounts of acid phosphatase<sup>3</sup>; so also do the osseous metastases of prostatic cancer,<sup>4</sup> and there is apt to be an excess of acid phosphatase in the serum of patients with disseminated cancer originating in the prostate.<sup>5</sup> After castration of these patients the acid phosphatase of the serum often falls.<sup>6</sup> Moreover there is evidence that the secretory activity of prostatic metastases, like that of the normal prostate, is stimulated by androgen<sup>7</sup> and inhibited by oestrogen.<sup>8</sup> It seems almost certain, if in fact the tumour cells are secretory as they often appear to be, that castration would cause a diminution of their activity and a consequent retarded growth or shrinkage of the tumour; this may explain the relief of pain observed in nearly all of 100 reported cases.

A rational surgical procedure in treating cancer is not always a successful one. At the end of last century Sir GEORGE BEATSON, rightly assuming that the cause of mammary cancer lay in the ovaries, advocated oöphorectomy as an ameliorative measure. His suggestion was followed enthusiastically by several surgeons who reported considerable benefits from the operation, but further experience brought disappointment and the operation was soon discarded. Castration for the cure of benign enlargement of the prostate—a simple, rational and successful remedy—died in its infancy, partly because of the rise in favour of suprapubic prostatectomy, but much more because a baseless rumour sped round the world to the effect

that castration was apt to cause mental deterioration. The operation as now practised for the relief of prostatic cancer will doubtless dispel this pernicious myth, and that in itself will be an important gain. It may be hoped, also, that this time experience will justify the early optimism. Occasionally sterilisation by X rays has been suggested as though it were an alternative to castration. Such a proposal is fallacious, for though a sterilising dose of X rays applied to the testes will arrest spermatogenesis it will not materially affect the production of gonadal hormones by the interstitial cells.

## THE NEUROTIC EX-SOLDIER

SOCIAL medicine, when it lately ceased to be a Cinderella, became for a time rather like the Sleeping Beauty, lauded but not roused. It is evident, however, that this stage is past, and that several princes share the honour of waking her. Neurosis being the very type and paradigm of social illness, psychiatry was one of them, and, in an article elsewhere in this issue, the necessity is stressed for keeping a social eye on the neurotic when he is called from one station of war-time life to another, much more familiar to him, which he calls Civvy Street, and in which he might be expected to be as little incapacitated by illness as he was before he left it. The ex-civilian who has been a soldier for a time and then reverts to being a civilian because of his poor mental health does not cease to be an important medical and social problem when he ceases to be a useful soldier: it is fortunate that the organisation of our health services makes continuity of treatment possible whatever clothes and responsibilities he carries. It is evident however from the results of Dr. AUBREY LEWIS's inquiry, that the continuity of this treatment is not as good as might be wished. It is true that half the men had attended a general practitioner since their discharge from the Army, but it is asking too much of the general practitioner to expect him to be able to give the skilled guidance so many of these men need if they are to become healthy working members of the community. He may not be acquainted, for example, with the principles now governing the treatment of "effort syndrome" and may therefore unwittingly—and in accordance with the teaching he himself received—prolong a patient's invalidism; or, even worse, revive an invalidism which expert treatment had spirited away. The interim training and rehabilitation schemes for disabled men concerted between the Ministry of Labour, the Ministry of Health and the Ministry of Pensions amount to a practical exercise in social medicine or medical sociology, rich with implications and already of proven value, but of necessity not accessible to the general practitioner as it is to the hospital physician—in this case the EMS psychiatrist. There is room, as the findings in this inquiry suggest, for an extension of the rehabilitation scheme, so that when a neurotic man has left hospital he may still be able to receive expert guidance, and his local employment exchange also may have the advice of the psychiatrist in dealing with any further problems of industrial adjustment that he may present owing to his neurotic difficulties. Facilities for vocational therapy while the men are still in the neurosis centre or in an intermediate rehabilitation

1. Huggins, C. *Ann. Surg.* 1942, 115, 192.
2. Neuwanger, C. H. and Vermooten, V. *New Engl. J. Med.* 1942, 227, 626.
3. Kutscher, W. and Wolbergs, A. *Hoppe-Seill. Z.* 1935, 236, 237; Gutman, A. B. and Gutman, E. B. *Proc. Soc. exp. Biol. N.Y.* 1938, 39, 529.
4. Gutman, E. B., Sproul, E. E. and Gutman, A. B. *Amer. J. Cancer*, 1936, 28, 485.
5. Gutman, A. B. and Gutman, E. B. *J. clin. Invest.* 1938, 17, 473.
6. Huggins, C., Stevens, R. E. and Hodges, C. V. *Arch. Surg.* 1941, 43, 209; Huggins, C., Scott, W. W. and Hodges, C. V. *J. Urol.* 1941, 46, 997.
7. Huggins, C. and Hodges, C. V. *Cancer Res.* 1941, 1, 293.
8. Herrold, R. D. *J. Urol.* 1941, 46, 1016.

centre would also be invaluable, particularly in recommending appropriate placement. It is however churlish to remark unduly on the present deficiencies of a scheme which presents a notable advance in the coördination of industrial and medical services.

The employment and health of the men investigated do not lend any colour to the belief that neurosis in soldiers is a medical euphemism for dodging military service, and that therefore the symptoms will disappear when the dodge has worked. These men are worse off in health and status than they were before enlistment. It would be easy, but mistaken, to conclude that the change is due simply to their military service. Their pre-enlistment record was to a large extent their prewar record: and, although the market for labour is now wide open, it is not always skilled labour that is most in demand, nor are the general conditions under which the civilian has to live so easy that one can properly assume them to be negligible in assessing the causes of an ex-soldier's present disabilities. The war has brought with it many stresses unknown in peacetime: some of the neurotically predisposed men are now less fit than before 1939, as much because of these extra burdens as because of the hardships of military service and the disruption of the routine of their lives—especially of their jobs and homes—which entry into military service entailed. Some psychopathic men indeed benefit by living under Army discipline and are apt to go to pieces when thrown on their own resources as civilians; but they are few compared with the number of those concerning whom summary arbiters mistakenly declare that "the Army will make a man of him."

The interests of the individual can in some contexts be set against the interests of the community, but certainly not here. Health and working capacity will go together—will indeed be dependent on each other, reciprocal agents. If neurotic illness makes a man undertake unsuitable work, or makes his work unsuitable for him, his neurosis will thereby be fostered or aggravated; but neurosis is due to, and can be remedied by, other influences than the purely occupational, just as the choice or allocation of a man's job is determined in these days by much else besides the ideal requirements for his talent and idiosyncrasy. It is in settling the nice balance of these factors that the skill of the doctor and the experience and judgment of social agencies can most happily be shown, conjoined in a good example of social medicine.

### ARTIFICIAL RESPIRATION

SINCE the beginning of the war men and women who deem themselves competent to stay hæmorrhage and revive the apparently drowned have multiplied exceedingly; general practitioners whose connexion with formal teaching ended when they ceased to be students now find themselves in the local chair of traumatic surgery and emergency medicine, and their students, whether drawn from the ranks of the British Red Cross, the St. John Ambulance or the local Civil Defence bodies share a strong taste for dogma. In the field of artificial respiration the method of Schafer has steadily gained ground, since it can be done single-handed and with no apparatus

or improvisation. Once the first-aider has learned the method all he requires, in order to practise it, is a suitably asphyxiated individual. GIBBENS<sup>1</sup> produces an old bone of contention in the shape of figures from various authorities purporting to show the superiority of either the Schafer or the Sylvester method. He concludes that the results, which are certainly discordant, depend on the nationality of the observer, and points out the importance of having a method for use at sea which is above suspicion. Many men who ought to survive die after only a short immersion.

It has long been known<sup>2</sup> that hyperventilation, which by removing carbon dioxide causes apnoea in the normal subject, also renders the chest resistant to ventilation by Schafer's and possibly other methods. A similar involuntary rigidity might conceivably arise from other causes. In conjunction with variations in the build of the subject and the technique of the operator, this might account for widely different results on different occasions. While GIBBENS states that such a loss of elasticity is in fact apparent in drowned men, LOUGHEED, JANES and HALL<sup>3</sup> actually found in drowning dogs that, after a preliminary rise, the blood-CO<sub>2</sub> surprisingly fell. Occasional breathing, as might result from the struggles of a victim bringing him intermittently to the surface, enhanced the CO<sub>2</sub>-deficiency whose cause was not definitely established. The condition was well known to YANDELL HENDERSON, who called it acardia and regarded it as a potent factor in the onset of circulatory failure.<sup>4</sup> The value of 5-7% CO<sub>2</sub> in making artificial respiration easier, in preserving a normal CO<sub>2</sub> level in the body, and in stimulating the respiratory centre is now recognised, and it should be supplied in oxygen as soon as possible.

But this does not solve the problem of how to begin. Drowning (or any other form of asphyxia) is as acute an emergency as a spurting artery: a 6-minute delay produces an 80% increase in the death-rate. GIBBENS has Schafer artificial respiration started the minute the patient is out of the water and transfers him to Eve's as soon as occasion permits. It is now some ten years since EVE first described<sup>5</sup> his gravity method of actuating the inert diaphragm. He used the weight of the abdominal viscera to move the diaphragm by rocking the casualty on a stretcher through a total angle of 60° at the rate of 12 double rocks a minute, but 90° rock at first assists lung drainage. Schafer's method, carried out by brawny mariners, in the grip of altruism, entails for the patient a risk of fractured ribs and ruptured liver. Eve's method, GIBBENS believes, produces greater lung ventilation for less effort; it can be applied even when the chest has been severely damaged. All the materials required are: a plane to which the patient can be fastened; a fulcrum high enough to allow a 50° angle with the horizontal; a stop to prevent the plane skidding on the fulcrum. Such things are more readily available on board ship than on bomb sites though they can readily be contrived with a stretcher and a suitable mass of debris. GIBBENS has done well to revive interest in Eve's method; and for once the

1. Gibbens, G. H. *Brit. med. J.* 1942, II, 751.
2. Henderson, Y. J. *Amer. med. Ass.* 1914, 62, 1133.
3. Loughheed, D. W., Janes, J. M. and Hall, G. E. *Canad. med. Ass. J.* 1939, 40, 423.
4. Henderson, Y. J. *Amer. med. Ass.* 1934, 103, 750.
5. Eve, F. C. *Lancet*, 1932, II, 995.

medical officer may slake the first-aider's thirst for dogma. Schafer's is *the* method in an emergency, say for a patient asphyxiated by coal gas from a ruptured main; it is literally first-aid, and may be continued in the ambulance if necessary. On arrival at hospital and on shipboard the method of Eve has a valuable place in treatment, which GIBBENS is not alone in insisting should continue after drowning until rigor mortis has set in, a difficult feat with the older methods.

## Annotations

### PERIPHERAL NERVE TESTING

SOME bad habits have wormed their way into the general surgeon's examination of peripheral nerves. Selected muscle-movement "trick" tests have come to be extensively used for deciding on nerve integrity: thus if the extended fingers can firmly grasp a thin envelope the ulnar nerve is declared sound; if the wrist or ankle can be actively extended that rules out radial or anterior tibial nerve damage; and the characteristic "policeman's tip" position clinches the diagnosis of an Erb's or upper trunk brachial plexus lesion. Attempts are rarely made to examine muscle after muscle in the order of their supply from the branches of the suspected damaged nerve. Where a more detailed muscle report is considered necessary, the patient is usually referred to the massage department for electrical muscle reactions, and the surgeon often does not realise how difficult it is to record these reliably. A valuable memo,<sup>1</sup> prepared for the Medical Research Council's nerve injuries committee by the department of surgery, Edinburgh University, urges that as far as possible each muscle should have its action separately tested, and not only must the weak and the paralysed muscles be charted but also those with full power. The memo suggests a simple system for recording the state of each muscle: 0 = no contraction; 1 = flicker or trace of contraction; 2 = active movement, with gravity eliminated; 3 = active movement against gravity; 4 = active movement against gravity and resistance; and 5 = normal power. It lays stress on the importance of both looking for and feeling the contraction of any accessible muscle that is being tested—a thing that few examiners of peripheral nerves do—and nearly sixty photographs demonstrate the most generally useful methods of testing individual muscles. A businesslike way of examining muscle function and recording the findings is particularly valuable in gunshot injuries, which are commonly multiple, so that the exact site of the nerve lesion is difficult to determine. Nor is the examiner at a special peripheral nerve centre to be regarded as a sort of nerve-damage diviner. The assessment of the case and the decision where to explore will be based on the records of the previous examinations. Often the patient is transferred to the special centre only after many months; adequate records may then tell that the muscle now working was formerly paralysed, and this will be an important bit of evidence in deciding on the need for exploration.

The memo points out that a cold limb does not move freely, and that "numb with cold" is no layman's exaggeration. Sensation is often poorly tested. It cannot be hurried, nor can pin prodding be continued for long without wearying the patient (not to mention the examiner); 20 minutes is about the maximum session that most can endure. The patient must be warm and if he be of the sons of Esau the hairs must be shaved; the cotton-wool wisp should be used for light touch, and a fine needle to test pinprick. Sensation should be tested from the anaesthetic to the sensitive

area and the stimuli should not follow each other too closely. An accurate guide to the extent of anaesthesia can often be obtained by giving the patient a pin and asking him to mark it out on himself. The loss of sensation to be expected in the different major nerve lesions is illustrated in the memo by twenty charts.

### INTERPRETATION OF THE SCHICK TEST

Schick<sup>1</sup> himself regarded the presence in the circulating blood of at least 1/30 unit of antitoxin (AT) per c.c.m. as necessary to afford protection against an attack of clinical diphtheria, and adjusted the amount of toxin (1/50 mld) in his test accordingly. But Parish and Wright<sup>2</sup> showed that a negative reaction—that is, Schick-immunity—was consistent with as little as 0.002 unit AT per c.c.m.; and, as Phair<sup>3</sup> has pointed out, it is now established that the theoretical threshold between positive and negative Schick reactions is about 0.01 unit AT per c.c.m. or less. Negative reactors contract clinical diphtheria only very occasionally and Phair shows that this may happen to individuals possessing more than 0.01 unit AT per c.c.m. Such occasional discrepancies may be found in any large series of observations and give rise to doubts about the value of the test. Phair has therefore investigated the sources, extent and commonness of error. He reminds us that, whereas the blood sample is usually taken when the test is done, the reading of the test is not made until several days later. Many years ago Glenny and Südmersen<sup>4</sup> showed that the amount of AT produced by a primary stimulus is small compared with that resulting from a secondary stimulus; and it is well recognised that the antitoxin produced by a primary stimulus tends in time to be lost wholly or in part, but (as O'Brien<sup>5</sup> demonstrated in 1926) may be restored by the tiny secondary antigenic stimulus provided by a Schick test. Thus, a negative test, says Phair, may reflect not only the presence of appreciable amounts of circulating AT but also in some degree the ability to mobilise this antibody; the test thus measures a dynamic rather than a static situation.

Phair has clarified this particular point by the analysis of three series of observations. Series A (1934) comprised 165 adults and children chosen and tested by Van Volkenburgh and Frobisher without reference to previous antigenic experience; the control dilutions consisted of heated toxin only and blood specimens were obtained at the time of the tests. Accepting 0.01 unit AT as the threshold and correlating titrations with tests, the tests were found to be correct in 152 out of 165 (92.1%). Series B (1939) comprised 3 groups: 45 white adult male students; 106 coloured children (aged 6 months to 20 years) in an orphanage; and 65 white children in another orphanage—a total of 216 adults and children. All received 4 intranasal instillations of concentrated formol-toxoid (FT) and a month later Schick tests were done and controlled with both heated toxin and diluted toxoid, blood samples being taken at the same time as the tests. The FT provided a recent specific antigenic stimulus and augmented the AT titre before the tests and titrations were done. Adopting the same AT threshold, the test proved correct in 207 out of 216 (95.8%). Consideration of the results in series A and B showed that the test can differentiate with fair accuracy those without demonstrable AT at the time of the test, since 85.2% and 89.2% of those with less than 0.0025 (1/400) unit and 74.3% and 84.6% of those with less than 0.01 unit gave a positive or pseudo-positive reaction. The more complete correlation between test and titre in series B suggested the possible importance of antigenic history or immunity status and therefore series C (1940)

1. Schick, B. *Munch. med. Wschr.* 1908, **55**, 504; *Ibid.* 1913, **60**, 2608.

2. Parish, H. J. and Wright, J. *Lancet*, 1933, **1**, 882.

3. Phair, J. J. *Amer. J. Hyg.* 1942, **36**, 283.

4. Glenny, A. T. and Südmersen, H. J. *J. Hyg., Camb.* 1921, **20**, 176.

5. O'Brien, R. A. *J. Path. Bact.* 1926, **29**, 320.

1. Aids to the Investigation of Peripheral Nerve Injuries. MRC War Mem No. 7. 1942. Pp. 48. HM Stationery Office. 2s.

comprising 99 patients in a hospital for crippled children was arranged. These children, whose average period of hospitalisation was 8.5 months, had had no recent opportunity to receive any natural or artificial antigenic stimulus either in hospital or in their homes, and thus there had been ample time for the AT content of the serum to reach a stable level. Tests (with heated toxin controls only) and bleedings were done at the same time and additional blood samples were obtained on the 3rd, 7th (day of reading of test) and 30th days. AT titrations in positive or pseudo-positive reactors tallied in 91.7%—a figure, Phair remarks, not essentially different from that obtained in series A and B. On the other hand, when he came to analyse the negative and pseudo-negative reactors he discovered that 23.8% had less than 0.01 unit AT and were thus "expected" positive reactors; but the subsequent titrations carried out 3, 7 and 30 days later showed that 17.5%, 14.3% and finally only 10% of the original negative reactors possessed less than 0.01 unit AT per c.c.m. The antigenic stimulus of the Schick test had reduced the disparity from 23.8% to 10%. Similar augmentation of AT was observed among most of the negative reactors in the series, some children reacting strongly, others moderately and a few (3.3%) not at all.

These observations, Phair concludes, provide ample confirmation of the value of the Schick test, especially in the field; it distinguishes nearly all those who are without demonstrable AT and who can rapidly mobilise this antibody if given a minute stimulus; there is a high degree of correlation between a negative reaction and actual or potential capacity to produce AT. A positive reaction indicates both lack of AT and inability to produce it if exposed to a minimal stimulus. Phair considers that some defence mechanism other than the production of AT determines whether or not the strain of *C. diphtheriae* is successful in its invasion attempt. In infants and young children a positive test indicates susceptibility; in adults who have had repeated exposures it indicates deficient circulating AT or an inefficient antibody mechanism, but not necessarily susceptibility to clinical attack; the antibacterial mechanism may be effective enough to suppress invasion, or if invasion occurs immediate antibody response, although not great, may be sufficient to prevent the clinical symptoms of the specific toxæmia. The ageing aphorism of Glenny and his colleagues<sup>6</sup> is still valid: "The Schick test does not divide the population into black and white but rather into those darker or lighter than a certain shade of grey."

#### DIET OF THE TUBERCULOUS PATIENT

SINCE it became the fashion to weigh tuberculous patients, a gain in weight has been accepted as a sign of progress, and to promote this gain in weight it became customary to encourage patients to eat prodigious amounts of food. Before the war this was relatively easy, but the onset of rationing made things more difficult because it limited sugar and fat and restricted the amounts of tasty meats that could be served. People could still eat as much as they liked but the patients did not like the food enough to eat as much as before. Day,<sup>7</sup> who writes scientific papers in a style which is all his own, has described the dietetic ventures and adventures of the Mundesley Sanatorium since rationing was introduced. The cut in sugar stopped the normal gains in weight. The patients were begged to eat more bread and they responded for a time, but soon got tired of it. The situation was saved (so far as that sanatorium was concerned) by the provision of extra sugar to be used for an experiment in dietary therapeutics. It was found that the patients could be made to gain weight if the necessary supplies of sugar were available, and exceed-

ingly good results were obtained when insulin was given as well, as an aperitif. The gain in weight has not been Day's only criterion of progress, and one of his most interesting findings has been that an improvement in the sedimentin index parallels the gain in weight. He considers that carbohydrate, particularly sugar, is actually the best supplement for these tuberculous patients: fats he thinks would not be so good. If this work is confirmed, and particularly if it is extended to include other yardsticks of progress, its importance will be considerable. Unfortunately these studies take a long time and few physicians interested in treatment will be minded to carry out the necessary control experiments.

#### FEAR AND ANXIETY AT TOBRUK

IN describing their experiences with some two hundred men in a neurosis clinic in Tobruk between May and August, 1941, Cooper and Sinclair<sup>1</sup> of the Australian Army Medical Corps, emphasise the importance of the experience of fear. In their opinion, this experience is more important in the production of neurotic breakdown than is constitutional instability, of which they found abundant evidence, or physical exhaustion. Only two of their patients were diagnosed as suffering from states of exhaustion, although many of the men were debilitated by such conditions as dysentery. With the exception of the men manning the anti-aircraft defences and the harbour facilities, the degree of strain was about the same for all in the fortress area. There was little movement of troops; food-supplies were always good, and vitamins B and C were added to the diet. No mention is made of loss of weight, which often results from strain and anxiety, and it may be that the physical factor is somewhat underestimated. Cooper and Sinclair draw a distinction between "fear states" and "anxiety states." In the former there is an exaggerated reaction to fear, but the fear itself is not unfounded, nor based on retrospective stimuli. At the first warning of an air-raid these patients would run for cover. During the raid they became pale; they had extreme, often audible, tachycardia, profuse sweating, pronounced tremor, repeated yawning. Desire to micturate was common; involuntary micturition occurred. At other times than during the raids somatic manifestations of anxiety were almost absent. These patients were treated differently from those diagnosed as anxiety states. Every effort was made to treat them as a non-medical problem. Their medical cards were labelled "fear state," to prevent the diagnosis, like that of "shell-shock," from being taken as a badge of honour. They were returned to front-line duties after treatment; and in the event of repeated breakdown their medical officers were instructed to evacuate them, if necessary, through non-medical channels. In fact, after a week or two of rest, 85% were able to carry on satisfactorily. The results of treatment were nearly as good in those diagnosed as suffering from anxiety state and hysteria. The distinction between fear and anxiety, made in this way, is probably unreal, though it may have some practical use. Most people who have had experience of bombing become aware of some disturbance of visceral sensations when they hear the swish of a falling bomb. If examined at such a moment, they would probably exhibit alteration of the pulse and other somatic signs of anxiety. For the translation of such a condition to a "fear state," all that is required is an unusual degree of timidity or of autonomic instability or a diminished power of self-control. Repeated subjection to stress may reinforce the response or gradually abolish it. If reinforcement occurs, the symptoms become more severe; they are released more easily, eventually by stimuli merely resembling the appropriate ones; they last longer, eventually persisting into quiet periods. We then have the typical picture

6. Glenny, A. T., Allen, K. and O'Brien, R. A. *Lancet*, 1921, 1, 1236.  
7. Day, G. *Tubercle*, 1942, 23, 215.

1. Cooper, E. L. and Sinclair, A. J. M. *Med. J. Aust.* 1942, 11, 73.

of the anxiety state, but the character of the response has remained the same throughout. It is likely that the differences between fear states, anxiety states, and normality rest on a different balance between individual susceptibility, gravity and duration of experience, and power of self-control. One would expect that fear states would be almost unknown in seasoned troops, where anxiety states might still be common. Anxiety neurosis, as ordinarily considered, needs time for its development; and there is often an element of conflict, in that the patient has forced himself to carry on when circumstances were almost too much for his powers of resistance.

#### SULPHUR METABOLISM AND CHLOROFORM POISONING

At Rochester G. H. Whipple has been working for some time on the production and metabolism of plasma proteins, and in a recent review of part of this work<sup>1</sup> we noted that dogs which had been depleted of plasma proteins were abnormally susceptible to chloroform poisoning and that the administration of methionene protected them. Further work has now appeared on this subject<sup>2</sup> which indicates that the methionene can confer protection even when given up to 4 hours after the chloroform. On examining the protocols it is evident that some liver damage followed the administration of the chloroform, but instead of the condition progressing to a fatal issue the icteric index began to fall after about 72 hours and the animals recovered. In trying to take this matter a little further, Miller and Whipple determined the nitrogen and sulphur in the livers and muscles of normal dogs and of dogs which had been depleted of plasma proteins. The nitrogen-sulphur ratio in 8 normal dogs averaged 11.6; in 3 protein-depleted dogs 14.3. It is suggested that the protein depletion removed more sulphur than nitrogen from the liver and that this deficiency of sulphur was the cause of the chloroform susceptibility. The shortage of sulphur was made good by the methionene. This is substantiated by the statement that after methionene had been administered the nitrogen-sulphur ratio in the liver of 2 dogs was found to be 8.4 and 11.3. It is a pity that the authors did not use more animals for this important work, for mongrel dogs must vary quite widely among themselves. Chloroform must be a rare cause now of liver injury in man, and there is no evidence from this work that methionene will protect a normal liver against chloroform; but liver damage is an industrial hazard of some importance and it might have far-reaching medical, economic and political importance if it were to be shown that a high protein diet prevented, for instance, TNT poisoning. Recent work on rats suggests that this may indeed be the case.<sup>3</sup> Miller and Whipple have also found that newborn and foetal animals have livers which are much more resistant to chloroform poisoning than those of adults. These resistant foetal livers have normal nitrogen-sulphur ratios, so that probably some other mechanism is responsible for their capacity to tolerate chloroform.

#### SALAZOPYRIN AND SOME SIDE-ISSUES

The sulphonamides are effective in the specific forms of acute arthritis due to susceptible organisms, such as the hæmolytic streptococcus, meningococcus and gonococcus, but are useless or even harmful in rheumatic fever; on the other hand, the salicylates are so successful in controlling the arthritis of rheumatic fever that their failure questions the diagnosis. With a lack of success which was to be expected both sulphonamides and salicylates have been empirically employed in non-specific chronic arthritis. Margolis and Eisenstein<sup>4</sup> gave sulph-

anilamide in adequate doses to a small group of rheumatoid arthritis cases not only without benefit but with some disturbing if not serious reactions. They also reported that of the 92 replies received to a questionnaire sent to the 178 doctors of the American Rheumatism Association 44 reported having tried sulphanilamide and were almost unanimous in condemning it for the treatment of rheumatoid arthritis. Coggeshall and Bauer<sup>5</sup> found that the clinical course of rheumatoid arthritis was not affected in 10 patients treated with large doses of sulphanilamide, and Hench<sup>6</sup> reported agranulocytosis in one case and chills, fever, prostration and anorexia in others, though Shea<sup>7</sup> claims satisfactory results in early rheumatoid arthritis, and even improvement in chronic cases, from injections of 'Soluseptasine.' There is no reason to suppose that in rheumatoid arthritis an association of sulphonamides with salicylates would be more effective than either separately. Yet in Sweden Svartz,<sup>8</sup> after being unsuccessful with salicylate and sulphonamide preparations given at the same time, found that salicylazosulphapyridine ('Salazopyrin') has a definite value in some active cases. She gave two 0.5 g. tablets five or six times daily for periods up to about four months, with reduction in the sedimentation-rate and varying degrees of symptomatic improvement. Cases which improved but relapsed responded to a further course. The drug had a good effect in some patients in whom gold therapy had failed, but no details of the gold treatment are given.

Svartz gives 11 case-reports to illustrate the use of the drug in rheumatoid arthritis, and also describes its employment in 9 cases of ulcerative colitis. With Kallner, she had already reported exceedingly good results with sulphapyridine in ulcerative colitis and describes those with salazopyrin as even better. During salicylazosulphapyridine medication varying concentrations of sulphapyridine and acetyl sulphapyridine were found in the blood, the former being usually not more than 1-2 mg. per 100 c.cm. Any of the unpleasant reactions which the other sulphonamides sometimes produce could no doubt result from this one, but in more than 200 cases treated with the drug Svartz says that nausea and vomiting were rare, and cyanosis (wrongly stated to be "exceedingly common") with sulphapyridine was also rare except when large doses were used. Renal complications and irreparable blood changes were not observed in this series, though she reports a fatal case of agranulocytosis from another hospital. The only common toxic manifestations were fever and exanthemata.

Svartz and Kallner claim to have shown that sulphonamide cyanosis does not depend on the formation of methæmoglobin or sulphæmoglobin but on "the amide component of the sulphonamide preparations becoming combined with hæmoglobin." They have decided that the crystals deposited in the urinary tract in sulphapyridine therapy consist not of acetyl sulphapyridine but of acetyl sulphapyridine hydrochloride, although the existence of such a substance will be questioned by chemists; certainly it is unlikely to occur in the urine. Micro-analysis should establish the composition of the crystals, or possibly their identity could best be established by crystallographic study. Photographs are given to illustrate the crystalline forms of acetyl sulphapyridine and of its supposed hydrochloride. These workers observed that the precipitation of crystals in the urinary tract is promoted by a high sodium chloride content of the urine, and during sulphonamide treatment they put the patients on a low salt diet. For the leucopenia of sulphonamide therapy they prefer injections of liver to preparations of nucleic acid, but they seem to be

1. *Lancet*, 1942, ii, 491.

2. Miller, L. L. and Whipple, G. H. *J. exp. Med.* 1942, 76, 421.

3. Himsworth, H. P. and Glynn, L. E. *Clin. Sci.* 1942, 4, 421.

4. Margolis, H. M. and Eisenstein, V. W. *J. Amer. med. Ass.* 1940, 114, 1429.

5. Coggeshall, H. C. and Bauer, W. 1938, 111, 2042.

6. Hench, P. S. *Ibid.*, p. 2043.

7. Shea, B. F. *Brit. med. J.* 1943, 1, 30.

8. Svartz, N. *Nord. Med.* 1941, 9, 554; 11, 2261. *Acta med. scand.* 1942, 110, 577.

referring to the benign form which occurs early, rather than the malignant leucopenia which appears from about the tenth day of sulphonamide therapy onward. Fever and a scarlatiniform or morbilliform rash, often appearing on the seventh to ninth day of salicylazosulphapyridine administration, were thought to be due to sulphapyridine, as the latter will always produce an eruption in a patient who has developed one with salicylazosulphapyridine. Neither "sulphonamide" (presumably sulphanilamide) nor sulphathiazole caused an eruption in patients sensitised to sulphapyridine, which is contrary to the usual experience. They found that hypersensitive patients gave negative results to cutaneous tests with salicylazosulphapyridine and sulphapyridine, but positive ones with aminopyridine, from which they conclude that the latter is probably formed from sulphapyridine in the body. They noted that the drug rash was benefited by calcium and ephedrine or ephedronin (synthetic ephedrine), and several patients who developed an eruption during salicylazosulphapyridine administration had no return of the eruption when the drug was resumed after two weeks on calcium and ephedrine. In this country the use of calcium and ephedrine in manifestations of sulphonamide sensitisation has been largely confined to conditions such as urticaria and angioneurotic oedema which are more typically "allergic" in character than morbilliform or scarlatiniform rashes. Thus Erskine<sup>9</sup> found adrenaline and intravenous calcium gluconate effective in his case of oedema of the larynx brought on by sulphapyridine in a patient sensitised a year previously by sulphanilamide given for lupus erythematosus. He has also found<sup>10</sup> that ephedrine may help to control severe irritation in any type of rash, especially when a pronounced urticarial element is present.

Svartz has raised some interesting side-issues in her papers, but it is doubtful whether she has established a prima-facie case for further trial of salicylazosulphapyridine.

#### HEART DISEASE AND CHILDBIRTH

MATERNAL mortalities fall steadily, but there is no corresponding reduction in maternal deaths from heart disease. Hoffman and Jeffers<sup>11</sup> find that in Philadelphia there were 307,015 live births and 1789 maternal deaths in the decade 1931-40; the total maternal death-rate fell during this period from 7.9 to 3.1 per 1000 live births, whereas the maternal death-rate due to rheumatic heart disease remained constant between 0.2 and 0.3 per 1000. In New York during more or less the same period Stander<sup>12</sup> reports 7 maternal deaths from heart disease in 34,353 consecutive pregnancies; in the 676 mothers with known heart disease the death-rate was therefore 10.3 per 1000 pregnancies, compared with 2.0 per 1000 for all obstetric patients. In Glasgow Sheehan and Sutherland<sup>13</sup> found a mortality of 6.3% among pregnant women with chronic valvular lesions of the heart. Hoffman and Jeffers made a careful study of 61 deaths in their series and concluded that more than 20 of them were preventable. They found that 39 of the 61 deaths were due to cardiac decompensation, 10 to "sudden exitus," and 9 to puerperal sepsis; 52 of the patients died after the 28th week of gestation and 41 after the 35th week. Most important of all, perhaps, 48 followed delivery, and 23 of these occurred in the first 24 hours of the puerperium, compared with only 3 during labour. Most of the early puerperal deaths, due to cardiac failure, were in patients with seriously damaged hearts; those with less cardiac damage died from delayed congestive failure, some unavoidable cardiac accident, or sepsis. Of the 48 patients dying after delivery—mostly those with

greatest cardiac damage—23 were delivered by caesarean section. There was only 1 death from sepsis after vaginal delivery in contrast to 6 after caesarean section. In almost 95% of Stander's 676 patients with heart disease the lesion was rheumatic, congenital lesions accounting for 2% and "uncomplicated aortic regurgitation" for 3% of the deaths. Basal analgesia and local infiltration were used for a large number of his patients having either spontaneous or operative delivery, and local infiltration anaesthesia was frequently used in cases of caesarean section where a general anaesthetic was contra-indicated. Caesarean section was performed in 3.6% of patients with heart disease, compared with 2.2% of all obstetric cases; it was performed in nearly half the cases with advanced lesions. Therapeutic abortion was carried out—almost always before the 4th month of pregnancy—in 37 (5.4%) of the cardiac patients and spontaneous abortion occurred in 5.1% of them, compared with an incidence for all obstetric cases of 6.8%.

The hope for a reduction of the maternal mortality from heart disease lies in antenatal supervision. A pregnant woman should be carefully examined as early as possible in pregnancy to decide whether she has a cardiac lesion. If she has, the first decision to be made is whether pregnancy should be allowed to continue. If pregnancy has already advanced more than three months every effort should be made to allow it to go on until the child is viable, even though this may involve long rest in bed. The pregnant woman with a cardiac lesion who is considered fit to continue her pregnancy must be closely watched throughout, and admitted to hospital if there is any sign of congestive failure (special attention should therefore be given to the lungs for evidence of congestion), or a respiratory or upper respiratory infection more serious than a common cold. Sore throats and the like are particularly liable to be treated casually, often with disastrous results. Over the best way of conducting the confinement itself there is still no unanimity. The high incidence of sepsis among the patients in Philadelphia who had caesarean section is significant, and Stander notes that fewer and fewer caesarean sections have been done in these cases in his clinic during the last five years. Mendelson and Pardee<sup>14</sup> found that in their cases of rheumatic heart disease no serious failure supervened if the pulse-rate remained below 110 and the respiratory rate below 24 per minute during labour. Stander finds that rapid digitalisation, with forceps delivery as soon as the cervix is fully dilated, is the treatment of choice when the threat of heart-failure is revealed by a rise above these levels. There is still no definite evidence as to the cause of the increased incidence of heart-failure in the first 24 hours of the puerperium, though the sudden flooding of the circulation at the time of contraction of the uterus may upset the dynamics of the circulation to such an extent that the damaged heart is unable to cope with the situation. If so, venesection would be rational treatment, and the time-honoured application of a tight abdominal binder immediately the uterus is evacuated may well help by so enhancing the respiratory movements of the chest as to improve the venous circulation.

Sir ST CLAIR THOMSON died in Edinburgh on Jan. 29 after an accident. By his contributions to laryngology, his international outlook, his gift for words, and his friendliness, he had become one of the personalities of British medicine. House-surgeon to Lister in 1883, he had survived into a later world which he liked and which liked him.

We regret also to announce the death in Boston, Mass., on Dec. 29 of Dr. ELLIOTT GRAY BRACKETT, editor of the *Journal of Bone and Joint Surgery*, in his 83rd year. He had many friends here among the members of the British Orthopaedic Association.

9. Erskine, D. *Brit. J. ven. Dis.* 1938, 14, 39.

10. *Brit. med. J.* 1939, II, 104.

11. Hoffman, G. L. jun. and Jeffers, W. A. *Amer. J. med. Sci.* 1942, 204, 157.

12. Stander, H. J. *Amer. J. Obstet. Gynec.* 1942, 44, 714.

13. Sheehan, H. J., Sutherland, A. M. *J. Obstet. Gynec.* 1940, 47, 597.

14. Mendelson, C. L. and Pardee, H. E. B. *Amer. J. Obstet. Gynec.* 1942, 44, 370.



## Special Articles

## MEDICAL RELIEF IN EUROPE \*

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THE nation is engaged in its maximum war effort. Nevertheless a moment's reflection will show the necessity for creating now the organisation required for post-war relief. In the three years following the last war more people died from famine and preventable diseases than had been killed in the war itself; and their deaths were largely the result of administrative chaos in relief.

Every day that relief work is delayed after a country or part of a country is liberated will be measured in terms of human life and suffering. The task is gigantic and the machinery, necessarily complex, cannot be ready for immediate action unless created in advance. Our obligations to the peoples of occupied countries alone make urgent action a responsibility which we can discharge only by thought and careful planning. The lives and health of millions in Europe, as well as the physique and welfare of a generation to come, depend on how well this preparatory work is done.

It must be realised that relief cannot wait for an armistice, but must follow immediately in the wake of the armies as they liberate a country or part of a country. Even superficial consideration of future military possibilities makes it clear how suddenly such a necessity may face us. The problem is clearly no academic one for an indefinite future. We also have to bear in mind that in the period between the liberation of an area and an armistice relief will be particularly difficult.

Movements of populations, agricultural breakdown, transport difficulties, the general economic strain and the impairment of public health and medical services have all contributed to the terrible medical picture that Europe presents today. Already malnutrition, with such resulting conditions as deprivation diseases and tuberculosis, are widespread over large areas. It is estimated that at the present time 200 million human beings in Europe alone are urgently in need of more food. Typhus fever is now epidemic in most of eastern and much of central Europe, as well as in Spain and North Africa. Malaria, too, is increasing.

Besides medical supplies and food, two salient medical needs are evident. Firstly there is the control of epidemics, including typhus fever, malaria, and other diseases which may exist in epidemic form, such as tuberculosis and dysentery. Secondly, the medical, hospital and public health services in each country will have to be re-established. A primary difficulty here is the shortage of doctors, nurses and midwives which at present affects all the occupied countries. A further contributory factor is that many universities have been closed by the Germans and most potential medical students are serving with the armies. The reorganisation of the medical faculties of the universities of Europe will be one of the most essential, as it will be one of the most far-reaching, pieces of medical relief. It will probably involve the feeding and possibly the complete maintenance over a long period of both professors and students.

Other special medical problems include maternity and child welfare, institutional accommodation for orphan children, old persons, epileptics and mental cases, and steps to deal with gross overcrowding in the larger cities.

## OFFICIAL ACTION

As an outcome of an Allied Conference held at St. James's Palace in September, 1941, the Inter-Allied Committee on Post-War Requirements, under the chairmanship of Sir Frederick Leith-Ross, was set up to enable the Allied governments to collaborate in making supplies of food, raw materials and articles of prime necessity available in the immediate post-war period for the needs of countries liberated from the Nazis. On this committee fourteen governments are represented—those of the United States, the United Kingdom, the Dominions and our European Allies—as well as the French National Committee. At the same time, an Allied Post-War Requirements Bureau was established to assist govern-

ments in preparing their estimates of relief requirements, to collate and coördinate these, and to present proposals to the committee. The staff of this bureau is provided by the Government of the United Kingdom.

The general work of the Inter-Allied Committee is carried on mainly through technical advisory committees composed of experts representing the governments concerned. Such committees have now been set up not only for medical requirements but also for nutrition, agriculture and inland transport. They are thoroughly international: the chairman of the nutrition committee is an American, that of the inland transport committee is Dutch.

The medical advisory committee, or to give it its full title, the Technical Advisory Committee on Medical Supplies and Services of the Inter-Allied Committee for Post-War Requirements, has the following members:—

Dr. Melville Mackenzie (United Kingdom) ( <i>chairman</i> ).	
Belgium and Luxembourg: Dr. E. J. Bigwood.	Union of South Africa: Col. P. G. Stock (observer).
Czechoslovakia: Dr. Skladal.	United Kingdom: Dr. N. M. Goodman.
French National Committee: Medecin-General A. Sice.	United States of America: Dr. H. A. Smith.
Greece: Dr. A. P. Cawadias.	Yugoslavia: Dr. L. Kojen.
Netherlands: Dr. Van den Belt.	Allied Post-War Requirements Bureau: Mr. J. H. Gorvin.
Norway: Dr. Caspersen.	
New Zealand: Lieut.-Col. B. Myers.	

*Secretaries:* Mr. A. C. Mason, Mr. G. H. Clark. *Address:* Allied Post-War Requirements Bureau, Berkeley Square House, London, W.1.

The work of this medical advisory committee covers the whole of Europe. Its duties are to examine the schedules of requirements of medical supplies submitted to the Inter-Allied Committee, to make recommendations on the organisation of medical services during the relief period, and to advise on the personnel required. It is an official committee whose members represent their various governments. But in order that it may obtain the best technical advice a number of expert subcommittees have already been set up and are at work on the following subjects: Drug and hospital requirements, including those for surgery, radiology, dentistry and bacteriology; tuberculosis; maternity and child welfare; malaria; typhus fever; typhoid, dysentery, cholera and diphtheria; and laboratory equipment, including vaccines and serum. Members of these subcommittees sit solely in virtue of their experience and expert knowledge and do not represent either their country or any organisation official or voluntary.

## PRIORITIES IN RELIEF

In preparing estimates for medical relief the time to be covered has been divided into three periods. Firstly, a period immediately following the liberation of a country or part of a country when hostilities may still be in progress and conditions are likely to be chaotic in the absence of effective local government, and with great refugee movement. At this time shipping and other transport will be required for purposes other than relief; consequently the transport of material and personnel will have to be reduced to a minimum. Secondly, a longer period when transport conditions may be easier and governments, local and central, are getting into the saddle. Thirdly, a period which may be defined as the period of reconstruction. Whilst it appears likely that every enemy-occupied country, even if not the scene of a military campaign, must pass through each of these stages, it is impossible to say for any one country how long each period may last.

Medical estimates are therefore grouped as Priority A, B or C so as to allow of elasticity in their distribution under the varying possible conditions in each country or part of a country. Thus, in the case of drug requirements a short list of about 50 medicaments has been prepared under Priority A. This list comprises drugs which may be regarded as essential, even under conditions of extreme emergency. A second list of 120 drugs has also been prepared under Priority B. The third and final list will be comprehensive of the requirements of each country and will be scheduled as Priority C. The subcommittee on drug requirements will next

\* Based on the inaugural lecture of a course of instruction for war-relief workers held by the British Red Cross Society.

proceed to the study of requirements for surgical and other types of hospitals, laboratories, radiology and dentistry.

Such then is the machine as it at present exists. In view of the difficult character of its work, opening up vast possibilities in the alleviation of suffering, I feel sure that the medical advisory committee can count on the interest and sympathy of the medical profession.

## MEDICINE AND THE LAW

### Another Cancer Act Prosecution

WHEN Parliament forbade advertisements of offers of treatment for cancer, in the Cancer Act of 1939, it must have had in mind the cruelty and the danger of allowing unqualified persons to exploit the hopes and fears of patients. Not many prosecutions have hitherto taken place under the act, but it is clear that, when proceedings are taken, the utmost publicity is desirable. People must somehow learn that these advertisements constitute a criminal offence.

At Leicester last month William Peter Vickerstaff was charged with publishing an advertisement in his shop window containing an offer to treat persons for cancer and also for taking part in publishing a booklet entitled *Public Opinion* which infringed the act. The advertisements in his window, it was said, contained his photograph and a statement that he was the first recognised herbalist in the world to cure cancer. The booklet, given away free to persons entering the shop, mentioned a claim to have cured a Derbyshire man of cancer and included such statements as "delivered from death," "a hopeless case" and "Collier was going to die." The case was said to have occurred in 1929 and the defendant claimed to have effected the cure. For the defendant it was stated that, since the act took effect, he had refrained from treating cancer, but had thought that, as in the past, he was free to publish legitimate tributes to his work which could be proved and would stand the test of investigation. It was further said that the profession of herbalist was unfortunately not recognised as within the law in this country—a statement difficult to reconcile with the so-called Herbalists Charter, the act of Henry VIII "that persons, being no common surgeons, may minister medicines outward," and with the concessions so pertinaciously extracted in Parliament when the Pharmacy and Medicines Act was under discussion in 1941. The bench dismissed the charges against Vickerstaff under the Probation of Offenders Act on payment of 15 guineas costs. The prosecution had stated, in opening the proceedings, that the defendant had been in business at the shop for many years and had claimed to cure asthma, diabetes and skin diseases by natural methods. This claim presumably related to the period before the operation of the Pharmacy and Medicines Act, since the act prohibits any advertisement of articles in terms calculated to lead to their use for treating diabetes.

### Workmen's Compensation claimed for Tumour

Recently at the Stafford county court an applicant unsuccessfully claimed compensation for the loss of his left leg which had been amputated because of a tumour. In 1940 he was kicked by a restive cow while working for his employers in demonstrating a milking machine. He suffered pain but continued at his work. Three months later he was given notice to terminate his employment. Subsequently a tumour was discovered in his left leg which was amputated below the knee. Was this an injury by accident arising out of and in the course of his employment? He claimed that it was. His employers repudiated liability on the ground that no mention was made of the kick from the cow till several months later. If there had been a report at the time, the leg could have been examined. There was apparently some medical evidence that the tumour was not due to the kick. The court held that the applicant had not discharged the burden of proving that the tumour was due to the accident as claimed. No award was therefore made.

ROYAL SOCIETY OF ARTS.—At 1.45 pm on Wednesday, March 3, Dr. J. D. Robertson will read a paper to this society on calcium metabolism in health and disease. The meeting will take place at the hall of the society, John Street, Adelphi, London, W.C.2.

## BREAST CANCER AND IRRADIATION

At a meeting of the radiological section of the Royal Society of Medicine on Jan. 15 was discussed the value of irradiation in association with surgery in the treatment of carcinoma of the breast. Dr. G. E. VILVANDRE, who spoke last, might well have voiced his wonder earlier that in a civilised country any such discussion should today be deemed necessary. It may be that British surgeons are more conservative than those of any other country; certainly they have been slower than others to accept radiology as a part of the routine treatment of carcinoma of the breast.

Air-Commodore STAMFORD CADE, who opened the discussion, pointed out the need to establish a common method of assessing the stage of the disease, so that a true comparison of result can be made. We must look, he said, not only at the acknowledged best, but also at the average result of treatment because these represent the usual results among the general public. He believed that the extent of the disease gives the best basis for description, though other variables, such as the age of the patient, must be taken into account. In stage 3—the stage of dissemination to neighbouring areas when the carcinoma is generally acknowledged to be inoperable—radiology offers its chief gains, as he was able to show from published figures collected from various sources. Moreover the evidence seems to indicate that where irradiation can be combined with surgery it has advantages over surgery alone at all stages; and this is true whether the irradiation is by radium, X rays, or a combination of the two. He spoke, he said, as one convinced of the value of irradiation in spite of the striking result obtained by pure surgery in some hands; he regarded X rays as a more flexible weapon than radium, but admitted a place for both, and uses both in his own practice. He holds that radiotherapy is no longer to be regarded as an auxiliary method of treating carcinoma of the breast; it is as important as surgery and sometimes more important.

This view of radiotherapy in breast cancer was supported by Dr. ROBERT McWHITTER from the evidence of his own work done in Edinburgh, and by Mr. JOHN RICHMOND who derived his statistical evidence from the very large number of patients treated at the Mayo Clinic. There was no quarrel with this view of the situation on the part of the remaining speakers, Air-Commodore GEOFFREY KEYNES, Dr. N. S. FINZI, and Dr. ANTHONY GREEN. Dr. Finzi on the technical side emphasised the importance of homogeneity of dosage with both radium and X rays. Dr. Green demonstrated a neat instrument for reinforcing the clinical diagnosis by biopsy. This was designed to give an adequate specimen for histological examination, while enabling the track through which it had been obtained to be sterilised by diathermy, and thus avoiding mechanical dissemination of the disease.

In summing up, Air-Commodore CADE said that it was still necessary to educate surgeons in the advantages of radiotherapy and radiotherapists in the achievements of surgery. The two skills are seldom combined in one man. This field of therapeutics has too long been the scene of competition between supposedly local schools. Resources must be pooled if the unfortunate sufferers from one of the commonest forms of malignant disease are to have the best chance of survival.

## SCOTTISH HOSPITALS AFTER THE WAR

THE Edinburgh medical planning study group, formed at a general meeting of the profession and including representatives of the allied health services, has summarised the lessons learnt in a six months' study of postwar problems in a memorandum. It assumes that the administrative organisation of hospital services will be on a regional basis, and that Scotland for this purpose will be divided into five regions, four being centred on medical schools in associated hospitals. All hospitals, cottage hospitals, convalescent homes, &c. in the region, including the EMS hospitals, will be related to these key hospitals and will work with them as a team. All the hospitals in the region will be for major administrative purposes under one regional controlling authority which will be responsible to a

central authority for Scotland. This regional controlling authority is designated a regional health authority and will consist of representatives of the hospital medical staff and general practitioners, the larger local authorities, boards of management of hospitals, the nursing services and the public. The central authority to which the regional health authorities will be responsible should be a statutory body constituted to formulate policy, and first to establish and later to correlate the administration of the regional health authorities; it should be responsible to the Secretary of State for Scotland. The members of the body should be nominated by the Secretary of State and should include representatives of the Department of Health, hospital staffs, medical officers of health, general practitioners and allied health services.

The group suggest that with each regional health authority should be incorporated four regional councils advisory to the regional health authority:

(1) *The hospital advisory council*, which should discuss all matters of general policy cognate to hospital services and make representations to and advise the regional health authority on them. It should consist of certain members of the regional health authority together with "additional" members appointed directly to it by the interests concerned.

(2) *The medical advisory council*, which should advise and make representations to the regional health authority on matters concerning hospital policy and efficiency. All the medical members of the regional health authority should be members and additional members should be appointed from teaching hospital staffs, other hospitals, university faculties of medicine, extra-mural schools, royal medical incorporations, medical officers of health and general practitioners. The council would set up from its members a medical appointments panel to which local authorities, the boards of management of the voluntary hospitals or the medical committees of other hospitals desiring to make any appointment to their medical staff (other than a house-appointment) would submit the list of candidates from which the appointments panel would make a recommended selection, the right of final choice being left to the body concerned, who would then notify the appointments panel of its decision. It is considered that while members of the medical staffs would be appointed to individual hospitals they could be seconded for certain purposes and for a limited period to other hospitals in the region by the regional health authority. The medical advisory council would also make recommendations concerning and inaugurate schemes for research and the study of statistical information in the region and in collaboration with other regions.

(3) and (4). *Domiciliary and nursing advisory councils*.—The constitution of these would be along the same lines as for the other advisory councils. The domiciliary advisory council would be appointed when domiciliary medical services become regionally organised, as it is contemplated that in future the regional health authority will supervise and administer domiciliary services as well as hospital services. The nursing advisory council would consist chiefly of members of the nursing profession, and would consider the recruitment, training, and allocation of the necessary domestic staff and make recommendations to the regional health authority.

The regional health authority should, in the group's opinion, set up a regional medical bureau with an office centrally situated. Among other duties it would prepare day-to-day information about the vacant beds in each hospital and in special departments and would arrange for admission of patients in conjunction with the general practitioners concerned. It would organise a regional transportation service and arrange for transport of cases to and from hospital and the transfer of cases from one hospital to another.

In the postwar development of a coördinated hospital service the best of the individual characteristics found in the voluntary hospitals and in local authority hospitals should be retained and developed. In the voluntary hospitals the medical staff have had the opportunity of influencing directly and even determining the type and character of the work carried out. It appears desirable that future hospital service should retain these principles. The memorandum recommends that patients be normally required to make some payment for hospital services: those of low income should pay a compulsory contribution to the state; those with incomes above a certain level should pay either by voluntary insurance or directly when availing themselves of hospital services.

The following scale of remuneration of medical staff is suggested.

Whole-time senior appointments: £2000-2500.

Part-time senior appointments: pro rata, based on a full-time salary of £1500-2000.

Whole and part-time appointments other than senior, pro rata, based on a full-time salary of £1000-1500 for assistant surgeon and physician and £550-900 for clinical assistant and tutors.

Whole-time house-appointments, with board: junior £100-200; senior £250-350.

Medical superintendents of key hospitals: £1500-2000. This figure to be reduced pro rata where there are other emoluments such as existing pensions or where house &c. is provided.

The regional health authority should allocate monies to the governing bodies of the voluntary hospitals and to the local authorities according to the needs of their respective hospitals determined on the advice of an assessor.

## In England Now

### *A Running Commentary by Peripatetic Correspondents*

HOT-HOUSE germs are all very well for a living but most pathologists itch to hunt them in the wild. Caged in a little pot, fed on dreary synthetics, spread-eagled on a bit of glass, what after all can a poor germ do? There was an old practitioner who sent us gallon pails of fæces but even that gave them only half a chance. So when the chief mentioned a typhoid epidemic in Little Cesspool we were glad of the prospect of a more equal fight. We did the thing in style, of course, and with sanitary inspectors and water engineers as beaters we made straight for the quarry's lair. A well in the back-yard of the Bull was marked with a big red cross on our charts and in the cottages surrounding the Bull lived the victims, but when we got there we found that the well had been filled in four years before and we felt rather like the dog who nosed our car wheels in the pouring rain. Then we remembered what we'd come for. All this talk of wells and drains and watercress and shellfish was so much poppycock. Eberthella prefers cohabitation with fat ladies—cress and fish are only useful alibis. So when Mrs. Stoutbody opened the door of No. 5 we knew we had Eberthella on the run; for Mrs. Stoutbody had a glint in her eye and in her spotless kitchen there was a warm sudoriferous aura which we felt was as it should be. Yes, she'd had typhoid all right—"but that were before me husbing died 20 year ago, doctor; that couldn't harm me kiddies." Her kiddies were two evacuees from London, clean and bright and the pleasantest little fellows you could imagine. We explained that typhoid had a pretty shady past, that hé might lie low for forty years and never reform. Being a sensible lady Mrs. Stoutbody agreed, and she and the little boys bared their arms like men and filled our pots and bottles with alarming alacrity. Our triumph, we knew, was complete as we shook hands all round and jumped into the car for home. We'd been gloating for five minutes when suddenly the chief changed the car gears from top to reverse. He looked worried. "I'd like a cigarette," he said, "but I'd better not. I'm certain Mrs. Stoutbody's handshake meant at least 100 m.i.d. of *Bact. typhosum*." Heavens alive, and I'd been scratching my lip five seconds previously. "Let's get to the nearest hotel," I suggested, "for a wash and something to eat." But the hotel couldn't serve lunch though the inn-keeper pointed to a little café where he thought we might be lucky. No, they hadn't any place where we could wash but they's give us what was left for lunch. We sat down gingerly at a long table with ten other people staring across and a menu-card that said, soup, steak pie and suet pudding. That at least was all right. The soup arrived and we gaily set-to; gaily, until I noticed that my spoon hadn't been dried after washing. Yes, I was certain a drop of moisture slid down the handle from my fingers into the soup. The only comfort, the soup was hot but not hot enough and the culture would be diluted at least 10<sup>4</sup>. I started to break a piece of bread. "Bread isn't a bad platinum-loop," said the chief as I tried to spit out the piece I'd already chewed. "Sorry the meat and pudding are done," said the waitress coming

to the rescue "would you like a Cox's pippin and cheese and bread instead?" "Don't like apples or cheese," said the boss, "think we'd better be going." We started off in silence, convinced that field work was a bit over-rated. Sixty-five hungry miles and no cigarettes, but we'd got Eberthella in the bag. Even so our gloom deepened. Two days later Wilson and Blair was clear, there was nothing from the tetrathionate. Eberthella had had a day at home. "Thank God for Vi," I said to the boss "otherwise I'd feel pretty small." "Damn Vi," he answered, "haven't had a decent Cox this year."

I wonder if Dr. Watson ever got tired of hearing Holmes blowing the trumpet of his amazing successes, and if he retaliated sometimes by recounting some of his own "singular and baffling" cases. Here is a true case of mine which I would like to have shown off to Holmes.

"The Problem of the Groom's Scalp. Ah! Now here is a case which might appeal to you, Holmes. I think it was in this case that all my faculties were exercised to their fullest extent, and I still look back on the case with satisfaction and regard its ultimate solution as one of my masterpieces. You will remember that after I qualified I went down to do a locum in Wales. The house was a dark gaunt building with an atmosphere of foreboding about it. The doctor's surgery was a dark musty room, and the only medical facilities I could find in it were seventy-nine rubber rings for treating prolapse, twenty assorted boxes of eye lamellæ, a broken curved needle, and a pair of rusty nail pliers. Can you wonder that in these gloomy surroundings, and with few patients, the time hung heavy on my hands?" "The solution is obvious, my dear Watson; you should have hammered the broken needle into the wall and passed the time trying to throw the rubber rings over it (keeping the score with eye lamellæ)." "You amaze me, Holmes! That is exactly what I did. On the third day the monotony was broken by a telephone message from the squire's house to say that one of his grooms had received a kick on the scalp, and he was sending him along to have it sewn up. You can imagine my chagrin, my dear Holmes, at suddenly being confronted with such an important case." "But where, my dear Watson, is the mystery?" "Elementary my dear Holmes, the mystery was this: How in heaven's name was I to achieve a satisfactory closure of the scalp wound with the primitive equipment at my command?" "And did you manage it?" "It was really quite a trivial affair, Holmes. First of all I pulled out the needle from the wall and sharpened it to a crude point on the back doorstep. I then went upstairs and in the children's toy-cupboard I found an old ukelele from which I removed one string (the third, or F sharp string if I remember rightly). Pausing to collect an old bottle of lysol that I had seen in the bathroom, I returned to the surgery; whereupon, cleaning the wound with dilute lysol, I then sewed up the wound with the ukelele string, holding the curved needle with the nail clippers, which I also used to cut off the ends of catgut." "You amaze me, Watson!"

If my fairy godmother were to tell me I could wish for something that the hospital needs badly there would be little difficulty in making a quick decision. I should wish for a dozen Cinderellas. What a difference a dozen able-bodied women to do the dirty and sometimes hard domestic jobs would make. For a long time I have watched our matron growing an extra furrow on her brow. That furrow means the domestic problem. I know the exasperation which she feels (but doesn't show) when "higher authority" blandly suggests steps she might take to overcome the difficulty. She explored all those avenues long ago. We were discussing one of our domestics this morning. We agreed she was just better than nothing and so we decided not to sack her. Of course we have a handful of good willing helpers, who work hard—too hard—and sometimes break down because of it. Others come when they can but the claims of their private lives often prove too great for them to fulfil their obligations to us; and there is no holding them. Dirt breeds disease. Is there a connexion between the chronic shortage of domestic helpers and the periodical visits which the staphylococcus pays to what should be prohibited areas? A hospital depends on the

skill of its medical men and the devotion of the nurses for most of its success. But what could they achieve without cooks, porters, stokers, maids and secretarial staff? We are all bound in the bundle of hospital life together and the whole machine would crash without its ground crews. If the chain is only as strong as its weakest link, that is the link to strengthen. There was a young soldier in the wards who had a trivial operation and became a case of "avoidable sepsis." If his opposite female number had been directed, instead of to a factory or the ATS, to the ward in which he was a patient he might have been back with his unit in six weeks. Yes, Cinderella should be told that her job is just as important as her uniformed boy friend's, and she should have a uniform and a little of his discipline. Perhaps then she would recognise herself to be doing a job which has the respect of the community. And perhaps to start with the community leaders, through their ministries, might play the fairy godmother.

The *Lancet's* list of names of those who had been successful in an examination for a well-known higher degree didn't include mine; yet it was well worth it, for I have at last dispelled that aura of infallibility with which I have so long deluded myself and others. It wasn't the examination which revealed my ignorance of matters medical. As soon as I began to study I discovered that I had forgotten more than I like to think of since the day I passed my finals. As I read there came to me sudden flashes of illumination which elucidated cases which in the past had sorely troubled me. I know now, for example, that I missed a textbook case of marble-bone disease, and that I twice treated infectious mononucleosis as acute tonsillitis. For those patients the ultimate result would still have been the same, but my recent reading and new humility may do future ones a bit of good. And anyway the examining board is appreciably richer for my presence.

As a result of the transference of our hospital to the country I and my colleagues have found it necessary to develop new spare-time occupations. For some of us this was no easy matter and time hung heavily on our hands until a new registrar arrived and inspired us all with an enthusiasm for Nature Study. Thereafter all our spare moments were spent out of doors watching birds, hiding under hedges in hopes of seeing an otter fish in the river, or gathering wild flowers. The effects of our new mode of life were noticeable indoors, too. None of us had time to spare for more than a fleeting perusal of Shirer's *Berlin Diary* and works of like eminence. The staff reading-room was no longer littered with the most up-to-date writings concerning *The Five Year Plan in Russia*, *State Medicine* and other burning questions of the day. In their room were to be found *British Birds*, *More British Birds*, *Fauna of the British Isles* and *Wayside Flowers*. For the first time in the long history of the hospital, shop disappeared from our table talk; instead one or other of my colleagues had always some wildly improbable story to tell of a golden eagle over Ramshornfell or of a plover which attacked him when he stumbled on its nest. The psychiatrist even managed to persuade himself that he had seen a seagull carry off a lamb and swallow it whole. The radiologist's contribution to our studies was a series of flashlight photographs of a few of the more retiring creatures on the moor behind the hospital which he obtained by setting a sort of trap which when sprung actuated the shutter of his camera. When, however, there arose a suspicion that some of his photographs were of human animals, and might be of value to blackmailers should they reach the hands of such unscrupulous persons, he became extremely unpopular.

Like most of its kind this craze for the outdoor world died a natural death when the weather became inclement, and I had regarded it as decently interred. Yesterday I was sadly disillusioned when Sister in Ward 2 told me that she had just admitted a patient whom she thought should be placed in the "Dangerously Ill" list. She produced from a box at her feet a tiny rabbit she had rescued from the clutches of a weasel. As the poor little animal appeared to be suffering from an acute anxiety state I suggested that it should be given some sedative, and if a suitable donor could be found be

transfused first thing in the morning. It must have heard of the fate in store for it because it took French leave during the night, having first drunk all the night nurses' milk.

It is not difficult to find accommodation for a baby rabbit in hospital but a demand by one of my colleagues for a bed for an orphan lamb found the superintendent unprepared. In the end we put it in a laundry basket. Our pet quickly adapted itself to its new quarters and after a few attempts mastered the art of sucking from a feeding-bottle. Our two authorities on infant feeding had a violent disagreement as to its probable metabolic needs. As both the eminent specialists concerned have still to sit their Finals we decided not to leave our patient to their tender mercies and instead adopted a trial and error method of discovering its real requirements. We soon found, however, that no matter how much we offered our lamb it baaed for more. Fortunately the shepherd found a foster parent for our charge before it had drunk all the milk in the hospital.

## Parliament

### ON THE FLOOR OF THE HOUSE

MEDICUS M P

Lord Woolton's warnings of the urgent need for economy with bread are a pointer to the way the world is going. Uneasy questions in the House of Commons point in the same direction. Sir Percy Hurd asked the President of the Board of Education what he was proposing to local education authorities in order that "the oncoming generation" should share in increased food production. Mr. Butler said that teacher courses were being held in different parts of the country and that the production of food and gardening were to be a permanent part of school life. Lest we become too anxious it is as well to remember that the Minister of Agriculture told us before the last harvest that this country was producing two-thirds of our own food. And that did not take into account the produce from gardens and allotments, which is considerable. This year, with a further increase in production, the proportion of home-grown food will be greater still, and we may at least hope to increase the fish available.

Britain can maintain a fairly good standard of feeding, and in view of the falling standard in Europe and the certainty of great postwar demands there this is of first-class importance. We have long been the bridgehead of the war against the Axis—we seem destined to become the bridgehead of relief and medical assistance. There is starvation to the point of death in many parts of Europe, and there is deprivation everywhere except in these islands and in one or two other favoured spots. But the epidemic situation does not appear to be so grave as it was at the corresponding period of the last war. Typhus has abated in Spain, and although there are many foci of infection in Western Europe, carried by prisoners or wounded from the Polish-Russian endemic zone, they are at present reasonably controlled. Also there is much more in the way of hygiene organisation and more provision has been made for preventive and remedial treatment. A greater danger than typhus perhaps is the possibility of great attacks of malaria, for quinine is scarce. But it is not only Europe that is short of food. There have been questions about food shortage in the West Indies, and Mr. Amery has made a statement about the serious shortage in India—indeed we are having to send cargoes of wheat to that great food-producing country, a serious demand on shipping space at this time of intensive U-boat warfare. Another claim on shipping space is made by the appeal that minimal amounts of concentrated foods should be sent to Belgium, France and Greece. Greece is already receiving food. Unoccupied France was receiving relief for children until our landing in North Africa brought Hitler's forces down to the Mediterranean. But it seems difficult to deny limited shipment of foods to France and Belgium to keep children and nursing and expectant mothers alive. Little enough can be done, and in practice it may not be possible to get the transport or the essential foods.

What the effects of the new mobilisation of man and woman power in Germany will be cannot yet be known,

but it is unlikely that food production can be increased. The condition of Europe at the end of the shooting war will be as much a matter of medical concern as of military security, and the medical personnel and supply problems will be acute. It is hoped that Parliament will turn its attention to these matters shortly, for this kind of postwar planning cannot be postponed much longer.

### QUESTION TIME

#### Postwar Famine and Disease

Replying to a question, Mr. HARCOURT JOHNSTONE stated that the policy of the Government is to arrange in advance for the supply of food to any part of Europe as soon as it is liberated. In view of our own food situation, this policy will call for joint action by other United Nations as well as ourselves. The machinery needed for this purpose is at present under discussion between HM Government and other United Nations, and HM Government will do their best to assist when the time comes to the fullest possible extent of their resources. While the effectiveness of any relief plan must depend on intergovernmental action he anticipated that there would also be scope for the activities of voluntary organisations and he saw no reason why their coöperation should be excluded.

#### Food-supplies in Trinidad

Mr. B. RILEY asked the Secretary of State for the Colonies whether he is aware of the grave dissatisfaction in Trinidad with the arrangements which exist for dealing with the food problem; and whether consideration has been given by the local government to the constructive plan which has been submitted to the authorities by the Trinidad and Tobago trades union council.—Colonel O. STANLEY: There have been shortages of certain supplies, due to circumstances outside the control of the local government. The government has made every effort to meet the difficulties and I understand the situation is now easier. I have no doubt that the government of Trinidad will give careful consideration to any constructive proposals for the better organisation or distribution of supplies which may be laid before it.

#### Food Situation in India

Mr. R. W. SORENSON asked the Secretary of State for India whether he has further information respecting the shortage of foodstuffs in India; approximately the number who are already affected; and whether the export of grain and food will be prohibited immediately, both to provide for the present emergency and to build up stores against future dangerous contingencies.—Mr. L. C. AMERY replied: The government of India have published a statement giving as their opinion that if hoarded stocks can be got on the market and fairly distributed there is little danger of the people having to go seriously short. There is no famine and no widespread prevalence of acute shortage, though a large part of the urban population is doubtless affected. The commerce member indeed has pointed out that the supplies available are as good as in five out of the past ten years. The difficulty is to get them on the market and the government of India have announced as measures to that end the removal of the maximum price for wheat, the establishment of a government purchasing agency and arrangements with HM Government for the import of substantial shipments of wheat to be sold and distributed under government supervision to the final consumers' in deficiency areas. It is expected that the price of this wheat will be less than that prevailing in the free market. The government of India have already announced their intention to prohibit exports of foodstuffs after March, this delay being necessary to allow for alternative sources of supply to be arranged for the territories concerned. Exports are, however, very small in relation to total supplies and cessation will not greatly affect the situation.

#### Food Production in Schools

In answer to a question Mr. R. A. BUTLER said that the importance of increased food production has frequently been brought to the notice of the schools since the beginning of the war and teachers' courses in rural subjects are being held in different parts of the country. There has been a noteworthy and valuable increase in the number and acreage of school gardens both in urban and rural areas and HM inspectors take every opportunity of fostering the interest and coöperation of the schools in gardening and food production. It is my aim to give these activities a permanent place in the life of our schools.

### National Loaf

Sir E. GRAHAM-LITTLE asked the Parliamentary Secretary to the Ministry of Food whether he was aware that scientific opinion was practically unanimous that utilisation of the wheat grain raised from 85% to 95%, or even higher, would save 10%–15% of shipping space and give a more nutritive bread; and whether he would consider the immediate provision of a 95%–100% extraction of wheat for national bread rather than incorporate potato and oatmeal which had not the same nutritive value as wheat.—Mr. W. MABANE replied: The answer to both parts of the question is no.

Mr. MABANE further informed Mr. R. BOOTHBY that oatmeal has now been introduced into the national loaf.

### Potato Flour in Bread

Mr. MABANE replying to Major C. N. THORNTON-KEMSLEY said: I am advised that there are various methods of producing a satisfactory potato flour. My department has, however, been anxious to avoid the construction of extensive new plant, and to find ways of utilising existing plant, designed for other purposes but having the requisite capacity. Preliminary experiments with this object were commenced at the outbreak of war. A fair measure of success has now been attained in large-scale trials. It will be appreciated, however, that the production of a suitable flour is only one of the factors to be considered in deciding whether or not to include potato flour in bread. He added that provision has already been made by the Food Rationing (Special Diets) Advisory Committee to investigate the possibility that flour mixtures containing potato flour might in certain cases cause allergic manifestations. If potato flour were put into bread, arrangements would be made to provide a special flour to meet the requirements of any proved cases.

### Hours of Work

Wing-Commander A. W. H. JAMES asked the Minister of Labour if he was aware that excessive hours were still being worked, particularly by women in munitions production; and what steps were being taken to limit hours where medical officers reported injury to health.—Mr. E. BEVIN replied: Inquiries show a widespread tendency to reduce working hours in factories where these have been relatively long, and in my department's recent leaflet on the problem of absenteeism stress is laid on the importance of planning, so far as reasonably possible, hours of working of individuals or of sets of workers with some regard to their personal circumstances. If I were to receive evidence of injury to health due to excessive factory hours I should not hesitate to take the matter up with the firm concerned.—Wing-Commander JAMES: Is the Minister aware that damage to health, particularly among women workers, is accruing, and will he press upon medical officers the need for watching the position?—Mr. BEVIN: I am constantly in touch with the matter, but I cannot introduce a universal regulation of hours owing to the nature of the war industries.

### Pregnant Women Workers

Mr. Q. HOGG asked the Minister of Health whether he was satisfied with the steps now taken to protect pregnant women engaged in employment in factories; and whether he was prepared to extend the present period in which employment was prohibited from one month after delivery to one of one month before and six weeks after delivery.—Mr. E. BROWN replied: Medical supervision under the Factory Acts is a matter for the Ministry of Labour and National Service: the prohibition of employment is a matter for legislation, and I have no authority to extend the period determined by Parliament. An extension of the prohibition could not, in my view, be suggested without examination of the financial provision to be made for the women in question, and recommendations on this point are contained in the Beveridge Report which is receiving the consideration of the Government.—Dr. EDITH SUMMERSKILL: Is the Minister aware that these women continue to work in industry until they are unfit to do so, because they are not eligible for National Health Insurance until the last few weeks of pregnancy?—Mr. HOGG: Can we assume that the Government will take active steps to deal with this important topic?—Mr. BROWN: Perhaps my hon. friend will exercise patience until these examinations are completed.—Miss I. WARD: Is the Minister aware that the Select Committee on National Expenditure has already made a recommendation on this matter?—Viscountess ASTOR: Will the Minister realise that this is a thing that will not wait because it affects the health of women and children, which is as important as anything else at this stage of the war?—

Mr. BROWN: That point is brought out in paragraph 341 of Select Committee's report.—Viscountess ASTOR: What is use of a paragraph? Mr. BROWN: Paragraphs often lead action.

### Paper for Scientific Journals

Mr. E. W. SALT asked the Minister of Supply whether he was aware that the amount of paper now available for the production of scientific journals published by the Cambridge University Press and other similar bodies was down to 30% of prewar supplies and might shortly be reduced to 19%; and whether, since this reduction caused delay of many months in the publication of results of research and therefore in the practical application, he would review the whole question of paper supplies for technical and scientific journals and ensure that technological developments essential in the national interest were not obstructed.—Sir ANDREW DUNCAN replied: The journals of learned societies are treated more favourably than periodicals generally, and there is no present intention to reduce the quotas.

### Child Adoption

The Home Secretary informed Miss WARD that it had been decided to bring the Child Adoption (1939) Regulation Act into operation as soon as the necessary arrangements could be made.

### Treatment under Regulation 33B

Dr. H. B. MORGAN asked the Attorney General whether, in view of the risks inherent in the modern treatment of syphilis by drugs containing arsenic, he had considered the probability of action for damages or legal suits against the special practitioners in connexion with their work under the compulsory treatment powers of Regulation 33B and the position if a breadwinner died or could prove permanent disability as the result of enforced treatment; and whether legal help would be afforded to such individuals in prosecuting claims in forma pauperis.—Mr. BROWN replied: The construction of the regulation is a matter for the courts and not for me to determine, but I do not think that a patient who is treated under the regulation is in a different position as regards claims against the practitioner than a patient who is treated by a practitioner who has been consulted in the usual way. The rules as to proceedings by poor persons will apply to a person who desires to bring an action in the High Court in the circumstances assumed as they apply in the case of other actions in the High Court.

### Infectious Disease in England and Wales

WEEK ENDED JAN. 23

*Notifications.*—The following cases of infectious diseases were notified during the week: smallpox, 0; scarlet fever, 2203; whooping-cough, 1841; diphtheria, 998; paratyphoid, 1; typhoid, 7; measles (excluding rubella), 11,827; pneumonia (primary or influenza), 1404; puerperal pyrexia, 187; cerebrospinal fever, 92; poliomyelitis, 3; polio-encephalitis, 0; encephalitis lethargica, 2; dysentery, 113; ophthalmia neonatorum, 69. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospital of the London County Council on Jan. 13 was 2155, including scarlet fever, 656; diphtheria, 283; measles, 476; whooping-cough, 189; enteritis, 107; chicken-pox, 94; erysipelas, 35; mumps, 36; poliomyelitis, 1; dysentery, 46; cerebrospinal fever, 13; puerperal sepsis, 19; enteric fevers, 11; german measles, 9; glandular fever, 1.

*Deaths.*—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 16 (0) from measles, 12 (1) from whooping-cough, 19 (1) from diphtheria, 37 (0) from diarrhoea and enteritis under two years, and 100 (13) from influenza. The figures in parentheses are those for London itself.

Birmingham reported 10 deaths from influenza, Sunderland 6, South Shields 5, no other great town more than 3. Liverpool and Manchester each had 4 fatal cases of diarrhoea. The number of stillbirths notified during the week was 249 (corresponding to a rate of 38 per thousand total births), including 17 in London.

**POSTURAL AND REMEDIAL EXERCISES.**—A demonstration of postural and remedial exercises will be held at the Seymour Hall, Seymour Place, Bryanston Square, London, W.1, on Wednesday, March 3, at 6 P.M. The RAF film "Fighting Unarmed" will be shown. Admission is free by ticket, which may be obtained from the acting secretary of the Board of Registration of Medical Auxiliaries, BMA House, Tavistock Square, W.C.1.

## Letters to the Editor

## GMC PROCEDURE

SIR,—It is gratifying that at least one member of the medical profession is taking an interest in its domestic tribunal. An important reason why the unsatisfactory penal procedure of the GMC has not been reformed long ago is that practically no member of the profession knows or cares anything about it, except those who sit on it and those who appear before it. The public know it only from occasional brief reports in the lay press. I have seen a good deal of the council, and the more I see of its penal procedure the less I like it. Every session produces at least one case, and usually more, in which I feel that the evidence has not justified erasure; what is worse, in many cases when the council has found the charges not proved to its satisfaction the doctor ought not, I feel, to have been haled before the council on such a travesty of evidence.

I exonerate the council absolutely from any suggestion of unfairness. Its members are extremely fair, and they are guided in their deliberations by a barrister with many years' experience of criminal practice. The root of the trouble is the Medical Act 1858, which practically makes them into a criminal tribunal without giving them the power to bring all the necessary witnesses before them, or to administer the oath to those who appear. Your medico-legal correspondent seems to suggest, as some judges have done, that because the GMC is a domestic tribunal it can be fittingly left to find facts on inadequate evidence. I have never understood why. To say that the GMC is not concerned to punish doctors is mere hair-splitting. It inflicts very severe punishment in fact. To my mind it is scandalous that a doctor should be liable to have his name erased after a hearing to which he may be unable to bring the witnesses necessary to his defence.

Doubtless the council protects the interests of the public to the extent of removing from the register the names of many doctors who have fallen below a proper standard of professional integrity. It is not, however, in the public interest that doctors should be removed from the public service on insufficient evidence, or that injustice should appear to be done. Both these evils must continue until Parliament gives the GMC power to summon witnesses, swear them, and award costs against unsuccessful complainants. Other reforms are desirable but these are really urgent.

London, S.W. 19.

D. HARCOURT KITCHIN.

## THE NURSE WITH TUBERCLE

SIR,—Artificial pneumothorax treatment, introduced to England thirty-two years ago by Claude Lillingston, was accepted cautiously at first, but once it found favour loosed a torrent of surgical adventure. There are, however, backwaters in England now, as your peripatetic correspondent told us recently, which hinder our national effort against tuberculosis. A nurse who contracted phthisis during training had 3½ years of active treatment at two well-known sanatoria in the London area; she was enabled to combine work with her "cure" and thus to add a considerable period to her professional usefulness. There were ups and downs, but the £1000 or so which she cost the country was offset by services rendered. Returning home to a rural county she found no opportunity for local refills, no part-time work of suitable character, no social service such as a good almoner's department provides—nothing but the cold comfort of advice to resort to public assistance with its unattractive methods and associations. She had good reason for regret at leaving London. But why such difference? Eventually Beveridge or Rushcliffe may help the financial aspect of such a case, but will not meet the loss of a nurse's service or her distress at finding herself useless after years of being a member of a team. If those are extra hazards in a nurse's life, is it not time they should be squarely faced and dealt with? The opportunity to give suitable part-time employment is there more clearly than in perhaps any other line, but there must be encouragement and efficient organisation.

Moore Park.

ESTHER CARLING.

## TROPICAL EOSINOPHILIA

SIR,—In 1933 a married woman of 35 was admitted to the medical unit to which I was then attached. The diagnosis was bronchial asthma. On clinical and radiological examination the characteristics of this disease were found with the exception of an eosinophilia of more than 70% of a total white count of about 10,000. The mystery of the enormous eosinophilia remained unexplained. The patient responded fairly well to the usual treatment for her chest condition, and the attacks of asthma became less common and troublesome, but the eosinophilia was unaltered on discharge. There were no signs of tuberculosis, and no history of allergic reactions in the patient or her family. No flariae were found in the urine, faeces or sputum. The patient said she had passed through a febrile stage when her illness started. Her serum Wassermann was strongly and repeatedly positive, but any knowledge of syphilitic infection was denied. Treatment with neoarsphenamine did not seem to influence the condition during the six weeks of observation. The patient was an Austrian who had followed her husband—also Austrian—to Tahiti and spent about 5 years there. The husband was still there and could not be examined.

London, S.W.

V. C. MEDVEI.

## Obituary

## ROBERT ARMSTRONG-JONES

KT, C B E, M D LOND., D SC WALES, F R C P, F R C S

At the age of 85, Sir Robert Armstrong-Jones died on Jan. 30, at his home in Caernarvon. His work at mental hospitals began when he qualified in 1880, and for the last ten years of his active medical career he was a Lord Chancellor's visitor in lunacy.

One of ten children of the Rev. Thomas Jones, he had a country upbringing: while at school at Portmadoc he had to walk 3½ miles night and morning, from his home and back. He went to University College, Aberystwyth, at 14, and thence to Grove Park School, Wrexham, and he had six months in the surgery of a general practitioner in Portmadoc before entering St. Bartholomew's Hospital in 1876. On graduation his first post was at Earlswood, and after six years at Colney Hatch he returned to Earlswood as medical superintendent. His chief contributions to psychiatric practice were made, however, in the 24 years he spent at Claybury Mental Hospital, from its opening in 1893.

Claybury, the first new asylum of the London County Council, was also the first municipal mental hospital to take private paying patients, and it had the advantage of Frederick Mott's services as pathologist. As superintendent, Armstrong-Jones interested himself particularly in the remedial employment of patients and in the teaching of nurses. No London asylum had previously undertaken the special training of mental nurses by the medical staff, and no LCC nurse had sat for the certificate of the Medico-Psychological Association, of which Armstrong-Jones became secretary, and later president. It was in recognition of his improvement in mental nursing that he was made a knight of grace by the Order of St. John of Jerusalem. His enthusiasm for occupational therapy was equally keen, and the patients at Claybury not only engaged in gardening but also, during the last war, cut steel shells for Woolwich Arsenal. For many years he was well known as a teacher of students, at Westminster Hospital, at the West London, and at Bart's. To his colleagues he brought information derived from visits to mental hospitals as far afield as Italy, Russia, Poland and Tunis.

Retiring from Claybury in 1916, Armstrong-Jones received a knighthood and was soon afterwards appointed consulting physician in mental diseases to the London Command and later to the Aldershot Command, with the rank of lieutenant-colonel. For ten years from 1917 he was Gresham professor of physics, and in 1921 Lord Birkenhead made him one of the three Lord Chancellor's visitors in lunacy. Among his other public appointments were those of justice of the peace, deputy lieutenant for the counties of London and Caernarvon, and, in 1929, high sheriff of Caernarvon. He married in 1893 Margaret Elizabeth, daughter of Sir Owen Roberts, and they had a son and two daughters.

## ISIDOR FISCHER

M.D.

Dr. Fischer, who died at Bristol on Jan. 13th at the age of 74, came to this country when Austria was occupied by the Germans. Having formerly achieved considerable success as a consultant gynaecologist in Vienna, where he was a Privatdozent at the university, he had turned his attention to the history of medicine, in particular the history of his specialty and of old Viennese medicine. He will be best remembered by his useful and thorough "Biographical Lexicon of Outstanding Doctors of the Last Fifty Years" published at Vienna in 1932 and the "Eigennamen in der Krankheitssterminologie" (1931), a list with full references to the original use of all such personal names as Addison's or Bright's for special diseases. Fischer subsequently amassed material extending this list to cover the use of proper names in every branch of medical literature. While living in London during 1939 and 1940 he worked assiduously at this compilation at the British Museum, the Royal College of Surgeons and the Royal Society of Medicine, of which he was elected an honorary fellow. Shortly before leaving Vienna he had written a history of the Vienna Medical Society, but the Nazis removed his name from the title-page. He had been for many years honorary librarian of the society, whose library became under his care one of the finest on the Continent.

## Notes and News

## CHARMS AND SPELLS

MEDICINE and magic have not yet dissolved an old partnership. In his address on the folklore of children's diseases, given to the Folk-Lore Society on Jan. 20, Dr. J. D. Rolleston remarked that the orthodox medical practice of one age is apt to become the folk remedy of the next.

Dr. Rolleston's lecture contained much material for psychological speculation. In what dark cavern of the subconscious mind did all these spells for the cure of children get their birth? Sometimes it seems fairly clear. To do something seven times, to whisper an invocation thrice, to carry out an intricate rite nine times nine days in succession is surely an obsessional method of propitiating some sense of personal guilt. To pass a child with hernia or whooping-cough through a cleft tree—still done, it seems, in parts of England—is evidently a rebirth phantasy, and one can imagine the mother's unconscious attitude: "Perhaps after all this trouble I can have a nice unruptured (or non-coughing) child." The same mechanism may be detected in some of the examples he quoted of the treatment of infantile convulsions; thus it has been common in the past to treat this condition by giving part of the placenta or of the umbilical cord, remedies that may symbolise return to the womb and a fresh start. The phantasy becomes almost articulate in the words "Wherewith I bear thee therewith I heal thee" used in the treatment of thrush with genital mucus. The secretions of the body seem always to have been given credit for magical properties, especially the saliva. "Spit on it for luck" has a long tradition behind it. Thus Dr. Rolleston tells of a Bohemian charm for skin eruptions in which three circles are drawn round the lesion, and three above it, and the operator whispers "Adonai" before spitting thrice on the spot. Besides being a propitiatory rite this probably had other symbolic meanings at an unconscious level. It would also be interesting to know what lay behind the treatment of enuresis in which the child was required to urinate in a newly dug grave.

The magical mechanism of transferring a disease to someone or something else is common, and is no doubt akin to the psychological mechanism of projecting resentment. The superstition that venereal disease can be cured by intercourse with a virgin is responsible, Dr. Rolleston pointed out, for many of the cases of rape of young children. Analysis of such beliefs provides material for the study of the developing mind.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

## University of Oxford

In a Congregation held on Jan. 21, the following degrees were conferred:

BM.—R. C. Evans, A. M. N. Gardner, J. K. Hawkey, A. M. Sweet, A. W. F. Erskine, D. C. Byron-Moore, G. M. T. Tate, F. E. Lodge, Margaret Myers, Renate H. Schulz. \*D. F. Barrowcliff, \*Bryan Bevan, \*W. B. Matthews, \*L. P. Le Quessne, \*A. I. Spriggs, \*E. L. Barr, \*C. S. Gardner, \*R. T. C. Pratt, \*D. M. Strathie, \*Phillip Vlasto, \*D. J. Arkle and \*Constance L. Simpson.  
\* In absence.

## University of Cambridge

The title of the degree of MD has been conferred on Mrs. C. M. Hall.

## Royal College of Physicians of London

A comitia of the college was held on Jan. 28 with Sir Henry Tidy, the senior censor, in the chair. The following fellows were appointed representatives of the college: Sir Robert Hutchison on the Aliens Committee; Prof. F. R. Fraser on the Poisons Board; and Sir Arthur MacNalty and Prof. J. W. McNeer on the Imperial Cancer Research Fund.

The following candidates having satisfied the censors' board were admitted to the membership:

D. S. Cadman, MB CAMB.; D. R. Cameron, MD ST. AND.; E. D. H. Cowen, MB CAMB.; F. C. Deller, MD LPOOL.; Wilfred Fine, MB LOND.; Frances V. Gardner, MB LOND.; W. P. U. Jackson, MB CAMB.; D. S. Lewes, BM OXFORD; D. de la C. MacCarthy, MD LOND., surgeon lieutenant, RNVF; M. E. MacGregor, MB LOND., surgeon lieutenant, RN; E. A. Spriggs, BM OXFORD, lieutenant, RAMC and T. C. Studdert, MB DURH.

Licences to practise were granted to 221 candidates (197 men and 24 women) who have passed the final examination of the conjoint board, and complied with the by-laws of the college. The following are the names of the successful candidates:

J. D. Abbott, J. M. Allcock, P. S. Allenby, David Annis, Nathan Arenstein, J. K. Arkle, F. R. St. C. Assinder, E. H. Back, Muriel I. I. Baird, T. E. Baird, J. F. Baker, T. M. Ball, D. R. Barnes, Joan E. Barter, N. I. Bartholomew, H. C. Bergmann, Margaret E. Berry, Isabel P. Bewick, J. W. Betts, Rosemary J. Biggs, P. R. Birks, P. L. Blaxter, D. H. Bodger, Cyril Boroda, J. P. Bound, R. E. Bowers, J. R. Briggs, F. S. W. Brimblecombe, F. B. Bromfield, F. H. Budden, J. D. Buxton, Coltn Campion, S. L. Carey, C. B. Cartledge, W. F. Cavenagh, A. H. Cheshire, J. M. Childs, S. M. Chris, G. H. V. Clarke, R. B. Coles, M. C. Connell, W. D. D. Cooke, T. A. Copp, A. K. Cumming, F. A. L. Da Cunha, Elisabeth Dalley, K. H. Dalrymple, I. E. Davidson, D. I. Davies (died 3.1.43), R. G. Davies, J. S. Davis, J. T. Dawson, L. F. Demetrius, P. F. G. Denton, John Douglas, W. K. Douglas, A. H. Drewitt, J. A. Eason, C. D. Edwards, A. J. Eloy, T. H. Elias, F. R. Ellis, I. C. W. English, G. L. Evans, G. M. Evans, T. G. Evans, Allanore M. C. Fairfax-Luoy, H. C. Faulkner, J. F. A. Fenton, P. F. G. Finch, R. A. Fisher, H. T. Foot, Kate Forrest, T. C. Fort, A. R. Fox, H. G. Frampton, Catherine J. S. Gauvain, T. A. L. Gethin-Jones, D. S. Gibbs, R. A. de K. Glover, F. J. Goddard, Samuel Goldman, Harold Goldstein, Eva M. Graves, F. T. Graves, A. J. Gray, F. W. M. Graves, R. F. Griffith-Evans, F. D. Griffiths, R. W. Griffiths, S. D. Gun-Munro, M. J. L. Hassall, P. E. Helme, A. G. Healing, G. C. Hickie, A. R. H. Hicks, Hazel B. Hill, J. L. Honig, G. A. N. Horton, J. G. Howells, A. J. R. Hudson, F. P. Hulke, W. H. Humphreys, R. J. Jameson, E. S. Jardine, Margaret M. G. Joad, E. L. John, Kathleen E. J. Jones, P. G. Keates, Margaret Komesly, H. W. H. Kennard, R. A. H. Kinch, E. J. King, H. E. Knowles, Simon Kramer, Raymond Lake, C. L. S. Lambert, Kathleen M. Lane, P. L. Langton-Lockton, H. J. C. J. L'Estrange, W. J. Lewis, Murray Lindner, John Littler, R. E. Loder, T. G. E. Loosemore, A. M. MacArthur, R. I. McCallum, Kenneth McLaughlin, I. S. MacLeod, J. P. Madhok, R. J. Markham, B. P. Marmion, A. S. Mason, C. J. Mathes, R. H. Maudsley, D. G. Maurice, S. R. Mawson, F. S. Mollows, Jessica Mostel, J. R. Moffat, P. A. G. Monro, R. J. Moolan-Feroze, H. C. Moore, Reginald Morris, K. E. Mortimer, M. P. Morton, J. R. Napier, G. D. K. Needham, C. T. Newnham, L. R. Nicholson, Naizby Noble, Rhona M. Oliver, H. B. F. Ordish, L. R. B. Parker, R. T. Parkin, P. R. P. Pearsall, J. G. Pegg, E. J. Perks, D. J. Petit, Lewis Posner, R. B. Raffie, A. J. H. Rains, G. S. Ramsay, C. R. M. Redwood, W. T. Rees-Jones, C. A. I. Reis, S. M. A. Rizvi, J. A. Robertson, H. M. Robinson, Edith M. Robson, Eric Roebuck, John Ronchetti, J. P. I. Rose, A. J. E. Rowe, Paul Rowntree, I. A. Roxburgh, T. J. Ryan, A. P. S. Sanders, H. T. N. Sears, Josef Sebel, F. O. J. Shaw, G. N. Shone, Mohan Singh, E. G. Sita, B. F. Smallhorn, E. S. O. Smith, F. M. Smith, T. G. Smith, V. O. G. Smyth, Paul Solnik, E. M. Southern, George Steiner, D. G. H. Stone, Benjamin Sullivan, F. R. Sutton, N. W. Tattersall, G. W. Taylor, L. B. Thomas, M. V. P. Thomas, J. D. Thompson, W. B. Thompson, Dorothy H. Thorne, B. E. Tomlinson, Edith M. M. Toye, Joan D. Trethowan, W. H. Trethowan, G. C. Turner, L. R. Twentyman, Elizabeth Tyden, F. L. A. Vernon, J. A. Vyse, Eric Waddington, I. R. Waters, Geoffrey Watkinson, Harry Weinreb, J. A. T. West, A. N. Whiteside, D. H. J. Williams, H. O. Williams, H. A. G. Winter, and Celestina M. Xavier.

Diplomas were granted, jointly with the Royal College of Surgeons, to the following:

DPH.—M. R. Blair, S. D. Elek, L. M. Franklin, Alexander Jephcott, N. J. S. Nathan, B. F. O'Flynn, T. G. Osler, B. F. Russell, and A. E. Tinkler.

Diplomas in anaesthetics were also granted to the candidates named in the report of the meeting of the Royal College of Surgeons in our issue of Dec. 19, and in psychological medicine and in laryngology and otology to those named in our issue of Jan. 23.



**University of Edinburgh**

At a graduation held on Jan. 21 the following degrees were conferred:

**MD**—J. W. Buchanan, \*R. F. Dawson, \*O. S. Gibbs, \*N. S. Gordon, William Limont and J. A. F. Roberts.  
**MB, Ch B**—H. T. G. Strawbridge (with honours); P. H. L. Barker, G. T. Bedford, G. V. R. Born, M. A. Caldwell-Nichols, E. M. Callander, K. M. C. Chalmers, T. B. Chetty, D. H. Clark, \*W. A. L. Collier, D. J. C. Cunningham, Helen W. Currie, K. J. R. Cathbert, D. A. Dixon, William Edgar, G. M. Falconer, E. C. Fear, Margaret M. Fleming, J. P. W. Grant, D. R. Gunn, Kaare Gunstensen, W. J. Howrie, D. W. Huish, W. H. Hunter, R. B. Huston, E. C. Jeffrey, D. R. Kerr, W. A. E. Kerr, A. D. M. King, R. P. T. King, W. T. Lesslie, D. W. Livingstone, D. G. McConnell, A. C. Macdonald, Evelyn E. McGuinness, Annie H. Mackay, Lachlan M. Lachlan, A. S. McLean, C. W. Magill, R. M. Marquis, A. R. Milson, N. R. K. Mitchell, Ian Payne-James, George Reid, P. M. Roemmele, E. B. Ross, W. T. Scott, C. W. Shearer, I. B. Sim, Iqbal Singh, A. S. Smith, C. R. Strother-Stewart, R. S. Sunderland, A. E. Sutherland, J. A. Tulloch, G. A. S. Wallace, J. L. Watson, A. W. Williams, Lena W. Williams, H. D. Wilson and A. F. Young.  
**MB, Ch B of the Polish School of Medicine**.—Henryk Markiewski, T. W. Drodzowski, F. J. Kuciel, W. S. Kulesza, Tadeusz Markiewicz, K. J. Parkita, S. J. Rydlewski and Halina Sullinska.

**DPH**.—\*Winefride M. Hamilton and \*Doreen G. Warnock.

**DMR**.—Eugene Tiscenco.

\* In absentia.

† Highly commended for thesis.

**Scottish Conjoint Board**

The following having passed the final examination of the board have been admitted licentiates of the Royal Colleges of Physicians and Surgeons of Edinburgh, and the Royal Faculty of Physicians and Surgeons of Glasgow:

M. W. Awad, J. D. H. Bankier, Margaret Barker, J. S. Bateman, C. E. Bell, J. M. Bolton, J. N. G. Burns, D. S. H. Cadlan, N. A. Chisholm, R. P. Cookson, J. H. Couper, Margaret M. A. Dunn, Oscar Ellahewitz, Margaret S. Elliot, G. St. J. Frost, Monroe Gaines, S. J. Halkett, Ian Hamilton, Isobel M. Hill, Regina Kemmerling, Abraham Manson, Thomas Notman, J. J. Pollard, R. K. Richardson, J. T. Rossouw, Gerald Solomons, G. P. Stillely, Ian Turnbull, H. W. Weisman, and Seymour Wiederlight.

G. C. Laszlo, a graduate of Budapest, a recognised foreign university, was also admitted to the licentiateship.

**Royal Medical Benevolent Fund**

At the quarterly business meeting on Jan. 26 several handsome legacies were announced and it was reported that the British Medical Association proposed to hand over a bequest of over £6000, made to its charities fund, in equal shares to the RMBF and the Epsom College foundation. Another welcome report was about the President's Christmas Gifts appeal. The fund had for some years made small gifts at Christmas-time to specially deserving beneficiaries, but in 1930 Sir Thomas Barlow made a personal appeal through the medical journals. The response that year was £184 but this year it reached £1670. The case committee which distributes these gifts has received many touching letters from the recipients which show how welcome this little extra money is. The ordinary subscriptions keep up in an encouraging way. The management committee is asking a subcommittee to advise it on the best way of providing a pension for retiring officials of the fund.

**Royal Institution of Great Britain**

On Tuesdays, March 16, 23, 30 and April 6, at 3 PM, Sir Henry Dale, PRS, will give four lectures on chemistry in modern medicinal treatment. On April 9, at 5 PM, the Friday evening discourse will be delivered by Air-Commodore Geoffrey Keynes, FRCS, on the history of blood transfusion. The lectures will all be held at the institution, 21, Albemarle Street, London, W.1.

**Course on Mental Deficiency**

The University of London extension and tutorial classes council in co-operation with the Central Association for Mental Welfare propose to hold a course of lectures and clinical instruction for medical practitioners on mental deficiency and allied conditions. The course, which would probably take place from May 10 to 21, cannot be held unless sufficient numbers apply, and those who wish to attend should send their applications as soon as possible, and in any case before March 20, to Miss Evelyn Fox, c/o University Extension Department, University of London, 24, Buckingham Palace Road, London, S.W.1. The course will include lectures by Dr. A. F. Tredgold on the nature of mental deficiency, by Dr. Kenneth Cowan on the administrative procedure in the ascertainment and treatment of mental defectives under the Mental Deficiency Acts, by Dr. Henry Herd on the work of the school medical officer in relation to defectives, and by Miss Lucy Fildes, PhD, on the psychology of defectives. Demonstration of clinical work and of mental testing will also be arranged.

**The Boyd Bequest**

It is over 100 years since the Manchester Medical Society was founded, largely to give the local doctors a chance to discuss their differences in private and to prevent them airing them in the local press, as was the custom in those days. The motto *Fovet Medicinam Concordia* was chosen by the society at its centenary to express this idea. The Medical Society, however, does not touch on ethical matters; it limits itself to the scientific side of medicine. Questions of local ethics and procedure come in the scope of two bodies, the Medico-Ethical Society, which treats of the academic side, and the eminently practical local branch of the British Medical Association. The latter has now received a magnificent bequest—the residue of the estate of the late Dr. Robert Boyd, a general practitioner of the city. The fraternisation of doctors in Manchester has of recent years been good, but here is a chance of bringing them close together, and this can only be to the benefit of both patients and doctors.

**Royal Faculty of Physicians and Surgeons of Glasgow**

Surgeon Rear-Admiral Cecil P. G. Wakeley will deliver a John Burns lecture in the hall of the faculty, 242, St. Vincent Street, Glasgow, on Wednesday, Feb. 10, at 4 PM. He will speak on the surgical aspects of blast.

**Science and Social Life**

Speakers at an open conference arranged by the Association of Scientific Workers and held at Caxton Hall, Westminster, on Jan. 30 and 31, discussed how to use the findings of science for the advantage of the whole community. The war has brought about advances. Dr. DOUGLAS McCLEAN recalled the founding of the Parliamentary and Scientific Committee in 1929, thanks to the efforts of the association, and its reconstitution (in which the association again took the lead) soon after the outbreak of war. The committee is made up of members of both Houses of Parliament and of representatives of 30 affiliated bodies concerned in applying science to social needs. Moreover, as Mr. R. S. BICKLE pointed out, the Government now has the advice of the best scientific ability in the country. This, he said, had not always been the case: first-class scientists usually choose the freedom of university research or the prospects in industry before thinking of the civil service as offering a scientific career. Civil servants are often blamed for stagnation: and to overcome the danger of this he urged that scientific workers in the civil service should be encouraged to take refresher courses and to keep in close touch with their colleagues in the universities and in industry. Sir LAWRENCE BRAGG, FRS, felt we must look to the universities still to supply the inspiration for pure research; and he recalled the impressive quality of the students who came back to their studies at the end of the last war. They had gained in character and knowledge of the world and a high proportion of them have become leaders in their various fields. A similar mature body of scientists will be returning to their work after this war, men who have grafted experience of organisation, production and leadership on their scientific knowledge. He too would like to see drastic revision in the research laboratories supported by the State; and he believes the Central Register to be the right body to watch the conditions and find the men for Government and industrial research to advise on postwar placement, assess needs, and regulate conditions of service. Prof. H. LEVY felt that science could play a significant part in implementing the Beveridge report; and Mr. J. G. SEBERT spoke of the tasks facing European scientists in the reconstruction of scientific institutions on the continent. Dr. C. L. OAKLEY ran over some of the gains achieved by the medical sciences committee since it was set up by the association in May 1942. It had brought into touch with each other three independent groups of workers who were studying gas-gangrene toxins at the beginning of the war, with the result that they had pooled their knowledge and done more effective work. The work of the Industrial Health Research Board was seriously curtailed at the beginning of the war, but thanks to the strong proposals made by the association to the Parliamentary and Scientific Committee the board was reconstituted and its field of work enlarged. Again, the medical sciences committee has formulated plans for breeding laboratory animals of pure line stock on a national scale, and is approaching the Medical and Agricultural Research Councils on the subject. He pointed out that all serious attempts to change existing conditions involve political activity; and he believes the association offers workers in the medical field the best opportunity yet available for the social application of medical progress.

### Boarding Schools and Public Schools

On Jan. 27 the education committee of the London County Council adopted a report recommending that the educational structure of the future should be based on the State system developed so as to provide a free and full secondary education for all. While admitting advantages in boarding-school life, the report maintains that these do not compensate for loss of the continuous influence of a happy home life. The future structure must be mainly based on day schools, supplemented by chances of living together in youthful communities such as holiday camps and residential schools and by school journeys in term or holidays. Boarding schools should be reserved for those particularly likely to benefit—for example convalescent or delicate children, physically defective and some mentally defective children, unstable or problem children, and those whose parents are dead, or abroad, or neglectful.

The committee holds that the LCC should not enter into arrangements that would involve transfer of pupils to privately run schools of any kind. All schools receiving aid from the public purse should receive it through the local education authority. Whatever the origins, traditions or merits of the independent "public" schools, they have serious anti-social characteristics and their existence entails serious disadvantage to general educational standards. They segregate, in general, the sons of the wealthy and successful from the sons of the less fortunate; two different types of citizen are being developed, each with its own characteristics and each ignorant of, and somewhat out of sympathy with, the other; and parents who send their sons to public schools have no personal or family stake in the State system. It is arguable that but for the existence of the "public-cum-prep" school system, the material and physical conditions of many of elementary and secondary schools under local education authorities might now be much better. In the absence of any plan for incorporating in the national system the facilities now in possession of the "public" schools, the committee thinks the most hopeful line of advance is to make the State provision so good that no citizen has any excuse for contracting out of it.

This report did not pass without brisk discussion. It will now be referred to a meeting of the London County Council as a whole.

**TESTING HALDANE HEMOGLOBINOMETERS.**—The accuracy of the result of any haemoglobin determination of the Haldane method depends on the accuracy of the colour-tube, graduated tube and pipette. British Standard specifications for all three have lately been drawn up (*Lancet*, 1942, ii, 732), and apparatus will in future be made in conformity with these. In the transition period the National Physical Laboratory, of Teddington, Middlesex, will test existing tubes and pipettes and supply a correcting factor to be applied to make the findings correspond with those of standard apparatus. The laboratory will also test new apparatus for conformity with the standard, and will etch their mark on approved tubes. The charge for testing a complete haemoglobinometer is about 28s.

**Corrigenda.**—PROPHYLAXIS OF ACUTE SPECIFIC FEVERS: A report in our last issue (p. 153) misinterprets certain statements made by Dr. E. H. R. Harries. His experiment in reducing the scarlet-fever isolation period to 3 weeks began soon after the last war, and no letters complaining of undue delay in release have reached him in the last eleven years. He pointed out that *return cases* of scarlet fever are rare despite the shortened stay, and despite the fact that the patients are discharged (usually without release cultures) at a time when they are probably harbouring organisms in abundance. In diphtheria he suggested that though three release cultures (tellurite) are necessary for the obstinate carrier, two should suffice for the ordinary case. His instance of "spurious intermittency" was drawn not from dysentery but from diphtheria—the transfer of a gravis strain to a mitis carrier or vice versa—and he did not in fact recommend that diphtheria carriers (who are immunes) should be immunised. It was not the routine use of the sulphonamides in the acute specific fevers that Dr. Harries deprecated but their routine prophylactic use.

The remarks made by Dr. A. G. Signy were inadvertently attributed to Dr. A. T. Simey, whose work on measles epidemics at Rugby had been mentioned earlier in the meeting.

**MASS RADIOLOGICAL SURVEYS:**—A paper on the control of pulmonary tuberculosis in industry, published in our issue of Dec. 12, 1942 (p. 693), contains a reference to mass radiological examinations by de Abreu in the Argentine. This needs correction. Dr. Manoel de Abreu is a Brazilian and his pioneer work has been done in his own country.

### Royal Society of Medicine

On Tuesday, Feb. 9, the section of psychiatry will meet at 2.30 PM to discuss the quality of mental test performance in intellectual deterioration. The opening speakers will be Major E. L. Trist and Dr. M. B. Brody. On Feb. 12 at 2.15 PM the clinical section will hold a meeting at Guy's Hospital, S.E. 1.

**FIRST-AID FOR CIVIL DEFENCE.**—The second edition of ARP Handbook No. 10 (HMSD, 6d.) has been rewritten in the light of recent experience. It falls into two parts, the first of which deals with training of parties in first-aid organisation. This includes such matters as co-ordination of Civil Defence and Home Guard organisations, procedure at an incident, reinforcements, disposal and so on. A useful section is a detailed treatment of inter-team tests and competitions. The methods of carrying injured are clearly illustrated and prominence is given to the use of webbing bands for lifting and carrying. The second part deals with actual first-aid and restricts its teaching to essentials. The instructions are simple and clear and may be taken as a guide about what to emphasise in the teaching of the standard textbooks. Opportunity might have been taken to point out the dangers of overheating shock cases, and the common recommendation of a walking stick for a splint (the other leg would be more satisfactory) has crept in. The general impression is of a well-written and carefully compiled guide.

### Appointments

AUDEN, G. A., PHIL D BIRM, MD CAMB., FRCP, DPH: temp. MO to Birmingham University.  
 FREELAND, ROBIN, MB GLASG., DPH: temp. asst. MOH for Gloucestershire.  
 JENKINS, J. F., MRCS: senior RSO at the Hampshire CC Hospital, Alverstoke, Gosport.  
 O'CONNOR, FRANCES E., MB DUBL., LM, DPH: temp. asst. MOH and asst. school MO for Hunts.  
 RICHARDS, FLORENCE G., MRCS, DRCOG: senior asst. MO (maternity and child welfare) for Coventry.

### Births, Marriages and Deaths

#### BIRTHS

BEATTIE.—On Jan. 26, at Norwich, the wife of Captain P. H. Beattie, RAMC—a son.  
 CAMPBELL.—On Jan. 16, at Ewell, Surrey, the wife of Lieut. Colonel A. E. Campbell, RAMC—a daughter.  
 CASSON.—On Jan. 16, the wife of Dr. Arthur Casson, CMS, Lul, Southern Sudan—a son.  
 COVE-SMITH.—On Jan. 26, in London, the wife of Dr. Ronald Cove-Smith, of Bryanston Court, W.1—a son.  
 GOLLEK.—On Jan. 20, the wife of Lieutenant Ella Goller, RAMC—a son.  
 NICOL.—On Jan. 19, the wife of Major C. S. Nicol, RAMC—a daughter.  
 THOMPSON.—On Jan. 26, in London, the wife of Surgeon Lieutenant Richard Thompson, RNRV—a daughter.

#### MARRIAGES

HARDWICK—MOORE.—On Jan. 16, at Epsom, Sydney Walpole Hardwick, MRCP, of West Park Hospital, to Margaret Joan Moore, MB, of Horton Hospital.  
 MELBECK—WRENN.—On Jan. 9, in Oxford, Simon Meleck, MBE, surgeon lieutenant RNRV, to Carola Wrenn.  
 MELLOWS—WILLIAMSON.—On Jan. 23, at Bowdon, Cheshire, Frank Stanley Mellows, MRCS, to Juliet Mary Williamson.  
 POCOCK—SEDDON.—On Jan. 23, at Oxford, John Pocock, FRCS, squadron-leader RAFVR, to Cicely Barbara Seddon.  
 PORTER—COURTENAY.—On Jan. 15, in London, Charles Porter, MB, to Geraldine Maziere Courtenay.  
 SPRINGETT—WEST.—On Jan. 21, at Frieth, Bucks, Victor Henry Springett, MRCS, of Sunderstead, to Joan West.  
 WRIGHT—FAWCETT.—On Jan. 20, at Enfield, Gordon Wright, lieutenant RAMC, to Philippa Kirby Fawcett, WRNS.

#### DEATHS

ARMSTRONG-JONES.—On Jan. 30, at Plas Dinas, Caernarvon, North Wales, Sir Robert Armstrong-Jones, CBE, DSC WALES, MD LOND., FRCP, FRCS, DL.  
 KING.—On Jan. 29, at Bath, Preston King, MD CAMB., JP aged 80.  
 MARTIN.—On Jan. 25, at Bath, James Pirlie Martin, MRCS, formerly of Box, Wilts, aged 85.  
 MEADEN.—On Jan. 23, at Denvilles, Havant, Surgeon Captain Edward Henry Meaden, CMG, MRCS, RN (RETD.).  
 RIDOUT.—On Jan. 19, at Headington, Oxford, Constance Elizabeth Ridout, MRCS.  
 SMITH.—On Jan. 25, in London, Charles Johnston Smith, CBE, MB EDIN., FRCS, late senior surgeon and professor of surgery, Singapore.  
 TEBB.—On Jan. 20, in York, A. E. Tebb, MD LOND., DPH, of Hampstead, aged 79.  
 THOMSON.—On Jan. 29, in Edinburgh, Sir StClair Thomson, MD LOND., FRCP, FRCS, aged 83.  
 TURRELL.—On Jan. 27, at Oxford, Walter John Turrell, MD OXF, DMRCE, aged 77.  
 WOOD.—On Jan. 4, at Rosslyn Castle, Midlothian, John Lawrence Wood, CBE, BA CAMB., MRCS, Lieut. colonel RAMC (RETD.), aged 61.

## CHRONIC PARKINSONISM

## ITS PROGRESS AND TREATMENT

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WHATEVER may be the cause of von Economo's encephalitis lethargica its modus operandi differs in several ways from that of any previously known infection. Thus while its harmful effects are almost limited to the nervous system, even there they are selective and affect areas rarely attacked by other nerve poisons. Hence the peculiar and often pathognomonic symptoms which have characterised this disease from its first appearance. Further, its activity does not necessarily end when the acute stage is over, but may continue intermittently or progressively for the remainder of life as the chronic stage; nor is there any constant relation between the two stages either as regards time-interval or severity. A mild chronic stage may follow a severe acute attack, while a mild or even a symptomless acute stage may be followed by a chronic stage of considerable severity. This suggests that the activity of the infective agent does not necessarily cease when the acute stage is over.

There are other reasons for such a view. Thus symptoms of the chronic stage may remain unchanged for years and then, for no apparent reason, become progressively worse. Or entirely new symptoms may be added at any time; in one young woman the acute attack was in 1924, when she was 14, and was soon followed by parkinsonism, but oculo-gyric attacks did not begin until 1940—17 years after infection. Also sudden death is by no means rare in the chronic stage, especially in young women. In my series, out of 53 known deaths from natural causes in female parkinsonians, 12 (about 22%) have died suddenly and unexpectedly. No less than 8 of these, 6 of whom were under 25 years of age, were found dead in bed in the morning, after having seemed to be in their usual state the night before. The question of accidental suffocation, suicide or gross organic lesion was excluded after careful investigation. Among young males such sudden deaths have been less common—only 5 in 109 cases. These deaths suggest active extension of the poison to a vital centre in the brain-stem.

If the chronic stage is one of continued activity of the infective agent, the chief object of treatment should be to destroy it, or at least to render it harmless. As yet no curative therapy is known, and treatment resolves itself into the relief of such disabilities as can be relieved.

As von Economo<sup>1</sup> pointed out, two main groups of disability characterise the chronic stage: parkinsonism with its disturbances of motility, on the one hand; and the mental changes of juvenile postencephalitis on the other.

The juvenile mental changes will not be considered here. Treatment of them is unfortunately almost limited to the restraint of antisocial habits by certification. The bodily disabilities which are largely covered by the term parkinsonism will be dealt with under four headings: disturbances of mobility; tremor; eye-attacks (oculo-gyric, eye-closure); salivation (dribbling). There are others, but they are relatively less common and less troublesome.

## DISTURBANCES OF MOBILITY

The patients chiefly show poverty of muscular movement, a motor hypokinesia, long familiar in cases of paralysis agitans, and always present to a greater or less extent in the parkinsonism of chronic encephalitis. In encephalitis it has long been known that relief, sometimes considerable, is given by various drugs of the atropine series, if given in adequate doses. Some find most benefit from one preparation, some from another. Dosage is important; not only can the parkinsonian tolerate more than the maximal BP doses of atropine, but such large doses are usually necessary for effective relief. The extremely large amounts given in high atropine therapy are not required by all cases; many get adequate and satisfactory relief from much smaller doses, which can be maintained for years with only an occasional increase in the daily intake. There is no certain evidence

that drugs of the atropine series destroy the infective agent, or check its advance. Some parkinsonians get steadily worse in spite of maximal doses, others on comparatively small amounts—or indeed, on none at all—remain unchanged year after year.

At the clinic for encephalitis at the Sheffield Royal Hospital, there are some patients in whom poverty of movement, in the arms at any rate, has not increased over 8–12 years. When first measured by the apparatus described in the *Lancet*,<sup>2</sup> the rate in all of them was considerably below that of normal persons.

RATE OF MOVEMENT OF ARMS IN PARKINSONIANS (MALES)

Period (in years)	No. of cases	Rate	
		Unchanged	Decreased
12	9	4	5
11	5	2	3
10	1	1	0
9	4	3	1
8	2	2	0

In 12 out of 21 males it was found to be unchanged when estimated by the same method 8 or more years later. In 10 females, during corresponding periods, the results were not so good. Only 4 remained unchanged. In one of these, whose rate of arm movement after 11 years had not decreased at all, the history illustrates some of the points mentioned:

In April, 1924, when 22 years old, and in the 8th month of her first pregnancy, she had a severe attack of acute encephalitis with delirium, diplopia and lethargy. A normal child was born at full term in May. Labour was normal. Parkinsonism with troublesome salivation soon followed, and for 18 months she was bedridden. In the early part of 1926, tincture of belladonna was begun in moderate doses. She was soon about again and able to do most of her housework. The dribbling ceased. She has been on the same treatment ever since, the quantity now taken daily being only min. 60. In 1927 her rate of movement in the right arm was 51% of normal, and in the left 44%. In 1938—11 years later—it was still 51% in the right and 42% in the left.

The records in the table represent only a small proportion of some 200 patients made since 1927. Of the other patients, some have died, many have been lost sight of, in others the hypokinesia has become much worse and they could no longer carry out the test. Several others have remained stationary for periods of less than 8 years.

Those taking large daily doses of atropine are liable to attacks of hyperpyrexia in hot weather, especially if exposed for long to bright sunshine, and deaths have resulted from this.

Apart from treatment by the atropine group not much can be done to relieve hypokinesia by drugs. Now and again it is possible, in various small ways, to help the parkinsonian to carry on his ordinary life and to stave off the onset of invalidism. One woman who had acute encephalitis in 1922, when 23 years old, soon followed by parkinsonism, had such difficulty in chewing and swallowing her food, that she began to lose flesh. She noticed that in the night, as is often the case, this difficulty disappeared. She therefore began to take her chief meal at two o'clock in the morning, instead of in the daytime. By this means she soon regained her weight. This release of inhibition, or whatever it may be, during the night hours, and particularly when half-awake is not uncommon in the automatic acts such as speech and gait.

As regards gait, so long as the lesion has been largely hemiplegic in distribution, it is not seriously impeded; the less affected leg props up the advancing trunk at each alternate step and there is no fear of falling. Such people get about quite well. One boy thus affected was able to carry on as a boy scout for years. When both legs are affected about equally the chief trouble is festination with falling forwards. This results chiefly from the forward posture of the body often present

1. von Economo, C. Encephalitis Lethargica, London, 1931.  
6233

2. Hall, A. J. *Lancet*, 1927, ii, 1009.

in these cases. If it is not, and especially if as sometimes happens there is some extending of the body backwards, there is no tendency to festination. Some patients with backward extension adopt a curious mincing gait, taking short rapid steps on the toes as if running. Some years ago a man with this type of gait was advised to practise taking long deliberate slow steps. By persevering with this he re-educated himself in walking. For years he has been able to get about comparatively well as long as he has a straight course before him, but as soon as he has to turn or twist about, to go through a door or get in and out of a tram car, the old mincing gait returns.

In typical festination there is no tendency to fall to either side. Owing to the hypokinesia in the arms, a walking-stick is no help but only an additional danger in most cases; it is rare to see a parkinsonian carrying one. In the milder cases a slight support, such as that provided by someone's arm, is enough to prevent falling. An equally slight support, in the form of a mechanical jacket, proved effective in the following case.

A man had severe encephalitis lethargica in 1926 when aged 32. He could not resume his former work, and a job was found for him in one of the public parks. In 1930 parkinsonism became so much worse that he could not continue this work, and for the next 5 years he was almost an invalid at home. In 1935 atropine, 12.5 mg. a day, was begun, and the hypokinesia improved enough for him to return to work. He has continued to take this amount daily ever since. In 1941 festination began. He had to have someone to take him to and from his work, and while there had difficulty in carrying on. Early in 1942, after one or two forms of mechanical support for the trunk had been tried without benefit, satisfactory relief was obtained by means of a slightly modified Taylor's brace (see figure). He can now walk alone with confidence, goes to and from work by himself, and does full work, which involves walking about the park most of the day. His wife said, "he has begun to carry a stick again as he always did before the trouble began."

No doubt the effect of this brace is largely psychological, but so is the taking lightly hold of somebody's arm; self-confidence is restored by very slight support. This minimal amount of support has been sufficient for more than 6 months.

Another man has solved the problem for himself in a different way. A man of 52 has had parkinsonism since he had acute encephalitis in 1924. About 3 years ago festination prevented him from walking out of doors unaccompanied. One day he tried riding a bicycle, which he had not done since his illness began 18 years before. This proved so successful that he now goes for rides by himself three or four days a week, for half an hour or more. Mechanically, the bicycle provides exactly what the festinator needs both when riding and when pushing it. Once in the saddle, with his hands on the steering-bar, his body cannot get in front of the wheels, however slowly he may pedal; and when pushing it, he has a companion which he not only can, but must, hold on to.

#### TREMOR, EYE ATTACKS AND DRIBBLING

In a few cases tremor comes early, but in most it is late; and in some at any rate for many years it is almost negligible. It is usually coarser than that of paralysis agitans. Possibly there is some connexion between this and the age-period of the two conditions. Drugs of the atropine series are said to give relief in some cases, but the effects are not constant in this or in any other form of therapy. Nor is any single effective treatment for oculogyric crises or eye-closure. This is unfortunate because eye attacks are sometimes the only disability

preventing employment. From time to time success is reported from one drug or other, but wider experience has not confirmed the claims of any. Of 150 parkinsonians in my series who have eye attacks, most remain subject to them in spite of treatment. In a very small number they have become less frequent or ceased, but there has been no uniformity in the supposed remedy, and some patients have brought the improvement about by avoiding conditions known to bring on attacks.

Dribbling is not present in all cases but can be troublesome. The primary factor is increased secretion of saliva, but contributory factors are the forward and downward posture of the head, and the diminished activity of the swallowing reflex. Fortunately the atropine group of drugs, besides being valuable in hypokinesia, also dry the mouth. In most parkinsonians these drugs do not cause uncomfortable diminution of saliva even when taken in large doses; in a few they do. Where atropine fails deep X-ray therapy over the salivary glands, originally suggested and carried out by Fraenkel<sup>3</sup> in 1923, often gives relief. In some of my worst cases dribbling has stopped after this treatment; in most there has been definite improvement. One man, even after six exposures spread over 6 months, says it has not become less. The duration of the effect of X rays seems to be limited, and treatment must be repeated. In one woman, in whom dribbling had been very troublesome for a long time, it was completely stopped for about 8 months, when it began again and further exposures were necessary. In addition, X-ray therapy may cause greasiness of the face to disappear.

While it is natural to compare the parkinsonism of chronic encephalitis with that of paralysis agitans, there is one important difference; the onset is at opposite periods of life. Parkinsonism in paralysis agitans does not usually appear until the declining years; that of chronic encephalitis sets in before—often long before—its zenith. The older nervous system has its association paths carefully laid down and well trodden; there is neither room for new ones nor energy to lay them down. In the younger nervous system, unless it is too widely damaged, there is not only room but also the urge to make up for functions which have become defective. A small amount of outside help is sometimes sufficient to start the blazing of a new trail.

#### FURTHER OBSERVATIONS ON ACUTE STAPHYLOCOCCAL INFECTION

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In a previous paper (Valentine and Butler 1939) we described a series of cases of acute staphylococcal infection. A study was made of the development of immunity in acute osteomyelitis and the result appeared to indicate the importance of antileucocidin among the various antibodies which were taken into consideration. The value of quantitative blood-cultures was established, and it was shown that in some cases fatal blood infection can develop and be maintained from small superficial lesions.

In a later paper (Butler 1940) these conclusions were amplified in a study of 500 cases of acute osteomyelitis. It was shown that the mortality in this disease is almost always due to the bacteraemia and is little affected by the surgical procedures adopted.

This paper covers our experience in the treatment of all kinds of acute staphylococcal infection during the past 4 years. The disease is characterised by its clinical variety, but on a basis mainly supplied by quantitative blood-cultures we have felt justified in dividing our cases into 5 groups. In this way we hope not only to clarify the problems of prognosis and treatment but also to offer a standard by means of which the effects of new methods of treatment may to some extent be assessed. A few cases described in earlier papers are included to emphasise some points.

#### GROUP 1

This consists of 9 cases of fulminating infection (see table). Death occurred in 4-8 days, except in one case

3. Fraenkel, M. *Dtsch. med. Wschr.* 1923, 1, 613.

(11th day). Colony counts in the blood show either very high figures (500-1000 per c.cm. on admission) or a rapid rise if the examination is repeated. Of these cases, 4 were facial infections, 1 giving rise to cavernous sinus thrombosis. We have not been able to associate this type of case with any unusual lack of immunity and regard the development of blood infection in any one case as a matter of chance to which maltreatment in the early stages may often contribute. Cases 1, 3 and 7 are examples of pyæmia arising from neglect of a small superficial lesion.

**CASE 3.**—A man, aged 60, died after 5 days' illness arising from a small infected blister present on his heel for 3 weeks before he fell ill. The colony count was 1000 per c.cm. of blood and autopsy showed pyæmia as the cause of death.

In cases 1 and 3 sections made from the tissues underlying the primary focus showed small veins full of infected thrombus. The immunity as measured by the antileucocidin does not appear to be an important factor in this type of case.

**CASE 2.**—Here no primary focus was found. The boy was admitted with indefinite signs of infection in the femur and the colony count was 900. He died on the 5th day and an ill-defined focus was found in the neck of the femur. The antileucocidin titre fell to 0.0025 and the antihæmolysin to 0.2 unit. Both these figures are subnormal and we feel that his unusual lack of specific immunity influenced the course of the disease.

GROUP 2

The colony count in this group is above 30. The infection is less overwhelming but still very serious since only 3 cases survived out of 8. The deaths took place after 3-6 weeks, giving time for the development of secondary foci and of antitoxin in the serum. In fatal cases death is commonly due either to an increasing blood infection, as in cases 10, 14 and 16, or to the formation of secondary foci in vital regions which may prove fatal after the blood has become sterile (cases 13 and 15). In the latter type of case death is often caused by pulmonary infection, pyopneumothorax being not uncommon. The importance of the last complication has been previously stressed by Perry and Butler (1940).

It is important in this group to treat or excise without delay any operable focus from which infection may be reaching the blood. This was done with apparent success in cases 11 and 12 and their case-records have been published elsewhere (Butler 1940). In case 10 the obvious focus was a huge carbuncle which could not be excised and the bacteræmia continued to a fatal end. In case 17 the opening of an abscess on the 12th day in the buttock may have been of influence in terminating the bacteræmia.

GROUP 3

This group is characterised by a low colony count of less than 20; the blood usually soon became sterile. Many cases of osteomyelitis are of this type. There were only 3 deaths, showing that in this type recovery is the rule. Of the deaths, case 23 was due to a lip infection, and, except for the colony count on admission, might better have been placed in group 1. In case 27 the blood infection steadily increased and death was due to pyæmia. Case 28 was shown at autopsy to have died of heart failure, no signs of acute staphylococcal infection being found. After an irregular pyrexia for 6 weeks following drainage of a thecal whitlow with colony counts up to 8 per c.cm., her temperature fell to normal and her blood-culture became sterile 48 hours after amputation of the infected finger. She was free from infection until her sudden death 14 days later.

A primary focus was demonstrated in 10 cases out of 12. The argument for excision of this focus is not so urgent as in groups 1 and 2, but we feel that whenever such a focus is found, however trivial it may appear, it should be excised or drained without delay.

In some cases (18 and 26) of osteomyelitis the general symptoms of infection were severe although the blood infection was slight. It appeared to us that there was a distinct correlation between the improvement in symptoms, notably the return of appetite, and the development of immunity as shown by the antileucocidin in the serum.

GROUP 4

These cases are characterised by the development of pyæmic abscesses while the blood-culture remains sterile.

ANALYSIS OF 32 CASES OF ACUTE STAPHYLOCOCCAL INFECTION

GROUP I

Case	Age and sex	Primary focus	Secondary foci	Anti-leucocidin (K) titre	Blood-cultures	Pr. focus excised	Chemotherapy	Serum given	Result
1	12 F	Finger	Humor- us	0.16	1000 (8)	..	..	..	D 8
2	9 M	..	Femur	0.005	900 (2)	..	..	..	D 5
3	60 M	Heel	..	0.12	1000 (4)	..	SP	..	D 5
4	29 M	Boil face	Men- inges	..	10,000 (4)	..	SP	..	D 5
5	26 M	Boil nose	Oav. sinus	0.02	7 (2), 500 (4)	..	SP	Yes	D 4
6	15 M	Boil face	..	..	800 (10)	..	..	..	D 11
7	13 F	Finger	Sac- rum	0.06	140 (6)	..	..	Yes	D 6
8	30 F	Boil face	Lungs	0.02	70 (5)	..	SP	Yes	D 7
9	4 M	Boil leg	Tibia	0.0025	1000 (5)	..	..	Yes	D 6

GROUP 2

10	41 F	Car- buncle	..	0.16 0.32	13 (7), 25 (9), 148 (11), 80 (23), 5000 (37)	..	U	Yes	D 38
11	12 F	In- fected scratch	Femur	0.06 2.0	170 (3), 26 (7), 2 (9), 0 (12), 0 (17)	Yes	U	..	A
12	24 F	Breast abscess	Pelvis	0.06 2.0	6 (14), 45 (17), 110 (19), 32 (21), 9 (25), 0 (33)	Yes	U	..	A
13	12 M	Boil nose	Lungs	..	140 (10), 130 (12), 50 (15), 25 (18), 2 (20), 0 (24)	..	ST	Yes	D 39
14	18 M	Boil arm	Lungs	0.25	30 (6), 1000 (20)	Yes	ST	Yes	D 22
15	26 M	Axilla	Tibia, lungs	..	59 (24), 205 (30), 110 (32), 82 (36), 4 (41)	..	ST	..	D 42
16	51 F	..	Lungs	..	6 (20), 70 (32)	..	ST	..	D 32
17	32 M	..	Pelvis	0.64	40 (10), 10 (14), 0 (20)	..	ST	Yes	A

GROUP 3

18	14 M	..	Tibia	0.01 4.0	Few (4), few (10)	..	..	Yes	A
19	13 M	Boil	Pelvis	0.08 2.5	20 (4), 12 (6), 12 (8), 20 (12), 0 (18)	..	..	No	A
20	12 M	Roof mouth	Tibia	0.08 3.0	4 (10), 2 (12), 0 (14)	..	..	No	A
21	38 F	Uterus	..	0.02 2.7	0 (6), 22 (11), 0 (21)	..	SA	Yes	A
22	30 F	Cellu- litis face	..	0.02 0.64	20 (7), 1 (12), 0 (14), 0 (21)	..	SA	Yes	A
23	55 M	Car- buncle lip	..	..	12 (8)	..	SP	Yes	D 10
24	50 M	Boil neck	Occip- ital bone	0.64	Few (28), 2 (33), 0 (43)	..	SA	No	A
25	5 M	Heel	Femur	0.64	0 (21), few (39)	..	..	Yes	A
26	18 F	Corn	Femur	0.01 1.0	1 (4), 0 (7)	..	..	No	A
27	13 M	Toe	Tibia	0.04 0.5	2 (6), 10 (15), 14 (18)	..	U	Yes	D 18
28	62 F	Finger	..	..	Few (44), 8 (54), 0 (59)	Yes	ST	No	D 73
29	14 F	..	Lungs, hand	0.32	10 (5), 10 (11), 0 (20)	..	ST	Yes	A

GROUP 4

30	37 F	Uterus	Soft parts	0.64	Neg.	..	..	..	A
31	26 F	Foot	Knee, lungs, spine, radius	0.64	Neg.	..	ST	..	A
32	24 F	Breast	Soft parts	2.0 0.64	0 (18), few (36), 0 (40), 0 (60)	..	..	Yes	A

The figures in the blood-culture column indicate the number of colonies per c.cm.; those in parentheses show the day of the disease on which the culture was taken. Numbers under "D" in the last column indicate the day of the disease on which the patient died. A = alive. SP = Sulphapyridine; U = 'Uleron'; ST = Sulphathiazole; SA = Sulphanilamide.

There is sometimes a history suggesting a transient bacteræmia and such must be presumed to have been present in every case.

CASE 30.—A week after an abortion she had a rigor with pains in the legs. She was admitted after 3 weeks with a vaginal discharge containing *Staphylococcus aureus*, and 3 abscesses on her back and legs. The blood-culture was repeatedly sterile. Altogether 9 abscesses were drained and she finally did well.

It seems that during the early bacteræmia in these cases secondary foci are established which may remain latent for varying periods. The distribution of these abscesses is also interesting. In case 30 all were in the soft tissues and none in bones or viscera. In case 31 the primary focus was opened, but secondary foci developed 4 days later in the knee, and a week later multiple abscesses were demonstrated radiologically in the lungs. Recovery took 10 weeks, but a month later she developed osteomyelitis of the lumbar spine, and later subacute bone lesions in both forearms. She finally recovered with perfect function in the spine and a clear chest. Case 32 was essentially of this type though the blood became positive on one occasion. Like case 30 all her abscesses were in the soft parts.

#### GROUP 5

These are rare cases in which the blood-culture is sterile though the presenting symptoms are those of a severe infection. We have recently seen 2 cases in males of 23 and 37. Each had a slight infection of the finger of about a week's duration and was admitted with a high fever and a rapid pulse. There was a generalised toxic rash and a moderate diarrhoea in each case. Contrary to our expectations, the blood-culture was sterile in both cases but the pus from the fingers grew *Staph. pyogenes*. Unfortunately the antileucocidin titre was only obtained in one case, giving the low normal of 0.01K. Recovery was rapid after drainage of the lesion and treatment with antitoxin and sulphathiazole.

We regard cases of this type as excellent examples of severe staphylococcal toxæmia which are clinically indistinguishable from cases of septicæmia until a blood-culture has been made.

#### TREATMENT

In addition to the treatment suggested by modern medical and surgical methods, special attention must be paid to combating the bacteræmia and toxæmia. Of these the first is all important since nearly all the deaths in this disease are due to bacteræmia and its sequelæ (Butler 1940).

*Primary lesion.*—Excision or drainage of the probable primary focus, especially if it is of some standing and regardless of its apparent insignificance, may be the most important single item in treatment. Except in fatal cases we have not yet succeeded in demonstrating septic thrombosis in sections cut from excised tissue. Even in the fulminating cases 1 and 3, however, only very small veins were affected and it is probable that at an earlier stage when life can still be saved such lesions may be difficult to identify in sections. The blood-stream does of course get reinfected sometimes from secondary foci in bones or viscera; and Lyons (1941) has shown that this may happen from pulmonary foci.

*Chemotherapy.*—Sulphathiazole seems to have more influence on the staphylococcus than the other sulphonamides; but in our experience its effect on bacteræmia is slight. On the other hand it seemed to benefit those with metastatic lesions, particularly when the lungs were involved. None of the cases in group 1 received sulphathiazole because with one exception they were seen before the drug was available; 5 in group 2 were given sulphathiazole; all died save one, and in this case the blood did not become sterile until 7 days after the drug had been stopped.

Most reports of successful chemotherapy have been in patients of the type of group 3—namely, those whose blood-cultures did not rise above 20 colonies per c.cm. In our experience recovery was the rule in this type before the introduction of sulphathiazole, so that its value in these cases is difficult to assess. Case 27 had two full courses of sulphathiazole but showed no improvement until her finger was removed. Cases 29 and 31 had severe lung infection which was proved radiologically and by

examination of the sputum. In both of them considerable clinical improvement followed the administration of sulphathiazole combined with continuous nasal oxygen. Both cases of toxæmia received sulphathiazole in addition to antitoxin, but we feel that the antitoxin was probably the biggest factor in their rapid recovery.

*Toxæmia.*—It is unfortunate that since we have had a supply of potent antitoxin no cases of severe osteomyelitis uncomplicated by a heavy bacteræmia have come our way. Two cases of toxæmia have been described in which the serum was probably of value, but it was combined in each case with drainage of the local lesion and the giving of sulphathiazole. Proof is therefore lacking of the value of antitoxin, but for reasons given elsewhere (Valentine and Butler 1939), and because toxæmia may be assumed to accompany bacteræmia in the absence of specific immunity, we give serum in severe cases unless the acute illness has lasted for 10 days or the antileucocidin titre is known to be at least 0.16K. The concentrated serum should have a titre of about 10K, the number of international units of antihæmolyisin being, we believe, of relative unimportance; 25 c.cm. should be given on 3 consecutive days, intramuscularly rather than intravenously since in our experience this serum may cause severe and even fatal reactions when injected intravenously. Our experience with purified serum, however, is very limited.

#### DISCUSSION

Our chief objects in presenting this paper on severe staphylococcal infections have been to demonstrate the value of repeated quantitative blood-cultures; to emphasise the importance of the primary lesion as a continuing source of blood infection, and to discuss the merits of antitoxin and chemotherapy. On the basis of the colony count we have divided bacteræmic cases in which there was hope of treatment into two groups: those with 30 colonies and more (group 2) and those with less than 30 colonies per c.cm. (group 3). Any case with a steadily increasing count, whatever the numbers, should be placed in group 2. Most of group 2 died whereas nearly all in group 3 lived. It is interesting that in a similar series of cases described by McLellan and Goldbloom (1942) the 16 survivors with 2 exceptions had colony counts of less than 15 whereas the 17 who died had colony counts of 19 or over with 3 exceptions, one meningitis, one serum death and one with a steadily increasing count. Their findings are thus similar to ours.

Minor staphylococcal lesions are common but rarely lead to blood infection. Such an event should, we think, be regarded as an unfortunate accident, though maltreatment of pimples on the face and neglect of minor foci under the hard skin of the feet and hands are probably important factors. We consider that the secondary foci set up by pyæmic infection may often have little or no responsibility for persistent bacteræmia which can be maintained from the primary lesion even in the presence of apparently more important metastases. We do not suggest, of course, that secondary foci never give rise to bacteræmia, but would urge that small superficial primaries should be regarded with more attention than they usually receive. McLellan and Goldbloom suggest that the resistance of the patient and the prognosis can be assessed from the character of the primary lesion. We do not agree with them on this point, having recently seen a death (case 15) in which the infection apparently spread from a small painless abscess underlying a scar which had been healed for 4 months. This is an extreme case but it is surprising how often pus will be found under an apparently innocent scab in this type of infection.

We feel that chemotherapy at present is of little value in severe cases of septicæmia and that most cases showing a low colony count will recover without it. In view of the apparent effect of sulphathiazole on those cases with visceral lesions a full course should be given in this type of case, especially those with a slight bacteræmia in whom there is evidence of lung infection. The minimal dose should be 3–4 g., 4-hourly for 3 days, followed by 2 g., 4-hourly for a further 4 days. If oral administration is impossible the drug may be given intravenously in conjunction with a drip saline transfusion. We have no experience as yet of the combined use of heparin and sulphathiazole in the treatment of bacteræmia (Lyons 1942). In the absence of more potent drugs, however,

this would seem to be the method of choice when the essential focus cannot be excised or drained.

One would not expect antitoxin to have any direct influence on an existing bacteræmia and our experience is in keeping with this view. But from our observations of cases with severe toxæmia we consider it logical to give antitoxin in the early stages of a bacteræmia when it can be shown or presumed that the titre of antileucocidin in the serum is low and toxæmia may be expected to exist. Since also in our experience bacteræmia rarely arises de novo in a patient whose acquired immunity is high, we consider it advisable to give antitoxin in serious lip infections or osteomyelitis with little or no bacteræmia in the hope of preventing its development. Because the effects of the bacteræmia overshadow those of any accompanying toxæmia, the value of antitoxin in the treatment of pyæmia is difficult to demonstrate, but we are unable to agree with Lyons (1942) that the beneficial effects of the serum are not specific.

In our opinion reports on the treatment of cases of staphylococcal septicæmia are valueless unless they include: the results of repeated quantitative blood-cultures; an account of the presence or absence of the presumed primary focus and of its history, nature and treatment; and an estimation of the specific immunity of the patient derived from the history if the antileucocidin titre is not available.

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REHABILITATION AFTER MENISCECTOMY

EXPERIENCE AT AN ARMY CONVALESCENT DEPOT

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LESIONS of the semilunar cartilages of the knee are a common cause of disability in the Army. This is very noticeable at the convalescent depot to which we are attached, where a large proportion of the cases admitted for rehabilitation have undergone meniscectomy. In view of this, we considered it important to determine the duration and results of rehabilitation of these cases and the factors influencing them; and during the last few months 186 consecutive cases have been analysed.

Each case was carefully examined by one of us on admission, and a record of clinical signs and symptoms was made and repeated thereafter at weekly intervals. The condition of the knee-joint on initial examination varied considerably: 140 cases (75.2%) showed obvious wasting of the quadriceps; 94 cases (50.5%) had some limitation of flexion at the knee-joint; an effusion was present in 63 cases (33.8%); and there was laxity of the cruciate ligaments in 45 cases (24.1%).

As a result of the first examination, the man was allocated to the appropriate grade of remedial exercise and physical training. The working day started at 9 AM and continued until 4.30 PM. In general, each man had daily two periods of remedial exercise, one period of physical training followed by a swim, one period of therapeutic games, and one period of education. With the exception of the last, the work was under the supervision of an instructor of the Army Physical Training Corps who had had a special training in work of this nature. The tables of remedial exercises devised for the cartilage cases were largely concerned with quadriceps exercises, which were initially non-weight-bearing. It was repeatedly emphasised that static quadriceps contractions should be carried out in the man's own time for at least 5 min. in every hour. Among the remedial exercises were those of the weight-and-pulley type. There were four grades of general physical training ranging from the lowest, where the training was carried out seated, to the highest, which included cross-country running and a 15 mile route march. We have found the last an invaluable aid in assessing in the later stages whether a knee was 100% sound. No case in this series was treated in this depot by massage or faradism.

In each case the rehabilitation time and the total time off duty were determined (table I). The former indicates the number of days of treatment in the depot, and the latter the number of days from the date of operation to the completion of rehabilitation—i.e., time in hospital and time in convalescent depot. The following facts were noted in this series:

Total cases	186	Cases in which the initial damage was attributed to football	111 (59.7%)
Average age	25½ years	Cases with previous hospitalisation	89 (47.8%)
Torn cartilage:		Average duration of symptoms before operation (extremes 6 days to 20 years)	2 yr. 9 mth.
Right medial	73 (36.6%)		
Right lateral	38 (19.1%)		
Left medial	61 (30.6%)		
Left lateral	27 (13.7%)		
Cases with two cartilages removed from the same knee	14 (7.5%)		

It will be noted that 60% of the cases dated from a football injury. Almost half the cases had been sent into hospital because of the knee on at least one occasion before their admission for meniscectomy. This obviously represents a considerable loss in working time, which is all the more serious in A.I. men (72% of this series).

In our opinion torn cartilage is an even commoner internal derangement of the knee-joint than is generally recognised. It is therefore important that medical officers should learn to recognise a cartilage injury at the earliest date, if unnecessary time off duty is to be avoided. A history of recurrent giving way of the knee, followed by effusion is very suggestive, and such cases should be referred for the opinion of an orthopaedic specialist. In doubtful cases we have found a trial on a course of graded PT, cross-country runs and route marches invaluable in arriving at a diagnosis. Cases of simple traumatic synovitis improve rapidly after a course of intensive quadriceps exercises, and do not tend to break down when tried out on graded route marches and cross-country runs. Cases in which the synovitis is secondary to a torn cartilage do not respond to treatment with quadriceps exercises, or if they do break down when tried out. On several occasions one of these doubtful cases has been brought to us with the knee locked and the diagnosis obvious. Such cases have often been labelled chronic synovitis, torn ligament (in the presence of intact ligaments), or arthritis in spite of negative radiological findings. We have also found repeated examination at weekly intervals very helpful in arriving at a diagnosis.

The average stay in hospital after meniscectomy was 47 days; the average stay in convalescent depot was 35 days; the average total time off duty was 82 days (table I).

TABLE I—REHABILITATION TIME AND TOTAL TIME OFF DUTY

	No. of cases	Av. rehabilitation time (days)	Av. total days off duty
All cases	186	35	82
Two or more cartilages removed	14	49	120
Treated with preoperative exercise	87	35	79
No postoperative exercise in hospital	9	38	87
Massage in hospital	56	34	84
Faradism in hospital	48	34	93
Admitted to depot with limited flexion at knee-joint	94	47	98
Admitted to depot with effusion in knee-joint	63	44	88.5

We have been unable to discover in published work on this subject any similar statistics with which these results could be compared. The average total time off duty was increased in those cases in which the preoperative duration of symptoms exceeded 2 years (table II). This increase was even greater in those cases where symptoms had been present for over 5 years before operation; this again demonstrates the importance of accurate diagnosis and early operation. There was a slight decrease in the total time off duty in those cases treated with exercise before operation, and a slight increase in the total time off duty of those cases who were given no postoperative exercise in hospital (table I). Treatment with massage and faradism did not decrease the duration of stay in hospital. The total time off duty is increased by almost half in those cases in which two cartilages

have been removed from the same knee-joint. Cases admitted with limitation of flexion at the knee-joint, and those with an effusion in the joint, took longer to recover. The treatment of these cases differed only in so far as the initial period of non-weight-bearing quadriceps exercise was lengthened. Rest without exercises played no part in the treatment of any case in this series.

One important factor in determining the total time off duty cannot be accurately measured. This is the desire of the man to recover quickly—a factor specially important in soldiers. The good type of man, keen to return at the earliest possible date to full activity in a unit he likes, will work hard at his quadriceps exercises and rapidly recover. But even with strict supervision if the desire to improve as quickly as possible is absent full recovery is inevitably delayed. We have been unable in this series to demonstrate any relationship between age and duration of rehabilitation.

In 154 cases (82.8%) the knee was regarded as sound at the end of rehabilitation (table III). In these cases there was no material quadriceps weakness, flexion at the knee-joint was full, there was no effusion, and any residual laxity of the cruciate ligaments was well compensated by powerful quadriceps muscles. These men, unless suffering from some other disability than that of the knee, were returned to immediate full duty. They had completed a strenuous course of physical training (purposeful PT and obstacle training), a 3 mile cross-country run, and a 15 mile route march. At a later

date we hope to present a review of the medical categories of the cases in this series after they have been on full duty for several months.

EXPERIMENT

To assess the relative merits of resisted exercises and unresisted exercises in the treatment of wasted quadriceps after meniscectomy, the following experiment was carried out.

Cases admitted to the depot after meniscectomy were allocated to one of two groups. Group I cases (48 in number)

TABLE II—DURATION OF SYMPTOMS BEFORE OPERATION AND TOTAL TIME OFF DUTY

Duration of symptoms	No. of cases	Av. total days off duty
One week to 3 months .. ..	45	78.9
Three months to 2 years .. ..	53	72.2
Two to 5 years .. ..	45	81.5
Over 5 years .. ..	43	95.2

TABLE III—RESULTS

Category		Cases	Knee sound	Remarks
Adm.	Dis.			
CATEGORY UNCHANGED, 158 CASES				
A1	A1	122	121	One airman was returned to his unit in Grade A1, but downgrading was advised because of another torn cartilage, for which operation was refused.
A2	A2	12	9	8 cases considered fit for upgrading to A1 after further trial at unit; 1 remained A2 because of hallux valgus; 3 remained A2 because of knee.
A3	A3	1	1	—
B1	B1	10	9	Some persistent quadriceps weakness in 1 case.
B2	B2	3	3	Category unaltered in 2 cases because of torn cartilage in other knee, for which operation was refused; the third case had bilateral hallux valgus.
B3	B3	2	2	—
B4	B4	1	1	—
B7	B7	3	2	Small persistent effusion in 1 case. Category not raised because of other disabilities.
C	C	4	1	Lax cruciate ligaments in 2 cases; 2 still C for other reasons.
CATEGORY RAISED, 7 CASES				
A2	A1	1	1	—
B2	A2	2	2	For upgrading to A1 after further trial at unit.
C	B2	2	0	Probably fit for further upgrading later.
D	A2	1	1	For upgrading to A1 after further trial at unit.
D	B2	1	0	Full flexion not regained.
CATEGORY LOWERED, 14 CASES				
A1	A2	1	0	Full flexion not regained.
A1	B2	10	1	Persistent quadriceps weakness in 3 cases; lax cruciates in 2; arthritis in 2; limitation of flexion in 2; bilateral pes planus but knee sound in 1.
A1	B7	1	0	Medial and lateral meniscectomy. Persistent effusion and limited flexion.
A2	B2	1	0	Small residual effusion.
B2	C	1	0	Lax external lateral ligament.

The 7 remaining cases were readmitted to hospital, 5 for further meniscectomy and 2 for manipulation.

were treated by resisted exercises—raising a weight suspended over a pulley. Group II cases (53) carried out a table of remedial exercises containing no resisted exercises. Progress was assessed in the following manner. On admission, the strength of the quadriceps was measured by the maximum number of times a 16 lb. bag suspended over a pulley could be raised and lowered. This was carried out in the prone lying position on a raised platform, with the leg below the knee projecting over the edge in order to obtain full extension at the knee (fig. 1). The end-point of the test was the last complete lift of which the man was capable. This test was repeated weekly for 3 weeks, improvement being measured by the increased number of lifts performed.

In group I, each man performed 50 lifts of a 16 lb. weight in the manner described above. He then rested for half a minute before carrying out a second 50 lifts. After another half minute's rest, the third and final 50 lifts were performed. If a patient was unable to do 50 lifts, he performed his maximum number 3 times, with half a minute's rest between. This was carried out twice daily. Group II cases performed twice daily a 30 min. table of remedial exercises, largely devoted to the development of the quadriceps. Static quadriceps contractions played a prominent part in these tables. Both groups wore army boots throughout treatment.

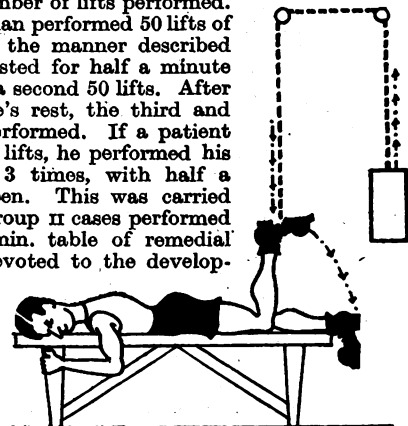


Fig. 1—Method of measuring strength of quadriceps.

It will be seen (fig. 2) that the average weekly number of lifts in group I increases more rapidly than in group II. At the final test, the average number of lifts performed by group I exceeded the average number of lifts performed by group II by 27.8. This seems to indicate that resisted exercises in the form of weight-lifting restore strength to the quadriceps more rapidly than non-resisted exercises. The experiment is open to the criticism that daily practice at weight-lifting trains the muscle to perform this particular task more economically in group I—thus a greater number of lifts can be accomplished with less expenditure of energy. It is our opinion, however, that the differences recorded are greater than can be accounted for by practice alone. This finding is in keeping with our clinical impressions.

We conclude that resisted exercises should form a part, if not the whole, of the treatment of cases with wasted quadriceps after meniscectomy.

SUMMARY

A series of 186 cases undergoing rehabilitation after meniscectomy is analysed. All cases were treated by a graded course of intensive quadriceps exercise. The average duration of treatment was 35 days, and the average total time off duty was 82 days from the date



of meniscectomy. Over 80% of the cases were considered fit to return to immediate full duty.

About 60% of the cases dated from a football injury, and almost half had been in hospital for knee trouble before. This means serious loss of working time, and a

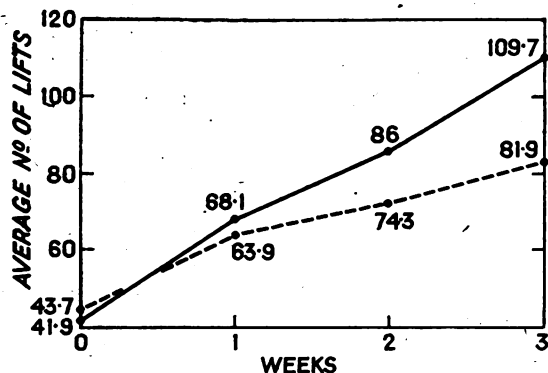


Fig. 2—Average numbers of lifts performed at the weekly test by each group. Group 1 (continuous line): resisted exercises, 48 cases. Group 2 (broken line): unresisted exercises, 53 cases.

plea is made for the earlier recognition of cartilage injuries.

From the results of an experiment it is concluded that strength is restored to wasted quadriceps after meniscectomy more rapidly by resisted exercises of the weight-and-pulley type than by non-resisted exercises.

We wish to thank Brigadier W. Anderson, consulting surgeon to the Army in Scotland and Northern Ireland, for his help and advice in the preparation of this paper, and we are indebted to the DDMS Scottish Command for permission to publish it.

## CHRONIC MELIOIDOSIS

A CASE DIAGNOSED IN ENGLAND

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MELIOIDOSIS, which was first discovered in Rangoon by Whitmore in 1912 at post-mortem examinations, was later demonstrated in life by Stanton in Malaya in 1917. It has since been identified in Cochin China and Ceylon. In 1932 Stanton and Fletcher analysed the records of the only 83 cases available, including those of 6 Europeans, and in only 9 of these had a diagnosis been made before death. All but 2 cases died within twenty days of the onset of symptoms. It is primarily a disease of rodents but since it is seldom found in the routine examination of rats in plague areas in which melioidosis occurs, it does not appear to be widespread in these animals. The mode of transmission to man is uncertain, but is probably through the consumption of food contaminated by the excreta of infected rodents. Case-to-case infection has not been recorded.

The clinical picture is extremely variable, the disease having simulated cholera, plague, typhoid, bronchopneumonia, amebic hepatitis and pyelonephritis. Thus many cases must have occurred without being identified. Like glanders, which it resembles, this disease—which is a blood-spread infection—is characterised by the formation of multiple infective granulomata in almost any situation in the body. Rarely it may pass into a subacute or chronic form, and Stanton and Fletcher record 2 such cases, both in young adult Indians. One was under observation for two years, at the end of which period he was well except for persistent sinuses in both feet. The other was in good health when lost sight of after five months.

There is no record of melioidosis having been previously diagnosed in England.

### CASE-HISTORY

A regular soldier enlisted in 1934 at the age of 23 and served in Singapore from 1935 to 1938, during which time he was on the mainland of Malaya for three months early in 1938, when he was sent to Penang. While there he was stationed at a hut encampment in a rat-infested area, but was

never bitten by a rat. In 1937 he developed a soft chancre in January and cystitis in July; and in January, 1938, he contracted gonorrhoea.

The first phase of his illness began in May, 1938, when two months after his return from Penang he developed arthritis of the right hip, followed in June by arthritis of the right ankle. After tonsillectomy in July he was transferred to Gibraltar, and in December, 1938, the gonorrhoea recurred, but responded to sulphanilamide and prostatic massage. In August and November, 1940, there were recurrences of the arthritis of the right hip which on each occasion resolved after 4-6 weeks treatment by rest and salicylates. He returned to England in February, 1941, became store-keeper at his depot and was free of symptoms until June.

The second phase started on June 1, 1941, when he became acutely ill with bilateral bronchopneumonia, confirmed by X-ray examination. On the 3rd day of the illness the pain and stiffness in the right hip recurred, and these persisted although the pneumonia responded to sulphapyridine. On admission to this hospital in July, 1941, he had an irregular evening pyrexia of 99°-102.5° F. with a pulse-rate of 80-100 per minute. He was wasted and the right hip was fixed by muscular spasm; the joint area was tender and there was wasting of the surrounding muscles. X-ray examination showed no radiological change in the joint, but two months later slight rarefaction of the joint surface became perceptible. The chest was normal clinically and radiologically. No other physical signs could be found and prostatic massage showed no gonococci; the gonococcal complement-fixation test was and has remained negative. The blood showed a moderate degree of anaemia with a normal leucocyte count. Blood-cultures were consistently negative. Urine and stools were normal and the Widal was consistent with TAB inoculation. No agglutinins for *Brucella abortus*, *Br. melitensis* or organisms of the salmonella or dysentery groups were demonstrable. The blood-sedimentation rate was 56 mm. in 1 hour. Mantoux test was negative. The Wassermann reaction was negative in 1941.

On treatment by extension the pain in the hip rapidly subsided. The temperature became normal after 10 days, but fever recurred from time to time, each bout being accompanied by sweating and slight malaise, but no other symptoms. Aspiration of the hip-joint produced a small quantity of clear sterile fluid. In October the extension of the hip was discontinued and full and painless movement of the joint obtained. During the remainder of 1941 the remittent temperature continued with normal intervals of up to three days only. All examinations, including meningococcal complement-fixation test and Casoni test (for hydatid infection) were negative, except the Wassermann and Kahn reactions which were now positive. He was given a course of potassium iodide, NAB and bismuth. In spite of this, the clinical picture remained the same and the Wassermann and Kahn reactions were still positive in November, 1941, but became negative in May, 1942. In January, 1942, he complained of pain and difficulty in micturition, but the urine was normal. A few days later the pain in the right hip-joint recurred and on Jan. 19 he developed pneumonitis in both lower zones and a right peroneal palsy, with foot-drop, which has persisted.

On Feb. 2 he developed a urethrorectal fistula and at the same time brawny swellings began to appear over the left side of the forehead, the left parotid gland and both external malleoli. The swelling over the right external malleolus disappeared, but in the remaining areas abscesses slowly formed. X rays of the skull showed a localised osteomyelitis of the frontal bone with destruction of the outer table. There was a similar lesion of the left external malleolus. All three abscesses healed well after incision and curettage, and pus from each grew a gram-negative bacillus which was reported to be *Pfeifferella whitmori*. In spite of treatment of the abscesses the bouts of pyrexia continued, and in April, 1942, the patient complained of pain in his back. X-rays at the time and at the end of May showed no abnormality, but a further examination in July showed partial destruction of the bodies of the 4th and 8th dorsal vertebrae with a large perispinal abscess.

Throughout the past year the patient has been sustained by repeated blood-transfusions, and despite much wasting his general condition remains remarkably good and his outlook cheerful. He has been treated at various times with different sulphonamides. Sulphathiazole caused a fall in temperature for two days, but the pyrexia recurred while he was still taking the drug. Sulphapyridine caused the pyrexia to abate, but

had to be discontinued because he vomited. Sulphadiazine, on the other hand, caused an immediate response, the temperature falling in spite of the presence of abscesses, only to rise again when the drug was discontinued.

#### BACTERIOLOGY

The organism was isolated from three specimens of pus from lesions of the forehead, parotid gland and ankle, and each gave a pure growth of the organism, no bacteria being seen in direct smears. The organism was a small gram-negative bacillus showing on first isolation definite polar staining; it was actively motile, capsulated, and not acid-fast.

*Cultural characteristics*, with some minor differences, were those described by Stanton and Fletcher (1932) for rough strains of *Pf. whitmori*.

On solid media growth was at first rather slow, but, even on plain agar, colonies up to 2 mm. in diameter were present after 48 hours incubation at 37° C. Growth on 5% glycerol agar was more luxuriant, a little inferior to that on horse-blood agar, on which colonies may reach a diameter of 5 mm. in 7 days. Colonies more than 24 hours old showed good differentiation, but the irregular wrinkled surface described as characteristic of rough strains of *Pf. whitmori* was not seen; instead the colonies had a raised central papilla and edge giving them a draughtsman appearance. Sometimes a central depression surrounded by a raised ring formed, with or without the peripheral ring. The colonies were dirty yellowish-white with a dull metallic surface like that of aluminium paint and a striking aromatic smell reminiscent of eucalyptus; no previous reference to these two features has been found. After subculture on a solid medium undifferentiated mucoid colonies appeared. Cultures in broth showed uniform turbidity, a thick, wrinkled surface pellicle, and a somewhat tenacious deposit. Growth was similar in peptone water and was slower in both these media at room temperature.

Good growth with rapid stratiform liquefaction takes place in gelatin at room temperature; in addition to the thick layer of growth between the liquefied and unliquefied portions a surface pellicle is also formed. Liquefaction of Loeffler's serum medium is apparent after 3 days' incubation. The appearance of mucoid variants, growth in fluid media and proteolytic properties thus conform with the descriptions available. Growth appears on MacConkey agar only after subculture: the colonies are red and typical morphologically. A café-au-lait colour, as described for the smooth strain, is produced on potato.

Greater fermentative activity is attributed to freshly isolated strains than was shown by this organism, which produced slight acid in glucose only; lactose was attacked only after repeated subculture on MacConkey. A narrow zone of hæmolysis with a greenish tinge appears early round colonies on horse-blood agar and later extends so as to involve the whole plate. Strictly anaerobic conditions support only an extremely poor growth.

*Animal experiments*.—During the early stages of the investigation of this organism the probability of it being a non-pathogenic contaminant belonging possibly to the achromobacteria was entertained. Animal inoculation soon dispelled this idea since the organism showed a high degree of virulence for the mouse and guineapig.

After receiving a subcutaneous inoculation of 0.2 c.cm. of a broth suspension, a mouse sickened rapidly and died in 3 days. At autopsy there was a small amount of pus at the site of inoculation and a slight, glairy peritoneal exudate; the spleen was enlarged and crowded with minute whitish nodules which were also apparent, though much less numerous, in the liver. The bacillus was recovered in pure culture from the heart blood. On first passage the same dose and route being employed, a second mouse became moribund in 24 hours. The post-mortem findings were essentially the same, though the areas of focal inflammation were less obvious in the spleen and visible only microscopically in the liver.

In an attempt to elicit the Strauss reaction (for glanders) a guineapig was inoculated intraperitoneally with 0.2 c.cm. of a broth suspension; death followed in less than 48 hours. There was slight testicular enlargement but no exudate could be seen in the tunica vaginalis though cultures from this region yielded a heavy growth of the organism. A second guineapig received 0.02 c.cm. of an 18-hour broth culture and showed a positive Strauss reaction with obvious testicular swelling and patchy, peri-orchitic deposits of pus. In both

these animals there was a copious viscid peritoneal exudate and multiple submiliary foci in the enlarged spleen. The liver of the first guineapig showed a few minute foci not visible to the naked eye. Several drops of heart blood in broth gave a positive culture, direct platings being sterile. Microscopical examination showed that, in each case, the lesions consisted of foci of acute pyrogenic inflammation with conspicuous karyorrhexis.

A mouse was inoculated with 0.2 c.cm. of a broth suspension of a known, apparently smooth strain of *Pf. whitmori*, obtained from the National Collection of Type Cultures (no. 1688, isolated from the rat). The animal appeared sick 24 hours after the inoculation but rapidly recovered and was quite well 7 days later when it was killed. A small, local, indurated abscess was found, and an enlarged spleen filled with coalescent caseous nodules; spleen and blood cultures proved sterile.

*Serological findings*.—The presence of antibodies in the patient's serum was tested for by the agglutination reaction. Suspensions of the patient's organism and the strain of *Pf. whitmori* supplied by the National Collection were prepared from 2-4 day broth cultures and killed by 0.5% formalin. Five human sera selected at random from those in the laboratory were used as controls. Readings were made after samples had been 4 hours in the water bath at 56° C. and again after they had stood overnight at room temperature. The findings recorded in the table are typical of a number of tests.

TESTS FOR THE PRESENCE OF ANTIBODIES TO THE ORGANISM IN THE PATIENT'S SERUM; COMPARISON WITH 5 CONTROL SUBJECTS

Organism	Serum from—	Dilution				Control
		1/25	1/50	1/125	1/250	
Patient's strain	Patient	++	++	+	±	—
	Control 1	±	—	—	—	—
	" 2	—	—	—	—	—
	" 3	—	—	—	—	—
	" 4	—	—	—	—	—
Type culture	Patient	—	—	—	—	—
	Control 1	—	—	—	—	—
	" 2	—	—	—	—	—
	" 3	—	—	—	—	—
	" 4	—	—	—	—	—

*Conclusions*.—The organism was undoubtedly *Pf. whitmori*, though the colonial morphology, metallic sheen and aromatic smell are not entirely in keeping with descriptions of the "rough" form of this species of bacterium. As far as can be ascertained, *Pf. whitmori* has not previously been isolated from man in this country. Nicholls's observation that the rough type of growth represents the virulent form of *Pf. whitmori* appears to be confirmed by its isolation in this state from our patient, and by the virulence of the strain in experimental animals as contrasted with the relative virulence of the smoothly growing strains provided by the National Collection. It seems likely that the capacity of the patient's serum to agglutinate his own organism and not the type strain may be accounted for by the presence, in his own strain, of a surface antigen which is lost in artificial culture.

#### DISCUSSION

It is possible to fix the date of infection between 1935 and 1938 and probably in the early months of 1938. This should make it possible to estimate the incubation period, or rather the time during which the infection remained latent. Unfortunately it is impossible to say whether the first clinical sign of infection with *Pf. whitmori* was the arthritis which developed in May, 1938, or the acute attack of bronchopneumonia in June, 1941. Arthritis was not a feature of the cases described by Stanton and Fletcher, and if the arthritis is taken to mark the start of melioidosis, the onset was insidious which again is unlike previously recorded cases. To postulate the coincidence of two diseases is never very satisfactory, but here there was a definite history of gonorrhoea in January, 1938, five months before the onset of arthritis; and that the infection failed to clear up is shown by its recrudescence in December of that year. If one attributes the arthritis to the gonococcus or some incidental cause the initial sign of melioidosis would be the bronchopneumonia of June, 1941, modified

by sulphapyridine, which seems to have some activity against melioidosis. The recurrence of arthritis at this juncture might well have been due to the onset of an acute generalised infection. This would imply a latent interval of three years between infection with *Pf. whitmorei* and the onset of clinical manifestations of the disease.

A tendency to spontaneous remission of symptoms in melioidosis makes the evaluation of specific therapy speculative. A long period of observation has shown, however, that sulphapyridine and sulphadiazine can bring the temperature to normal even in the presence of large abscesses, and it is legitimate to conclude that these drugs reduce the activity of the organism, though in this case they failed to eradicate localised foci of infection.

We are indebted to Prof. S. P. Bedson for his help and advice, to Dr. W. A. Bullough, the county medical officer, for permission to publish this report, and to Dr. J. R. Gilmour for the examination of animal tissues.

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## HÆMOLYTIC ANÆMIA DUE TO SULPHAPYRIDINE

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HÆMOLYTIC anæmia has now been reported after sulphanilamide (Wood 1938), sulphapyridine (Ravid and Chesner 1940, Hipsley 1942) and sulphathiazole (Bunim and Israel 1942, Rothstein and Cohn 1942). In the following case arising after sulphapyridine therapy some light on the mechanism of hæmolytic was thrown by in vitro and in vivo experiments.

A retired merchant, aged 59, was admitted to hospital on July 18, 1941, complaining of jaundice of fourteen days' duration. Eleven days before the appearance of jaundice he had begun an eight-day course of sulphapyridine (total 24 g.) for pyelitis. There had been no previous jaundice and no family history of jaundice.

He was a well-covered man, pale and moderately jaundiced. His tongue was normal, and his liver and spleen not palpable. Urine contained urobilin in excess and fæces were dark brown. Blood-counts are shown in table I. Differential

TABLE I—BLOOD FINDINGS BEFORE TEST DOSE

Date in 1941	Red cells (millions per c.mm.)	Hb. (%)	Colour-index	White cells (per c.mm.)	Reticulo-cytes (%)	Hæmatocrit (%)
July 17	1.43	42	1.5	15,000	Less than 1	26
" 20	1.79	51	1.4	11,500	9.6	..
" 22	..	55	..	..	8.4	..
" 24	..	63	..	..	8	..
" 29	..	70	..	..	1.8	..
Aug. 5	..	77	..	..	0.5	..
" 6	3.46	80	1.18	8400	2.2	..
" 9	..	84	..	8100	..	43
" 11	3.14	78	1.25	..	..	43
" 17	..	80	..	..	..	..

\* Haldane.

count on July 17: polymorphs 64.5%, eosinophils 3%, basophils 1%, lymphocytes 27%, monocytes 1%, myelocytes 2%, metamyelocytes 15%; occasional erythroblasts seen (1.5 per hundred leucocytes). Serum bilirubin on July 18, 0.8 mg. per 100 c.cm. Sternal marrow on July 22: normoblasts 5.5%, primary erythroblasts 12.5%, secondary erythroblasts 3%, myeloblasts 1.5%, myelocytes 11.5%. Gastric test-meal on July 26: free hydrochloric acid present. Fragility of red cells normal. Intradermal inoculation of sulphanilamide and sulphapyridine produced no cutaneous weal. No specific treatment was given and he was on ordinary hospital diet. On Aug. 17 the patient was given 1 g. sulphapyridine by mouth and table II summarises the changes in his blood after this test dose—a significant fall in his hæmoglobin. On Aug. 18 an attempt was made to demonstrate a hæmolytic system in his blood. Sulphapyridine was added to his serum, to his whole blood, and to his washed red cells suspended in normal saline, to a concentration of 10 mg. per 100 c.cm. Control tubes were also set up of normal serum, normal blood

TABLE II—BLOOD FINDINGS AFTER TEST DOSE OF 1 G. SULPHAPYRIDINE AT 4 PM ON AUG. 17

Date	Hb (%)	Hæmatocrit (%)	Serum bilirubin mg. per 100 c.cm.
Aug. 17 (11 AM) ..	80	43	0.1
" 17 (11 PM) ..	78	43	0.1
" 19 ..	76	41	0.7
" 20 ..	68	38	0.7
" 21 ..	66	36	..
" 21 ..	66	34	0.3
" 28 ..	76	41	..
Sept. 18 ..	80	..	..

and normal washed cells of the same group as the patient, and a similar set containing sulphapyridine to the same concentration as in the patient's series. These tubes were incubated for periods up to 72 hours at 37° C. No hæmolytic occurred in any of the tubes and there was none when the patient's serum plus sulphapyridine was incubated with the patient's and with normal washed red cells. No hæmolytic system was thus developed in vitro.

The patient made a good recovery from his anæmia. During convalescence he became hallucinated for a few days with a persecution fixation on his physician but he recovered completely and was discharged on Aug. 28.

## DISCUSSION

The recorded cases of hæmolytic anæmia following sulphonamide therapy almost all started the hæmolytic process within eight days of their first dose, though in the case reported by Rothstein and Cohn (1942) hæmolytic began after the second week of therapy. In our patient the jaundice became obvious eleven days after the start of therapy and three days after therapy had stopped. Like our's, Rothstein and Cohn's patient had a macrocytic anæmia of severe grade, whereas other reported cases were either normocytic or only slightly macrocytic. Further cases will show whether the delay in the appearance of the anæmia plays any causative part in the production of macrocytosis. We do not consider that the reticulocytosis was of sufficient degree to account for the macrocytosis, as has been suggested for other hæmolytic anæmias by Singer and Dameshek (1941), reticulocytes being larger than normocytes.

The in vitro experiments with the patient's cells and serum were also done by Rothstein and Cohn with negative results, but we can find no record of a test dose having been given with the strikingly positive result obtained in our patient. After 1 g. of sulphapyridine the patient's hæmoglobin fell from 80% to 66% and the hæmatocrit from 43% to 34.5%. The maximum fall occurred seven days after the test dose and three days elapsed before there was any significant fall in the hæmoglobin. These facts may be significant in the mechanism of hæmolytic. Fox and Ottenberg (1941) suggest that hæmolytic may be produced by an unusual oxidation product of the sulphonamide or by hypersensitivity to the drug. In our case the gradual fall over a period of days is, we think, against hypersensitivity, whereas it strengthens the supposition that some oxidation or other product of sulphapyridine is responsible. The fact that incubation of the patient's serum with sulphapyridine of the same concentration as is usually found in the blood during treatment failed to produce a hæmolytic system may be taken as evidence that this hæmolytic product is manufactured outside the blood-stream. The mode of onset, leucocytosis, free hydrochloric acid in the gastric juice, and spontaneous recovery without specific treatment eliminates the possibility of this case being pernicious anæmia. The fall in hæmoglobin after 1 g. of sulphapyridine seems the best possible proof that his anæmia was directly due to the drug.

I wish to thank Dr. A. D. M. Greenfield and Dr. R. T. Campbell for their help in the investigations on this patient.

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## PHOSPHORUS BURNS

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PHOSPHORUS incendiary bombs are being used by the Germans, and it is fully appreciated by those responsible for organising civil defence that phosphorus may play an important part should intensive raiding of this country be resumed. Sticks of phosphorus are being burned at fire demonstrations during ARP instruction. We have, in this borough, had first-hand experience of relatively trifling first degree phosphorus burns suffered by wardens during these demonstrations.

In one case—the first—a burn of a finger resulted in several weeks of incapacity with severe pain. At one stage it was decided that the finger would have to be amputated. Though it was finally saved this incident taught us a lesson. Phosphorus burns, even minor ones, are more dangerous than most people realise. It may be useful, therefore, to set out the more important practical and theoretical points about them.

**General Principles.**—Phosphorus is lipid soluble. It therefore spreads with great rapidity and tends to eat its way into the deeper tissues. Speed in treatment is therefore the first essential. Every first-aid-er must be taught to soak the area burned with phosphorus in an alkaline copper solution with the minimum of delay. This solution combines with the phosphorus (in an alkaline medium copper phosphide is formed) and has the additional advantage of making the phosphorus easily visible; all phosphorus spots show up as dead white with a faint bluish tinge. The rapid removal of all affected tissues is of primary importance. Small spots which are restricted to the epidermis can be rubbed away with pledgets of wool soaked in alkaline copper solution. More extensive areas must be scraped with a scalpel. The danger of shock is far greater than with ordinary burns. If areas of skin greater than 6 in. are involved, or if the burn is of second degree, immediate transfusion with serum or plasma may be a lifesaving measure.

Bearing these principles in mind, we have put the following policy into force.

**First-aid Treatment.**—First-aid-ers are to be supplied with two bottles, one of alkali (about gr. 60 of sodium bicarbonate to the pint) and one of 2% copper sulphate solution. These solutions cannot be kept mixed, because an insoluble copper carbonate is formed which renders the mixture useless. The solution should be mixed in a bowl in roughly equal quantities just before use. Nurses in charge of first-aid posts and mobile units have been instructed to keep a phosphorus burn corner in the treatment room, equipped with the above solutions, pledgets of cotton-wool and sterile 'Vaseline' gauze. We have asked for a supply of amyl salicylate. The corner is also equipped with scalpel, forceps, syringe, procaine and standard serum transfusion kit for the use of the doctor. Nurses in charge are told to call a doctor if they are in doubt about the severity of any phosphorus burn. They are only to treat slight, superficial burns, seen immediately, and to rub off all affected epidermis with pledgets soaked in the solution. It is explained to them that dabbing is useless and that hard rubbing is essential. Either gentian violet or vaseline gauze can be applied if all traces of phosphorus have effectively been removed. In all other cases they are instructed to call the doctor of the post.

**Medical First-aid Treatment.**—For the guidance of first-aid post and mobile unit doctors, we have suggested the following treatment:—

In first degree phosphorus burns, where the area of skin affected is too great to allow of removal by rubbing with pledgets, the affected skin is to be removed by scraping with a scalpel after infiltration of a surrounding area with procaine. The skin surface should then be dressed with amyl salicylate. This liquid has the advantages over other dressings that it dulls pain, prevents scarring, and promotes granulation thus accelerating healing.

All second degree burns, however small, should be treated for shock. If all phosphorus can be excised at the post, without difficulty, this should be done first, but 400 c.cm. of dried serum solution are then to be injected intravenously.

In more extensive, second degree, and severe burns, no attempt should be made to deal with the lesion. A pad soaked in alkaline copper solution is applied, an intravenous serum transfusion given and the patient rushed to hospital for excision of affected tissues under an anæsthetic.

We have also applied for collapsible canvas baths for the mobile unit. In the event of an incident involving serious phosphorus burns, the only hope for a phosphorus casualty would be immersion in such a bath and a serum transfusion before being sent to hospital.

## PREPARATION OF GROUPING SERUM

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THE qualities of an ideal grouping serum are numerous but not difficult to obtain. They include rapidity of action, usually connected with a high titre and absence of prozone phenomena, ability to react with weak or subgroup agglutinogens, freedom from rouleaux-forming tendencies and from agglutinins other than those of the ABO series, a low fat content and sterility.

While most writers insist on a high titre serum being used, there is no agreement as to what is the lowest figure compatible with safety. Wiener (1939) states that a good serum will bring about visible agglutination in a dilution of 1/20, although he says later that for the detection of the A<sub>2</sub> receptor in a subgroup A<sub>2</sub>B a serum of very high potency may be required. Taylor and others (1940) recommend a serum with a titre of at least 64, while preferring a higher one, and Riddell (1939) one with a titre not less than 100. This discrepancy is mainly due to the varying methods of titre estimations in use. Most methods depend on the use of mixtures of increasing dilutions of serum with homologous cells, the titre being the reciprocal of the serum dilution in the last tube in which agglutination occurs.

Although simple in principle, at the moment estimations of one laboratory cannot be compared with those of another, and within one laboratory results in a series of experiments may not be comparable. Three possible variants are responsible for this. The saline of the cell suspension may or may not be included in the calculation of the dilution. Some methods take the end point as the last tube in which agglutination can be seen microscopically, others take macroscopic agglutination; this difference amounts to one or two tubes in a serial dilution. Finally the sensitivity of the cells is a very variable factor.

### INVESTIGATION

Four groups of titrations were carried out, the method employed in each case, as in other titrations described in this paper, being that of Brewer (1937). A constant amount of a measured 1/150 dilution in 0.85% sodium chloride of washed cells containing the homologous agglutino-gen was added to increasing dilutions of serum in 0.85% sodium chloride. The mixtures were made in round-bottomed tubes of about 1 cm. diameter and the readings were made after standing overnight at room temperature. The saline cell suspension was included in the calculation of the dilution of the serum. Before reading, the tubes were inverted twice and the agglutination was scored as follows:

- +++ One solid clump.
- ++ Several small clumps or one large clump with several smaller ones.
- + Suspension of small but macroscopic clumps.
- ± Very small but definite clumps detectable by the naked eye, possibly with the assistance of a hand lens.
- No visible agglutination.

In each group of titrations the same group A serum was titrated against 15 different group B cells. One protocol typical of the four is shown in the table; it illustrates the range of variation which may occur.

To obtain comparable titre values end-point reading should be adjusted and calculation of the dilution made. It is suggested that the use of a cell suspension from a pool of 10 or more bloods will give more even results not only against group B cells but also against group A cells, where the use of cells from 10 or more bloods is likely to avoid the presence of a predominant number of group A cells.

SERUM DILUTIONS

Cells	1/24	1/5	1/10	1/25	1/50	1/100	1/200	1/400	Titre
1	++	+	+	±	-	-	-	-	25
2	++	+	+	±	-	-	-	-	25
3	++	++	+	±	-	-	-	-	50
4	++	++	+	±	-	-	-	-	10
5	++	++	++	+	±	-	-	-	100
6	++	++	++	+	±	-	-	-	25
7	++	++	++	+	±	-	-	-	25
8	++	++	++	+	±	-	-	-	25
9	++	++	++	+	±	-	-	-	10
10	++	++	++	+	±	-	-	-	25
11	++	++	++	+	±	-	-	-	25
12	++	++	++	+	±	-	-	-	100
13	++	++	++	+	±	-	-	-	25
14	++	++	++	+	±	-	-	-	10
15	++	++	++	+	±	-	-	-	25

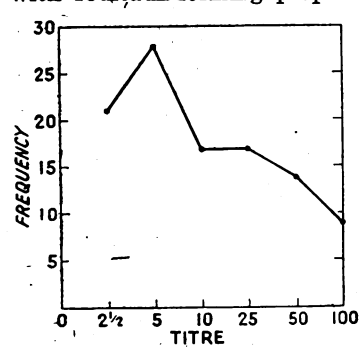
One group A serum was titrated against 10 pools of group B cells, each pool consisting of cells from ten donors.

Pool of group B cells	1	2	3	4	5	6	7	8	9	10
Titre	100	100	200	200	200	100	200	100	200	100

Another group A serum was similarly titrated against 6 pools of cells. Each pool consisted of cells from 10 donors (group B) and in every case a titre of 100 was obtained.

In dealing with A subgroups the relative powers of reaction are in descending strengths A<sub>1</sub>-A<sub>1</sub>B-A<sub>2</sub>-A<sub>2</sub>B. Fortunately in most cases the power to agglutinate weakly reacting cells rises with the titre, but all grouping serum should finally be tested against A<sub>2</sub>B cells. Using Brewer's (1937) method with pooled cells to determine the titre, a titre of 100 appears to be the lowest that will give reliable results. Sera with a titre of 100-400 are not difficult to obtain and produce more rapid and massive clumping.

Rouleaux formation will not affect dilution methods of grouping, but when using the open-tile method a serum with rouleaux-forming properties should be discarded.



Distribution of cold-agglutination titre in 115 sera.

With this method a high titre serum should give a result within two minutes, avoiding drying and concentrating phenomena.

The most likely extra agglutinins to give rise to misleading results are the cold agglutinins. A cold agglutinin will demonstrate its presence by the clumping which takes place at lower than body temperature when the serum is mixed with red cells of its own group, of group O or its homologous isoagglu-

tinogen group when the isoagglutinin has first been absorbed out. To see how many contained cold agglutinins active at 5-7° C., 4710 sera were examined. One drop of the serum was mixed on a porcelain plate with one drop of a 1/20 suspension of fresh washed cells of the same group. This was done in an ice-chest at a temperature of 5-7° C. A positive result was taken to be one where the mixture showed obvious naked eye agglutination. Rouleaux formation did not interfere with the readings, probably on account of the cell suspension dilution and the low rate of evaporation at that temperature. As a precaution against it, all positive reactions were diluted with saline and many were reversed by heating. Of the 4710 sera examined, 1518 showed cold agglutinins (32%).

Of 151 AB sera	48 contained cold agglutinins	(32%)
" 2100 A "	" 706 "	" (29%)
" 419 B "	" 136 "	" (33%)
" 2040 O "	" 628 "	" (31%)

As each serum was tested against one specimen of cells, the cells varying from day to day, the results will obviously include agglutination due to non-specific cold agglutinins and to agglutinins with an affinity for subgroups of the A cells.

The titre of the cold agglutinin factor was estimated in 115 sera containing an active cold agglutinin (see figure).

The technique employed was the one outlined above, using washed cells of the same group as the serum. The results were read after standing overnight at 5-7° C. Observations made on the effect of heat on cold agglutinins agreed with those made by Kettel (1930). After a fortnight at 20° C., cold agglutinins were still present. One hour at 56° C. weakens but does not destroy cold agglutinins, while heating at 60° C. greatly weakens their action in 5-10 minutes and destroys it in an hour. No evidence was found for the statement that standing serum overnight with its clot alone (i.e., free from suspended cells) freed it of cold agglutinins.

In a series of 10,000 bloods, 29 sera exhibited a cold agglutinin active at a room temperature of 19-23° C. It may be suggested that grouping is never done under conditions where cold agglutinins are active. The following temperatures are recorded to show that temperatures suitable for the activity of cold agglutinins may be encountered in places where emergency grouping sometimes takes place. These of course do not include the much lower temperatures sometimes met when enrolling blood donors.

*Series A.*—Bedside ward temperatures (° C.) taken during 20 consecutive transfusions at a London sector hospital were as follows, number of occasions being shown in parentheses. 11° (1), 14° (3), 18° (4), 19° (9), 20° (1), 21° (1) and 22° (1).

*Series B.*—Temperatures of various pathological laboratories and ward annexes during the months of January and February, (° C., number of rooms in parentheses). 7° (1), 8° (2), 9° (2), 10° (1), 12° (4), 14° (3), 16° (2), 17° (2), 18° (4), 20° (3) and 21° (4).

The prozone phenomenon described by Pondman and Brandwijk (1932) is relatively common. It is lessened by storage or by heating the serum to 56° C. for half an hour.

Excess fat content produces an unsightly serum and is said to harm the keeping powers. It is generally agreed that the addition of preservatives to serum assists in lowering the titre during storage.

PREPARATION OF GROUPING SERUM

High titre serum can be obtained by the selection of naturally occurring strong serum or by concentration. O'Meara (1933) described a method in which serum was frozen, and on thawing the isoagglutinins were concentrated in the lower layers. Various methods have been described by Landsteiner and Miller (1925), Thalhimier and Myron (1942) and others, in which isoagglutinins have been partially isolated or prepared in combination with the globulin fraction of the serum. One disadvantage of this is that rouleaux formation goes hand in hand with an increase in the globulin content of the grouping serum.

In this laboratory it was the practice to titrate the serum of a series of donors to find high titres. Time can be saved by using the routine test for the isoagglutinin content of serum. If this is done by the open tile technique in a series it will be found that the clumping caused by an occasional serum will stand out by reason of its speed and degree. Such a serum, chosen by comparison of its action with that of other sera, will in most cases prove to have a high titre. Of the first 18 A and B sera so selected :

6 sera had a titre of	400
8 " " " " "	200
3 " " " " "	100
1 " " " " "	50

Cold agglutinins may be eliminated by two methods. The first is most suitable for small scale preparation of grouping serum. It depends on the use of a known high titre donor and in it the cold agglutinins are absorbed by the cells of the donor. In this method 400 c.cm. of blood is collected into a MRC bottle containing 2 g. of sodium citrate; after it has stood for 48 hours at 5° C. the supernatant plasma is siphoned into a MRC bottle containing 1 g. of anhydrous calcium chloride and glass beads. After clotting the serum is run off, Seitz filtered and is ready for use.

The second method is more suitable for large blood centres where blood of A and B groups is collected for the preparation of serum. During the course of a week's routine testing for the isoagglutinin content of serum some 20 or 30 high titre sera are selected by the method described above. At the routine pooling of the serum 30 c.cm. of serum is left in each bottle with the clot. At

the end of the pooling each bottle containing selected serum and clot is shaken gently and the serum-cell suspensions are then pooled by siphoning into a common container. After 48 hours standing at 5° C. the cells settle, carrying the cold agglutinins with them and the supernatant fluid may be siphoned off for use as grouping serum. Sterility is ensured by carrying out the whole proceeding in a closed circuit, and as well as ridding the serum of cold agglutinins, the potency of the serum appears to be enhanced by the pooling of several sera. With this method 1 litre of grouping serum may be prepared at a time, and the only titre estimation that has proved necessary is that done on the final product.

#### SUMMARY

The qualities of grouping sera are discussed and methods of determining the titre are compared; it is suggested that pooled cell suspensions will give comparable results.

Of 4710 sera examined, 1518 (32%) were found to contain cold agglutinins active at 5-7° C. Of 10,000 sera, 29 contained cold agglutinins active at room temperature.

A rapid method of selecting high titre sera is described and methods of small and large scale preparation of cold agglutinin-free serum are outlined.

I am indebted to the Medical Research Council for the facilities placed at my disposal, to Dr. H. F. Brewer for helpful advice and criticism, and to Mr. R. Hudson for advice and technical assistance.

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## GROUP PSYCHOTHERAPY FOR WAR NEUROSES

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 MAJOR RAMC

THE problem of obtaining satisfactory treatment for neuroses in the Fighting Services is urgent. The large numbers of patients obtaining discharge to civilian life owing to neurotic disability is a drain on the manhood supply of the Forces; moreover, there is a national demand that cases discharged should receive adequate treatment.

The object of the individual therapist must be to return as many cases as possible to the Forces in some useful capacity, and to send the remainder back to civilian life in a fit state to begin work of national importance immediately. The problem confronting the Army psychiatrist, however, is how to treat patients with any success in the limited time at his disposal. My own experience may prove illustrative.

During 6 months at military hospitals dealing with neurotic cases and no psychotic cases, nearly 300 patients have passed through my hands. I have seldom had less than 60, and never less than 50 patients under my care simultaneously, and in addition to psychiatric work I took my share in the general duties involved in running a hospital of 250 patients. The difficulty of giving each patient even a semblance of effective treatment became obvious. Eventually I decided to try group psychotherapy,<sup>1</sup> and evolved the following scheme.

#### METHOD

To obviate the necessity of repeating to each patient encouragement and reassurance at the time of his admission, I had typewritten copies of my usual exhortations made and placed under 'Cellophane' covers. On the day of his admission each patient, after he had settled down, was handed one of these copies to read at his leisure. The value of this procedure was proved by noting the difference in tone and attitude of patients who had read it, compared with those who had not. Next day I had a short interview with individual patients and told each of them (with certain obvious exceptions,

such as low-grade mental defectives) to write me a history of their lives with special reference to any events which may have affected their mental welfare. Criticisms may be levelled by psychoanalysts against such biographies, but I found them of considerable assistance. The writing and phraseology alone told one much of the patient's character. Many biographies were masterly efforts, and contained material that would have taken many interviews to collect. They often furnished innuendoes useful in unravelling deeper complexes later on. The frankness with which the majority were written surprised me. Nearly all patients agreed that they found it a great relief to unburden their minds, and that they were able to put on paper much that they would not have been able to divulge by word of mouth. As soon as possible after he had completed his biography I gave each patient a long interview, during which I made further notes and decided on the general lines of treatment to be adopted. I found most cases suitable to attend my group psychotherapy lectures. These consisted of a series of approximately 10 lectures of one hour each, their main contents being as follows.

1. Introductory lectures frankly discussing mental conditions in general and neurosis in particular, with emphasis on the fact that despite misconceptions on the part of the public it is no more disgraceful to be mentally ill than bodily ill.
2. A lecture on the inter-relationship of body and mind, examples of their interaction being given.
3. Convenient methods of describing the mind, with examples of each: (a) conscious, subconscious, and unconscious compartments; (b) knowing (cognition), feeling (affect) and striving (conation); (c) the fact that one's mental reactions are the sum result of events affecting one's mind in the past.
4. A description of the instincts, each instinct being present in every human being but varying in strength from one individual to the other.
5. Elementary anatomy and physiology.
6. A description of sentiments, complexes and mental conflicts, with examples of each, particular attention being paid to home-versus-duty conflict in relation to their neuroses.
7. The stages of mental life; details of where each stage may go wrong; the consequences of maladjusted occupation.
8. Sex; masturbation, homosexuality, &c.
9. Fear; excessive fear in the production of symptoms; a brief summary of previous lectures.
10. Self-treatment; realisation of the origin of symptoms; though apparently bodily in manifestation they are mental in origin; the less attention paid to them the more easily they disappear; necessity for a less selfish outlook; importance of a sound general philosophy; a plea for patients to come to me for further discussion of their individual symptoms.

#### RESULTS

It might be thought that these lectures were far above the heads of most of those attending them, and I embarked on them with trepidation on this score; but by simplification and illustration of my points with comprehensible examples I managed to present the material in a manner which held the attention of nearly everyone present. Naturally the degree of comprehension varied greatly from one patient to another according to intelligence and temperament, but though only a few understood and remembered details most appreciated the general gist and implications.

There were several reasons for success. In the past the usual attitude towards these patients had been one of scorn, coupled with exhortations to pull themselves together and exert their will-power; now they found there was an explanation for their failure to improve by such methods. Attending lectures with so many others made them realise that their neurotic symptoms were far from peculiar to themselves. A frank discussion of sexual and other problems proved helpful in many cases. It encouraged a man to find himself one of a class in which those present were if possible to return to duty in the Forces, their disabilities being taken into consideration. Those who could not return in their original capacity were to have a suitable one found for them, and only those who were honestly incapable of carrying on were to be discharged. The latter were not to be stigmatised and were to be treated until they were fit to return to work of national importance as soon as they left hospital.

1. Snowden, E. N. *Lancet*, 1940, ii, 769.

Moreover everyone present felt that he was at last receiving adequate treatment. The lectures were almost the equivalent of each patient having ten separate interviews. The advantages of this were brought home to me on being posted to different hospitals on two occasions and each time receiving legacies from my predecessors of about 50 cases. With no reproach to the psychiatrists concerned, who were extremely heavily worked, I found that many of the patients who had been in for several weeks had been given only one interview of about an hour and an occasional short one during that time. Many felt neglected and thought nobody really cared what happened to them. They were thoroughly "browned off" in the truest sense of this slang term, and hoping for discharge to civilian life (with neurotic symptoms often unimproved). The change in their moral tone after a course of lectures was striking.

I do not propose to give statistical figures as a vindication of this method. For these to be anything but misleading, a careful record of the prognostic factors of each case would be necessary, and a follow-up of a large number of cases over a long period. Such steps have as yet proved impossible. However the proportion of cases returning to duty in their own units or under the "Annexure A" scheme (which implies posting to a more suitable occupation) compared favourably with the results obtained by other psychiatrists, and the therapeutic effect in some individual patients was particularly encouraging. No case was discharged from the Army before being ready for civilian work immediately. One great disadvantage was that as soon as the patients left hospital one lost touch with them completely. I feel that many will relapse who would not do so if they were able to come for consultation again when they felt their symptoms recurring. From this point of view it seems important that patients being discharged from the Army should attend the EMS hospital nearest to their homes for therapy and rehabilitation. Group methods might prove a success in treating such patients.

SUMMARY

To cope with the difficulty of dealing with neurotics under Army conditions I introduced group psychotherapy. The combined effect of the explanation, persuasion and suggestion involved produced satisfactory results. The method enabled me to give each patient reasonably adequate treatment. The patients themselves appreciated the attention received, and at the end of the lectures discussed their problems in a more satisfactory manner than they would have done with several individual interviews.

Group psychotherapy can only be applied by psychotherapists having a personality fitted for the method, but in their hands I think it well worthy of trial.

I have to thank Brigadier J. R. Rees, Lieut.-Col. R. J. Rosie, and Lieut.-Colonel J. D. W. Pearce for their interest and encouragement.

New Inventions

A NEW LARYNGOSCOPE

This laryngoscope is designed to lessen the difficulty of exposing the larynx to pass an endotracheal tube. Normally the long straight blade of the standard laryngoscope (fig. 1A) is passed *beyond* the epiglottis in order to evert it. Occasionally this manoeuvre jeopardises the patient's upper teeth or takes a minor divot out of the posterior pharyngeal wall. Human<sup>1</sup> advises that in some cases the blade of the laryngoscope should be passed only until the epiglottis comes into view, and that the endotracheal tube should then be guided behind the epiglottis into the trachea; I have seen Dr. Margaret Hawksley use this method with great success in infants. To expose the larynx more easily Cassels<sup>2</sup> has curved slightly the end of the standard (long) blade; this passes beyond the epiglottis in the accepted way. The new laryngoscope (fig. 1B) is designed so that when its short curved blade is in position the tip will fit into the angle made by the epiglottis with the base of the tongue (fig. 2); fig. 3 shows direct view thus obtained. If the laryngo-

scope is now lifted the base of the tongue will be pushed upwards (fig. 4); the epiglottis, because of its attachment to the base of the tongue, is drawn upwards and the larynx comes into view (fig. 5).

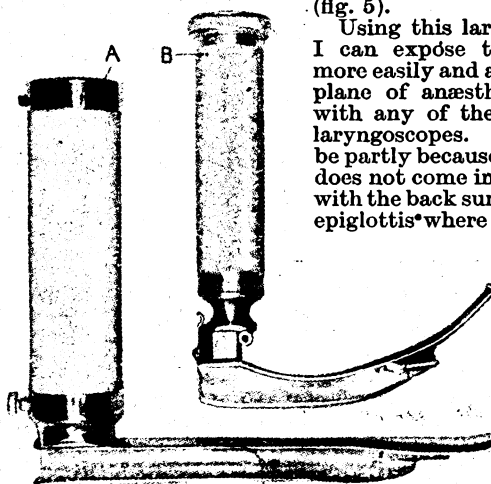
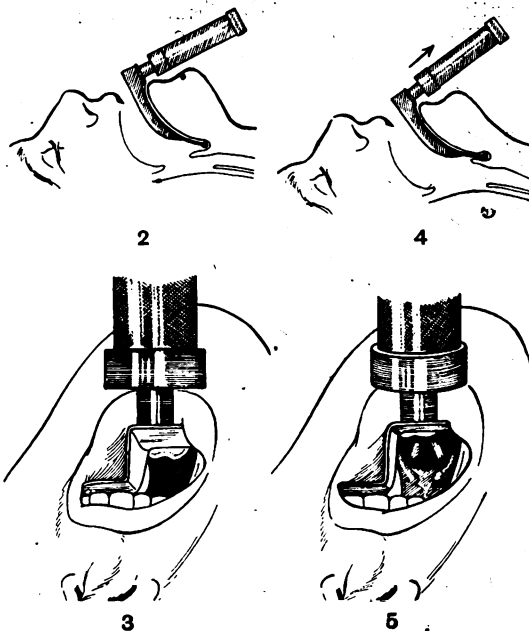


Fig. 1—(A) Standard laryngoscope with long straight blade. (B) Laryngoscope with short curved blade.

Using this laryngoscope I can expose the larynx more easily and at a lighter plane of anaesthesia than with any of the standard laryngoscopes. This may be partly because the blade does not come into contact with the back surface of the epiglottis where the inner-

vation is the superior laryngeal nerve, but with the base of the tongue, innervated by the glossopharyngeal nerve. The precise shape or curve of the blade does not seem to matter much provided the tip does not go beyond the epiglottis. The blade is inserted to the right of the tongue, which is pushed over to the left. If the tongue is allowed to bulge over the blade the view of the larynx will be occluded. When not in use the blade unit is folded on the handle as in the Foregger pattern; this unit is easily removed for sterilising.

I have to thank Dr. N. Saher of the Nuffield Department of Anaesthetics for pointing out that the direct view of the larynx is improved by moving the smaller (or lower) blade of the instrument through 180°. I am indebted also to colleagues in the laboratory for constructional help.



Figs. 2 and 3—Site of blade and view obtained before lifting laryngoscope. Figs. 4 and 5—Site of blade and view obtained when laryngoscope is lifted in direction of arrow.

The laryngoscope can be obtained from Medical and Industrial Equipment Ltd., of 12, New Cavendish Street, London.

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1. Human, J. U. Blind Intubation and the Signs of Anaesthesia, London, 1941, p. 57.  
2. Cassels, W. H. *Anesthesiology*, 1942, 3, 580.

## Reviews of Books

### Medical Jurisprudence and Toxicology

(7th ed.). JOHN GLAISTER, MD, DSc Glasg. Edinburgh: E. and S. Livingstone. Pp. 671. 28s.

THE pre-eminence of British forensic medicine has been established on the writings of authors from the Scottish school: Littlejohn, Sidney Smith, Glaister father and son. For nearly 50 years volume after volume has recorded the sober reflections of this school, and here, once more, is Glaister laying out a veritable feast of forensic medicine in a fresh and attractive way. A rewritten text has swept away the cobwebs; the references are modern, the illustrations apposite. It is no digest for the student's few weeks of forensic medicine, but a sizeable and reliable reference book for those practising the subject. The only serious criticism which can be made of it is that it is still unbalanced. A classical account of identification contrasts with an inadequate account of sudden death from natural causes (including "rupture of the heart . . . from gummatous changes," a rare if not fabulous bird); 77 microphotographs of hair including those of the duckbilled platypus and the Arabian baboon lie too near sections on hanging, throttling and drowning, illuminated dimly by two pictures, one of a hyoid bone and the second of a body cut to ribbons by a screw. A rare and misleading collie-dog incident gets 41 lines accompanied by no warning on the shortcomings of the Pearson formula; 6½ pages are spent on micro-analysis for blood-alcohol and a bare 9 lines on the practical aspects of anæsthetic deaths. But the book is outstanding and will bear searching use.

### History of Tropical Medicine

(2nd ed.). SIR HAROLD SCOTT, MD Lond, FRCP. London: Edward Arnold. 2 vols. Pp. 1219. 63s.

THIS monumental work, first published in 1929, is based on the FitzPatrick lectures delivered in 1937-38. Sir Harold Scott describes the rise and development of tropical medicine in the generally accepted connotation of the term. The first chapter deals with the Royal Navy and the Merchant Navy, since medical officers of these services played an important part in the earlier investigations of diseases of warm climates; then follows a description of the work of the Army, and the general development of the subject in the Colonies, Protectorates and Dominions. The great tropical diseases are dealt with severally in detail under the headings malaria, blackwater fever, melioidosis, dengue, amoebic dysentery, ancylostomiasis, and tropical diseases connected with food. Sections on the Suez and Panama Canals, disease and the slave trade, bring out the relations between commerce, economics and tropical medicine. The book ends with brief but delightful sketches of the lives of a few of those to whom tropical medicine was the chief interest in life. Among the two million books destroyed in the great fire of London in September, 1940, were 500 copies of this work, and the opportunity was taken of adding as an appendix to the new issue some recent advances of importance. The wide appeal of the subject at the present time will secure many new readers to enjoy the author's erudition and the charm of his writing.

### Visual Outline of Psychiatry

LELAND E. HINSIE, MD, professor of psychiatry, College of Physicians and Surgeons, Columbia University. London: Humphrey Milford, Oxford University Press. Pp. 109. 12s. 6d.

Professor Hinsie's aim was to enable the student to "grasp the gist of current psychiatric matters and . . . gain a feeling for the subject." In contrast to the wordiness of so many books about psychiatry, the bareness of his outline is almost comparable with that of a flora. This laudable dryness, however, is accompanied by a system of division and subdivision that may be well enough in a flora but makes an outline of psychiatry almost unreadable and not of much use for reference. Almost every sentence is an isolated statement, with its number or letter of the alphabet prefixed; thus the assertion that "a psychiatric patient is emotionally a child even if he is at the same time superlatively developed intellectually and physically" is subsection (3) in the

subdivision (c) of the five subdivisions of the ontogenetic part of the mind, a statement about which is number 3 of the substatements about ontogenetic division, which is itself category B of the "Form of the Psyche." The form of the psyche is number 3 of the divisions in which the organisation of the mind is dealt with in chapter 2. This is carrying a good principle too far. The psycho-analytical side of psychopathology is given a large place in the book, but apart from this unequal emphasis the statements made would be sound and informative for the instruction of a beginner.

### Toxæmias of Pregnancy

WILLIAM DIECKMANN, MD, associate professor of obstetrics and gynecology in the University of Chicago; attending obstetrician at Chicago Lying-in Hospital and Dispensary. London: Henry Kimpton. Pp. 521. 37s. 6d.

THIS is among the more complete surveys of an ever-green problem. The published work of the last decade has been analysed and discussed, and the bibliography is comprehensive. Dr. Dieckmann has written with two main objects: to stimulate interest in the unexplored field of obstetric physiology, and to provide a solid groundwork of obstetric pathology and physiology for any investigator who is unacquainted with obstetrics. Many case-reports are incorporated in the text, which is illustrated with excellent charts and photomicrographs. The obstetrician or physician who is called upon to treat the toxæmias or is teaching students will find here an honest and critical survey of old work and much that is new and stimulating.

### Nelson Loose-Leaf Medicine

Renewal Pages. New York and Edinburgh: Thomas Nelson and Sons.

THE renewal sheets for 1942 bring this loose-leaf medicine up to date, and a new index volume of nearly 300 pages picks up past and present. In a new article in vol. I on the clinical use of sulphonamide compounds, P. H. Long gives a timely warning against their use to the exclusion of adequate surgical treatment, especially in staphylococcal infections; he counsels careful daily observation of patients and the maintenance of their urinary output at 1000 c.cm. or more per day. In the second volume H. G. Barbour completes his account of toxicology, with an exhaustive description of both common and rare conditions. It is difficult to pick out a drug which is not included, though they are not all easy to find among the various divisions of depressants, circulatory poisons, metabolic poisons and the like; amphetamine is unexpectedly placed among central nervous depressants. R. W. Clarke contributes a new chapter on diseases due to variations in atmospheric pressure, and T. J. Dry a long account of hypertensive heart disease. H. Goldblatt, H. A. Lewis, and J. R. Kahn in a survey of the pathogenesis and treatment of hypertension describe the demonstration of a humoral mechanism of renal origin as a cause of experimental hypertension: the hypertension-*renin* interaction with enzyme hypertensinase has applications to medical and surgical treatment of high blood-pressure which are well though cautiously set out. Progress will, they think, be hastened now it is possible to carry out experiments on hypertensive animals before they are tried out on man.

### War-time Information for Pharmacists

Compiled by the *Pharmaceutical Journal*. London: Pharmaceutical Press. Pp. 54. 1s.

THIS is a useful summary of acts of Parliament, defence regulations, and statutory rules and orders having a bearing on the practice of pharmacy which have come into force since the beginning of the war up to Oct. 31, 1942. Although intended primarily for the pharmacist, much of the information concerns doctors prescribing medicines, and those drugs are listed which must now be used with strict care. The section on quinine conservation, giving the economies legally enforced in the prescribing of quinine, is an example of the way in which the booklet reduces highly complicated enactments to easily comprehensible terms. It also gives much information on preparations (such as those for the treatment of scabies) which have come into prominence as a result of war-time conditions.



# THE LANCET

LONDON: SATURDAY, FEBRUARY 13, 1943

## APPENDICITIS IN CHILDHOOD

APPENDICITIS is not essentially different in children and adults, but its urgency is greater in the child because intraperitoneal infection is less likely to remain circumscribed. The formation of an abscess efficiently isolated from the surrounding peritoneum should never be expected, and even when an abscess does form it may leak or burst. For this lack of localisation there are two likely explanations. First, in children the omentum is relatively short and may thus fail to reach the appendix and enfold it, as is its habit in the adult. Secondly the leucocytic reaction is relatively slight; S. S. JACOBSON,<sup>1</sup> in 918 cases, found no relation between leucocytosis and the incidence of appendicular abscess, and even in the presence of general peritonitis only a quarter of the children showed a white-cell count of over 20,000 per c.mm. JACOBSON nevertheless maintains that the severity of the disease may largely be forecast from the white-cell count on admission to hospital. The average stay in hospital was 9.5 days in the small group with less than 5000 cells per c.mm. and gradually increased to 18 days for those with a count of over 31,000. The mortality, on the other hand, showed no proportionate relation to the leucocyte count, and there were no deaths among 13 patients with counts over 31,000.

The child with abdominal pain is as a rule a particularly good witness. The march of events from para-umbilical pain to vomiting, and then to tenderness in the right iliac fossa, can usually be traced with certainty. Without this sequence the doctor is right to doubt the diagnosis of appendicitis. But there are snags. The appendix with its tip well over the pelvic brim may give no signs at all on abdominal palpation until the dreaded rupture spreads the inflammatory process upwards. It follows that rectal examination should never be neglected in a child who has a history of abdominal colic followed by vomiting. Diarrhoea is a very common accompaniment of pelvic appendicitis, especially in children; and it is fatally easy in the small child to make a diagnosis of gastro-enteritis, concluding from the absence of all tenderness and guarding in the right iliac fossa that the appendix is not at fault. The high retrocaecal appendix, with its tip touching the posterior parietes, may closely mimic kidney disease or perinephric abscess, even to producing a patch of cutaneous hyperaesthesia near the renal angle and oedema of the subcutaneous tissues in the loin. Here careful attention to the development of the illness, with special inquiry for a central abdominal pain at the beginning, may prevent a wrong diagnosis. Appendicitis is the only important cause of persistent abdominal colic in a child, and when this colic is followed by right-sided pain appendicitis can be presumed till its presence has been proved or disproved by operation.

The treatment of appendicitis in children is appendicectomy as soon as the diagnosis is made.

1. Jacobson, S. S. *Amer. J. Dis. Child.* 1942, **63**, 1110.

The only two exceptions are that delay may be considered in a case of obviously subsiding appendicitis, where the temperature, pulse and local signs are all improving; and that drainage of the peritoneal cavity alone may be the safest procedure where removal of a very oedematous glued-on appendix promises to do much local damage and open a large absorptive area around the caecum. JACOBSON'S figures encourage the hope that sulphanilamide is improving the prognosis of perforative appendicitis. In his series a fatality-rate of 8.9% for patients with peritonitis during 1934 and 1935 fell to 4% during 1936-40 when sulphonamide drugs were used. During 1940, when, in addition to oral and parenteral administration, sulphanilamide crystals were poured directly into the abdominal cavity through the operation incision, there were no deaths. Other factors to which improvement is attributed were better preoperative and postoperative care, prompt parenteral administration of fluids, and drainage through the Miller-Abbott tube in cases of intestinal obstruction.

## MANAGEMENT OF SEVERE HEAD INJURIES

DIFFERENCE of opinion about the treatment of severe head injuries has continued since the Stone Age, but at least the contestants change their ground from time to time. MOCK and MOCK<sup>1</sup> classify the controversies of the present century as follows.

- 1900-10.—Trephining *v.* non-operative treatment.  
 1910-20.—Subtemporal decompression *v.* spinal puncture *v.* do-nothing treatment.  
 1920-30.—Routine spinal puncture *v.* never do a spinal puncture *v.* dehydration treatment.  
 1930-40.—Spinal drainage when indicated *v.* routine spinal puncture *v.* no spinal puncture. Radical *v.* mild *v.* no dehydration. Subtemporal decompressions (10% Dandy) *v.* exploratory decompressions (38% Munro) *v.* delayed operations for certain definite lesions.

There is no argument about the need for operation in cases of depressed and comminuted fractures of the skull, or of cerebral compression by intracranial haemorrhage; the variations in practice are in the treatment of severe uncomplicated accidental head injuries. Unfortunately the cause of death after this form of injury is not known. Autopsy may reveal areas of bruising on the surface of the brain, subarachnoid haemorrhage or small scattered haemorrhages within the cerebral hemispheres, and these are often said to be the cause of death. But the explanation is seldom convincing, for every brain surgeon knows that operation on the brain may cause extensive damage of this sort without the patient's life being endangered or even his consciousness being impaired. Some swelling of the brain is also occasionally seen post mortem, but there is no evidence that this increases the intracranial pressure enough to cause death. It is in fact highly doubtful in cases of head injury whether increased intracranial pressure is ever sufficient to endanger life in the absence of a gross haemorrhage compressing the brain. Recent experimental studies<sup>2</sup> support the ancient view that severe closed head injury causes widespread commotion in the brain with resulting paralysis of neuronal function. This may lead to death from paralysis of medullary

1. Mock, H. E. and Mock, H. E. jun. *J. Amer. med. Ass.* 1942, **120**, 498.

2. Denny-Brown, D. and Russell, W. R. *Brain*, 1941, **64**, 93.

centres without there being any visible injury on histological examination of the brain—"invisible contusion," JEFFERSON<sup>3</sup> calls it. Study of the clinical features of fatal cases and these experimental observations indicate that too much attention has been paid to visible findings, while the essential cause of death is usually an invisible injury to vital centres in the hypothalamus and brain stem, manifesting itself by changes such as hyperglycæmia and hyperpyrexia, with a steadily rising pulse- and respiration-rate preceding death. The controversies regarding treatment have therefore arisen from what now appears to be a faulty conception—that death is usually caused by surface areas of contusion and hæmorrhage which lead to cerebral œdema and compression. Surgeons who have critically reviewed the results of operation on closed head injury<sup>3</sup> conclude that neither contusion of the cerebral hemispheres nor swelling of the brain are necessarily present in patients who die, so their operative findings support the view that in many cases death cannot be explained by visible damage.

The value of lumbar puncture, dehydration and decompression in uncomplicated head injury must be viewed in relation to the evidence that the cerebral disorders they attempt to counter are not the actual causes of death. It is not surprising therefore that in most British head centres dehydration and decompression have been discarded, and that lumbar puncture is used rather for diagnosis than therapy. The MOCKS give figures to show that moderate methods of dehydration reduce the mortality, but it does not seem certain that they are quoting statistically comparable samples. Current British practice in the treatment of severe closed injuries lays special emphasis on careful nursing and detailed clinical observation directed towards the earliest possible recognition of complications such as intracranial hæmorrhage and seeping of cerebrospinal fluid through the nose. Convalescence had been shortened by graduated rehabilitation, as SYMONDS and RITCHIE RUSSELL<sup>4</sup> have lately described; old ideas regarding the invariable need for long rest have been discarded and each patient is allowed to resume normal physical activity at a rate adjusted to his clinical state. The most important organic effect of severe head injury is intellectual impairment, commonly associated with change of personality. This is often demonstrable when the duration of post-traumatic amnesia exceeds 48 hours, and when it exceeds 7 days some permanent intellectual loss is apparent in the majority. The degree of incapacity which this mental slowing causes depends on a large number of factors such as the previous level of intelligence, the previous personality and the patient's occupation. An essential part of rehabilitation in severe injuries is provision for the gradual resumption of responsible duties, so that the patient can if necessary re-learn his former job and thus recover sufficient confidence and knowledge to continue responsible work with reasonable efficiency. Many who have been severely injured adapt themselves to a lower degree of efficiency with remarkable success and continue to do useful work.

3. Jefferson, G. *Glasg. med. J.* 1942, 20, 77; McCConnell, A. A. *Brain*, 1942, 65, 266.

4. Symonds, C. P. and Russell, W. R. *Lancet*, 1943, i, 7.

## GLOVES OR NOT?

SINCE HALSTED<sup>1</sup> introduced the rubber glove to the operating-theatre in 1889, the proportion of surgeons who operate with bare hands has steadily fallen until today it must be very small. In the transition era, many converts to the glove have testified to its greater safety in minimising wound infection and in protecting the operator's hands. Now, when rubber is scarce and the Ministry of Health has limited the normal issue to six pairs of gloves per doctor or per midwife per annum, the bare hand may willy-nilly have to be used again for surgical and maternity work, and the possible hazards—and how to overcome them—must be explored.

First let us see what can be done to prolong the life of the glove, of which there is ordinarily such a wastage. Even the most careful dry-heat sterilisation—and too often gloves are harshly treated by too high temperatures or imperfect drying—means a short life of 5-6 sterilisations before the gloves deteriorate. Gloves sterilised by boiling last longer, but wet gloves are unpopular and uncomfortable. However, it is not sufficiently known that dry gloves can be sterilised on the hands without inconvenience to the wearer and without apparent risk to the patient. The following procedure has given satisfactory results in a large general hospital.<sup>2</sup> The hands and arms are first scrubbed in soapy water; the gloves are put on, avoiding wrinkles, and washed for 3-5 minutes in soap and water; the sterile gown is donned, and the sleeves are fastened at the wrists over the gloves with sterilised rubber bands; the gloved hands are then steeped in 1 in 50 lysol for two minutes—or if that is unprocurable in liquor chloroxylenolis (*NWF*) or biniodide of mercury 1 in 250. Substitution of this method of sterilisation reduced the consumption of gloves to an eighth of the previous requirements. The greater longevity brings another problem to the forefront—the needle-puncture which is much more common than is usually supposed. In one series of 4549 operations of all kinds in a teaching surgical unit, 35,763 gloves were used and 8602 (or 22%) became perforated.<sup>3</sup> Punctures are discovered by filling the gloves with water, or more accurately by examining the air-filled glove under water: new gloves practically never show perforations. Tearing and needle-punctures are more common when the gloves fit badly or are put on when the hands are insufficiently dry, when the wearer is clumsy or inexperienced, and when the operation is a deep abdominal one or carried out in a confined space. The rôle of the puncture in facilitating wound infection, particularly if the surgeon is a staphylococcal skin-carrier, was pointed out by DEVENISH and MILES.<sup>4</sup> Moreover, if punctures occur in 10-20% of used gloves, the life of the glove even with frequent patching must be limited. Patched gloves are not liked for major surgery or plastic work, but can be used for minor operations, ward dressings and maternity work.

Since the issue of surgical gloves is to be limited, methods for minimising the risk of infection from the bare hands must be popularised. It is virtually impossible to sterilise the skin, which harbours what

1. Halsted, W. S. *Johns Hopk. Hosp. Rep.* 1890-91, 2, 255.

2. Craig, N. S., Dodds, A. L., Tanner, N. C. and Vernon, H. K. *Brit. med. J.* 1942, ii, 438.

3. Weed, L. A. and Groves, J. L. *Surg. Gynec. Obstet.* 1942, 75, 661.

4. Devenish, E. A. and Miles, A. A. *Lancet*, 1939, i, 1088.

PRICE<sup>5</sup> has called "resident" and "transient" bacterial flora. The resident group consists mostly of harmless saprophytes like the skin-staphylococci, diphtheroids, and indifferent micrococci, although *Staph. aureus* must sometimes be included. Transient bacteria include *Streptococcus pyogenes*, *Staph. aureus*, the coliform group and possibly *Corynebacterium diphtheriae*; these can be removed by efficient washing and the use of appropriate antiseptics. COLEBROOK has carried out many experiments on the disinfection of the skin, and his findings with those of others are summarised in a recent review.<sup>6</sup> He found that household yellow soap was highly bactericidal (much more so than the refined soaps), and that washing the hands in 3-4 pints of hot soapy water for 5 minutes destroys most of the transient flora. Efficient skin-disinfectants were 2% iodine (in 4% potassium iodide watery solution), liquor antisepticus (NF),<sup>7</sup> chloramine 1/100, and the proprietary chloroxylenol preparation, 'Dettol.' Both iodine and the chloroxylenols maintain a bactericidal barrier on the skin for several hours. Thus, scrubbing the hands in soapy water for 5 minutes followed by 2 minutes immersion in a bowl of liquor chloroxylenolis should render them safe for most surgical operations. The new detergent, 'CTAB,' may also prove useful. For ward dressings the non-touch technique combined with the other precautions recommended in the MRC War Memo No. 6 will effect a considerable saving in gloves. It is most important, where gloves are not used, to see that the hands of surgeon and dresser are kept whole and healthy, and here again ingenuity is needed for the preparation of a good and cheap hand-lotion.

## Annotations

### RELIEF OF MIGRAINE

CLINICAL study of migraine has long suggested that during the aura there is a spasm of cerebral vessels which is later replaced by a throbbing headache due to vasodilatation. Wolff and his collaborators<sup>8</sup> confirmed this view, for they observed that the pain of migraine is associated with an increase in the amplitude of pulsation and the calibre of the middle meningeal and temporal arteries, while the relief of pain after the administration of ergotamine tartrate coincided with a diminution in both the pulsation and the diameter of the artery. Parenteral ergotamine tartrate has proved to be the most effective means of relieving an attack of migraine, but gives symptomatic relief only and in some people produces toxic symptoms such as nausea, tingling in the extremities, and pains in the muscles which are so severe that the cure is worse than the disease. Therapeutic experiments therefore continue. Gottlieb<sup>9</sup> finds that amphetamine sulphate relieves half the patients when administered intravenously and a third of them when given by mouth. Engle and Evanson<sup>10</sup> point out that all attacks of migraine seem to begin with vasoconstriction of certain branches of the carotid artery, and they have therefore investigated the usefulness of a long-acting vasodilator, potassium thiocyanate, which they found effective in reducing both the incidence and severity of the attacks.

These studies indicate that the relief of the patient with severe and frequent migraine often remains a

difficult therapeutic problem. On the other hand, many migrainous subjects have attacks so rarely that no treatment is necessary, while Trowbridge and others<sup>11</sup> have found simple remedies effective in about a third of all cases. Thus of 186 patients who had tried analgesics to relieve their attacks, 16% invariably got complete relief while a further 19% usually obtained adequate relief; the analgesics used included acetylsalicylic acid, amidopyrine and phenacetin. The best results were however undoubtedly obtained with ergotamine tartrate, which gave complete relief in 80% of cases; caffeine was also effective, presumably by virtue of its cerebral vasoconstrictor effect. There is good reason therefore for continuing the use of the old-fashioned headache powders and for including caffeine in the prescription. Ergotamine tartrate should be reserved for severe cases with frequent attacks which are not relieved by analgesics, and even then, as the treatment is merely symptomatic, it is for the patient to decide whether the relief he gets more than offsets the side-effects.

### SULPHONAMIDES BEFORE OR AFTER MEALS?

THE commonest question that patients ask about a medicine is whether they should take it before or after meals. The effect of this difference of administration upon the absorption of sulphonamides has been investigated by Peterson and Finland.<sup>12</sup> They gave 5 g. of the compound and measured the rate of absorption by the curve of the blood concentration and by the total amount excreted in the urine during the subsequent 72 hours. They found that the absorption of sulphaniamide was slightly delayed if it was given after breakfast instead of before. The absorption of sulphadiazine was also slightly delayed by food, but the amount absorbed was greater, 77% of the dose administered being excreted in the urine, compared with 54% when the drug was given to the fasting patient. The simultaneous administration of acid or alkali exerted no constant effect upon the rate of absorption. However, in all the cases the differences were not great, and considering the large variation between one person and another, it is doubtful whether they are significant. In clinical practice it is presumably much more important to diminish the risk of nausea by administration after the meal than to obtain a problematically more rapid absorption by giving it on an empty stomach. When very rapid absorption is wanted, the sodium salt of sulphadiazine (or sulphathiazole or sulphapyridine) may be given on an empty stomach; in very acute conditions it is better still to inject it intravenously or intramuscularly. Peterson and Finland also offer an interesting observation about the part played by the stomach itself in the absorption of sulphonamides. Some of their subjects received the compounds by tube direct into the duodenum, and in these the absorption of sulphapyridine, sulphathiazole and sulphadiazine (but not of sulphaniamide or of sodium sulphadiazine) was much diminished. This suggests that a considerable portion of the sulphonamide may reach the blood-stream by absorption through the stomach wall.

### MIXED SALIVARY TUMOURS

LITTLE is certain about the so-called mixed salivary tumours except that they are not "mixed" in the sense of being teratoid fibro-epithelial tumours. The modern view is that they are adenoid tumours with a peculiar liability to degeneration both of the parenchyma and stroma; this is supported by recent work<sup>13</sup> on the histochemical differentiation of connective tissue and epithelial mucin, both forms being found in the salivary gland tumours. Harvey, Dawson and Innes<sup>14</sup> would

5. Price, P. B. *J. infect. Dis.* 1938, **63**, 301.

6. Colebrook, L. *Bull. War Med.* 1941, **2**, 73.

7. Now liquor chloroxylenolis (NWF).

8. Graham, J. R. and Wolff, H. G. *Arch. Neurol. Psychiat.* 1938, **39**, 737.

9. Gottlieb, J. S. *Amer. J. med. Sci.* 1942, **204**, 553.

10. Engle, D. E. and Evanson, C. O. *Ibid.*, p. 697.

11. Trowbridge, L. S., von Storch, T. J. C. and Moore, M. *New Engl. J. Med.* 1942, **227**, 699.

12. Peterson, D. L., Finland, M. *Amer. J. med. Sci.* 1942, **204**, 581.

13. Homplmann, L. H. Jun. and Womaock, N. A. *Ann. Surg.* 1942, **116**, 34.

14. Harvey, W. F., Dawson, E. K. and Innes, J. R. S. *Edin. med. J.* 1938, **45**, 275.

prefer to designate all mixed salivary tumours adenomas unless they are malignant. Unfortunately, their malignancy is revealed not to the pathologist but to the surgeon, when he finds recurrences or metastases. Working on submaxillary tumours only, because of the greater ease with which they may be totally extirpated, Dockerty and Mayo<sup>15</sup> come to the conclusion that all the mixed tumours and "cylindromas" should be regarded as adenocarcinomas. Of about 90 of these tumours they found 51 to be adenocarcinomas of the so-called mixed tumour type, 15 cylindromas (that is, chiefly solid or hollow acinar adenocarcinomas) and 7 intermediate in form. They put the cylindromas in a separate category—though one finds all kinds of intermediate forms between the cylindromas and the so-called mixed type—because of their greater malignancy and tendency to metastasise, as well as their predilection for spread along nerve-fibres. They found metastases in only 2 out of 14 regional lymph-nodes examined in the mixed type, but in 4 out of 9 in the cylindroma type. They can give the surgeon no sure guide as to which type he is dealing with at the time of operation, and the history and naked-eye appearances of the growth are not of conclusive help; later, though, when the histology is available, this will give a good indication of the prognosis. They therefore recommend the maximum of "tissue sacrifice" in all cases, including the whole of the submaxillary salivary gland and its regional lymph-nodes. They condemn the practice of "shelling out" these tumours. Their figures giving the result of treatment may not be statistically significant, but they do suggest that recurrence takes place not only in cases where the tumour is of more malignant character but also in those in which tissue sacrifice has been inadequate. The average age of their patients was forty, which is in accordance with other published figures. They support Kennon<sup>16</sup> in saying that patients show a curious pride and affection for their salivary tumours and are loth to be separated from their slowly enlarging companion; for the average duration of symptoms before medical aid was sought was seven years.

#### BACTERIA AND THEIR TOXINS IN FOOD

BACTERIAL food-poisoning may be caused by eating food which contains toxins or living organisms which produce toxin in the intestine or both. Staphylococci and streptococci and possibly proteus and some aerobic spore-bearers may cause the first or toxin type of poisoning; the salmonella and dysentery groups and occasionally *Bacterium paratyphosum B* may produce the second or infection type. The two types can typically be distinguished clinically by the time of incubation—the time between supping and suffering. When a dose of toxin is swallowed symptoms usually follow in 2–4 hours; when contaminated food is eaten 6–14 or even up to 40 hours may elapse before the patient feels ill. But the distinction is not always easy. Pollock<sup>17</sup> describes a small outbreak of food-poisoning caused by *Bact. enteritidis* in which severe symptoms began 3 hours after eating corned-beef hash. In such cases one must suppose either a very heavy contamination or the presence of preformed toxin as well as organisms in the food. From the public-health point of view it is of great importance to distinguish between the two types. In the toxin type danger ends with the destruction of the food; in the infection type those who eat also excrete the infecting organism. In the outbreak mentioned one of three people who handled the hash was found to be excreting *Bact. enteritidis* but gave no history of recent illness. Pollock suggests that the food was contaminated before it was fried in boiling fat and that *Bact. enteritidis* may have survived the frying process. To find if this

was possible corned brisket beef was cut into half-inch cubes, a broth culture of *Bact. enteritidis* was poured over them and they were left for 4 hours at room temperature. The cubes were then fried in fat over a low flame and samples were removed at intervals and cultured. The organism was recovered from the meat after as long as 13 minutes steady frying. In this experiment contamination was intentionally heavy but no attempt was made to inoculate the centre of the cubes and the hash was over- rather than under-done. While it has long been known that some bacterial toxins are highly resistant to heat it has usually been assumed that non-sporing bacteria would be readily killed by most cooking processes. It seems, however, that the frying-pan may be a healthier place for bacteria than we had imagined.

#### BLEEDING PEPTIC ULCER

THE diagnosis of bleeding from a peptic ulcer may not always be easy. On the one hand, a daily loss of blood from an ulcer may be missed in the stool through failure to carry out the simple test for occult blood; on the other, a severe open hæmatemesis may arise from many other causes than a peptic ulcer. Stool examinations must be assessed with care. The benzidine test is so delicate that a faintly positive result is of little significance, and experiment has shown that even the less delicate guaiac test may remain positive for as long as ten days after the swallowing of only 8 ounces of blood. Nor do tarry stools necessarily mean a large hæmorrhage—under half a pint of swallowed blood is enough to produce them—and they may persist for at least five days after one isolated administration of blood by mouth.

These facts, while not lessening the value of tests for the presence of hæmorrhage in peptic-ulcer cases, do emphasise the need for caution in planning therapeutic measures on their results alone. In both the differential diagnosis and the treatment of gastroduodenal hæmorrhage the factors of age and pain are of especial importance. Many severe hæmatemeses are unassociated with any pain, but absence of pain does not by any means exclude an ulcer. The first indication of a chronic peptic ulcer often may be a violent hæmorrhage, while others bleed in a quiescent phase after relatively mild bouts of ulcer symptoms for which they have had little or no special treatment. As a rule, however, painless hæmatemesis comes from some form of superficial gastroduodenitis, with or without visible mucosal erosions or ulcers. Thus of 14 patients who had died after gross painless gastroduodenal hæmorrhage Moschcowitz, Mage and Kugel<sup>1</sup> found at autopsy that only 3 had chronic peptic ulcers. The frequency of hæmorrhagic gastritis, duodenitis and postoperative jejunitis is not yet sufficiently realised; they must be kept in mind when deciding on treatment, and in particular surgical treatment. Kiefer,<sup>2</sup> for instance, reporting on the failures of subtotal resection of the stomach for peptic ulcer, describes 8 cases in which operation for proved duodenal ulcer was followed by recurrent gastro-intestinal bleeding with trivial pain or distress, and in none of these was any jejunal ulcer found. So important do Hinton and Church<sup>3</sup> regard the presence of pain that they seldom if ever recommend operation for massive hæmorrhage in duodenal ulcer where there is no pain.

In prognosis age is the outstanding factor. In a study of deaths after hæmorrhage from peptic ulcer in 120 men and 31 women Blackford and Allen<sup>4</sup> noted only one death in the twenties, one in the thirties, six between 40 and 45, and the remaining 95% at over 45, most being in the fifties. Scherf and his collaborators<sup>5</sup> have re-

15. Dockerty, M. B. and Mayo, C. W. *Surg. Gynec. Obstet.* 1942, 74, 1033.

16. Kennon, R. *Brit. J. Surg.* 1921–22, 9, 76.

17. Pollock, M. R. *Bull. emerg. publ. Hlth Lab. Serv.* January, 1943, p. 2.

1. Moschcowitz, E., Mage, S. and Kugel, V. *Amer. J. med. Sci.* 1941, 202, 48.

2. Kiefer, E. D. *J. Amer. med. Ass.* 1942, 120, 819.

3. Hinton, J. W. and Church, R. E. *Ibid.*, p. 816.

4. Blackford, J. M. and Allen, H. E. *Ibid.*, p. 811.

5. Scherf, D. *Rev. Gastroenterol.* 1941, 8, 343.

corded electrocardiographic changes appearing within a few hours after massive gastric hæmorrhage, and lasting only a few days; these may point to a myocardial contributory cause for the high death-rate in older people. A further one may be the secondary azotæmia which follows hæmatemesis; this is partly dependent on renal function, which is likely to be less efficient in the old. But the difference presumably depends most on the previous health of the eroded vessel, and here age cannot compete. Blackford and Allen found that 77% of fatal hæmorrhages occurred at the first bleeding, and that two-thirds were from gastric and a third from duodenal ulcers. Age must be remembered when comparing the results of different kinds of treatment. Meyer and others<sup>6</sup> report no deaths among 25 patients with severe hæmorrhage under the age of 45 treated medically, as against 8 deaths among 38 older patients similarly treated. Among 17 comparable patients treated by gastric resection, 3 of the 7 older patients and 3 of the 10 younger ones died. The medical treatment consisted of rest, morphia and a short starvation period followed by hourly feeding. Even successful subtotal resection does not always prevent further hæmorrhages, especially in cases of duodenal ulcer; of Kiefer's 173 patients, 6.8% developed a jejunal ulcer after this operation, and a further 4.6% had recurrent hæmorrhages. Walters and Cleveland<sup>7</sup> reported satisfactory results in 87% of 112 patients treated by partial gastrectomy for bleeding ulcer and consider that this operation offers the best prophylaxis against further hæmorrhage. But the operative mortality is not small, and the general success of a modified Meulengracht regime, with the frequent uncertainty about the presence and location of the ulcer, makes the decision to operate in gastro-intestinal hæmorrhage an intensely anxious one. In younger people the risk of death is probably smaller from a bleeding ulcer than from gastric resection, and now that more liberal feeding is the rule there is little doubt which treatment the patient is likely to prefer. Izod Bennett and his colleagues at the Middlesex Hospital,<sup>8</sup> who have made the most determined attack on this problem so far attempted in England, insisted on giving enough fluid to prevent dehydration and enough food to sustain the body during a long period of illness, while avoiding mechanical or chemical irritation.

#### PHYTIC ACID AND CALCIUM ABSORPTION

THE announcement that brown bread interfered with the absorption of calcium was a surprise to many of us. It was a nasty surprise to those who had cherished the conviction that as a food brown bread was in every way superior to white. It is always upsetting to have one's beliefs attacked, but the disturbance is mitigated as a rule if we are given convincing proof of the correctness of the new view and a reasonable explanation for its occurrence. McCance and Widdowson<sup>9</sup> did their best in these respects by saying nothing of what they thought about brown bread till they had made sure of their facts by tests on 8 human subjects over considerable periods. They also showed that the phytic, or inositol hexaphosphoric, acid in brown bread was likely to be the noxious agent, by considering its chemical properties and by demonstrating that its sodium salt did indeed interfere with the absorption of calcium when added to white bread. They sugared their pill for the food reformers by showing that the unpleasant effect of brown bread could easily be avoided by adding a little calcium to the flour. Many might have rested content with this, but McCance and Widdowson set out to obtain final proof by studying the metabolism of human subjects on a brown bread from which they had removed the

phytic acid. As they described it<sup>10</sup> the removal process seems to have been relatively simple, but there are hints of difficulties behind the scenes, as anyone who knows what it is to interfere with a complicated and highly empirical process like bread-making can well believe. Nevertheless, McCance and Widdowson seem to have succeeded not only in making a palatable brown bread which contained no phytic acid but also in making a brown bread from which they had removed most of the phosphates formed by the enzymatic hydrolysis of the acid. They found, as they had no doubt expected and hoped, that when they had removed the phytates and phosphates from brown bread they had removed its capacity to interfere with calcium absorption. Looking back 20 years, it is easy to see now why Mellanby's puppies got such bad rickets on oatmeal and whole wheat, but it was not so obvious then. Many doubted the results and no-one offered the correct explanation until Harrison and Mellanby<sup>11</sup> did so in 1939. McCance and Widdowson have now placed the whole subject of rickets, cereals and calcium metabolism on a reasonable basis.

#### X-RAY DIAGNOSIS OF DISPROPORTION

WITHOUT a high degree of accuracy in measurement attempts to correlate the size of the foetal head and the maternal pelvis with the observed course of labour can have little or no meaning. Credit is due to all those who by stereoscopic and other methods have made and are still making strides towards the solution of this problem. If non-stereoscopic methods are employed correct positioning of the patient is important, as Prof. J. Chassar Moir pointed out to the obstetrical section of the Royal Society of Medicine on Jan. 15. Both the size and shape of the pelvic inlet can now be accurately determined. A corresponding precision has not so far been achieved in cavity and outlet measurement, especially near term, because then it is often difficult even with the most modern apparatus, to get a clear picture in which the tips of the ischial spines and other landmarks may be clearly identified. If the pregnant woman of the future is to have her pelvis measured as a matter of course, and if there is a possibility of the rays being harmful to the early embryo, the second trimester may be the most suitable time for pelvimetry. Cephalometry with its special difficulties will be left to the last few weeks of pregnancy.

Assuming reasonably exact measurements, how may these best be reduced to a form comprehensible at a glance? Two methods are used—one chiefly visual, the other mathematical. In the first, the size and shape of the pelvis and foetal head are drawn and the degree of disproportion estimated or calculated by a comparison of areas or other appropriate measurements; but the method is tedious and complicated where large numbers require examination. Nicholson<sup>12</sup> illustrates the second method when he calculates the value of "area of head multiplied by 100% divided by area of pelvis" for each pelvic level. Since he has previously shown<sup>13</sup> that the pelvic area as calculated (on the assumption that the pelvic shape is an ellipse with the anteroposterior diameter and the transverse diameter the two axes) is a good approximation to the true area, his area ratio is easily obtained.<sup>14</sup> Provided the pelvis is not asymmetrical or grossly distorted by accident or disease this method holds forth great promise. During labour in a rickety flat pelvis the migration of the head to one side of the pelvis leaves the other side partially unused, and under such conditions adjustments in the calculations of the available area may be required. As a basis for calculation the head area may be taken as a circle

6. Meyer, J., Sorter, H. K. and Necheles, H. J. *Amer. med. Ass.* 1942, 120, 813.  
7. Walters, W. and Cleveland, W. H. *Ann. Surg.* 1941, 114, 481.  
8. Bennett, T. I., Dow, J. and Wright, S. *Lancet*, 1942, 1, 551.  
9. McCance, R. A. and Widdowson, E. M. *J. Physiol.* 1942, 101, 44.

10. *Ibid.* 1942, 101, 304.

11. Harrison, D. C. and Mellanby, E. *Biochem. J.* 1939, 33, 1660.

12. Nicholson, C. *Biométrica*, 1941, 32, 16.

13. *J. Obstet. Gynec.* 1938, 45, 950.

14. Area of circle =  $\pi r^2$ . Area of ellipse =  $\pi ab$  when 2a and 2b are the two axes.

with either the biparietal or suboccipitobregmatic as diameter. Particular difficulties have to be faced in any attempt to reduce the outlet measurements to a simple form. Whereas the area of so-called "least pelvic dimensions" may be obtained with fair accuracy from the anteroposterior diameter of the outlet and the bispinous diameter, the available space below this, which may be independently contracted, depends on such variables as the pubic angle, the length and inclination of the pubic rami and the posterior sagittal diameter; from these measurements it is not clear how best the available space may be deduced. Fortunately contraction of the outlet with no corresponding narrowing of the "plane of least dimensions" seems to be rare.

If radiology shows apparent disproportion to what extent should the treatment of the particular case be modified? Until unequivocal statistical evidence is available the answer to this problem must depend largely on the individual, but no radiologist should express an opinion about the outcome of a case until he has accumulated clear evidence that his prognoses will be reliable; he should rather confine his report to statements of measurement, and leave their interpretation and application to the obstetrician. Until a better method is devised the head-pelvic relationship as expressed by Nicholson's areas ratio might be a suitable basis for such reports.

The outcome of any labour depends on many factors, and this, some critics consider, detracts from the value of information obtained by radiology. But pelvimetry and cephalometry can never claim to be more than a method by which the proportion between the foetal head and maternal pelvis is recorded with a precision many times greater than is possible by clinical methods. In the management of labour, exact knowledge of head-pelvic relationship has the same value as precise information about the extent of injury in the management of a fracture.

#### SURGICAL TREATMENT OF MUMPS ORCHITIS

THE oedema of the testicle associated with the severer types of orchitis may be extremely painful, and followed by atrophy of the organ. Wesselhoeft and Vose<sup>1</sup> believe that in orchitis associated with mumps relief of tension by incision of the tunica albuginea is the best method of saving the testicle and of cutting short the pain. They reserve operation for severe cases, and regard an enlarged, tender testicle, with general symptoms of chill and fever as the indications for surgery. Orchitis, pancreatitis, or encephalitis may precede any manifestation of mumps in the salivary glands which may sometimes escape altogether. Wesselhoeft and Vose find orchitis to be rare before the age of puberty; at and after puberty they assess the incidence at 18%. The onset of the orchitis may be rapid with high fever, rigors, nausea and vomiting, and even with delirium. Under epidemic conditions both testicles are likely to be affected in 1 out of 6 cases. In the follow-up of 347 cases atrophy was found in 190 (54.7%). In unilateral cases, the remaining testicle serves for procreation, but in bilateral disease, even though atrophy may not be associated with damage to all the tubules, the numbers of spermatozoa may be much reduced, and chances of procreation considerably diminished.

General rather than local anaesthesia is recommended for the operation, because the testicle is so acutely tender that handling causes pain. Nitrous oxide and oxygen has proved more satisfactory for these cases than 'Pentothal Sodium.' An incision is made in the scrotum, which is likely to be oedematous; a spurt of hydrocele fluid appears; the incision is enlarged with scissors to 3 cm., and the tunica albuginea, which may

be studded with small petechiae, is incised longitudinally for 1.5 cm. Another incision may be made at right angles to the first, but beside rather than across it. The greater the tension the less the bleeding. The scrotal incision is closed round a small rubber drain. A rapid fall in temperature and prompt relief of pain are to be expected after operation.

#### PHOSPHORUS BURNS

REVISED EMS instructions on the treatment of phosphorus burns appear on p. 214. The essentials are (1) soaking in water, (2) washing with soda, (3) swabbing with 1% copper sulphate, (4) removal of all particles thus revealed, and (5) soaking in soda. Obermer, on p. 202, emphasises the danger of these burns, and proposes immediate application of a mixture of alkali solution and 2% copper solution, with rubbing or scraping to remove affected skin. Unfortunately it is doubtful how far aqueous solutions of copper sulphate can be relied on to inactivate phosphorus in actual practice. Goldblatt and Oakeshott<sup>1</sup> think that, with solid phosphorus, inactivation would be "nothing like complete" in the circumstances in which these solutions would be used. They point out that when phosphorus is in a form that does not readily mix with water, inactivation can be expected only at the interfaces of the two liquid phases; and still less effect is likely when the phosphorus has been dissolved in rubber or other solvents to make a viscous incendiary mass. Godding and Notton<sup>2</sup> produced a copper sulphate, glycerol and starch mixture to meet this difficulty, but glycerol is scarce, and Goldblatt and Oakeshott bring forward an alternative formula which they consider preferable. As phosphorus is not easily wetted by water they use copper in an oil-soluble form, and their mixture dissolves rubber. It consists of copper oleate, trichlorethylene, Turkey-red oil and surgical spirit, and they believe it to be the best means yet discovered for inactivating phosphorus on the skin. It is applied as soon as burning has been stopped.

An extra session of the General Medical Council will open on Wednesday, Feb. 17, at 10.30 AM.

In his article on medical relief in Europe, published in our last issue, Dr. Melville Mackenzie said that the number of people in Europe who are urgently in need of more food is estimated at 100 million (not 200 million as printed). We are glad to know that Poland is represented on the medical advisory committee by Dr. W. J. Babecki, whose name was inadvertently omitted from the list of members.

1. Goldblatt, M. W. and Oakeshott, S. H. *Brit. med. J.* Jan. 30, p. 128.  
2. Godding, E. W. and Notton, H. E. F. *Ibid.*, 1942, 1, 433.

ROYAL SOCIETY OF MEDICINE.—The section of comparative medicine will meet at 2.30 PM on Feb. 17, when Dr. Gregory Kayne and Mr. R. E. Glover, FRCVS, will open a discussion on immunity to tuberculosis. Cases will be shown at the meeting of the section of dermatology at 2 PM on Feb. 18. At 4.30 PM on the same day there will be a discussion at the section of neurology on encephalomyelitis and allied conditions when Dr. W. Russell Brain, Dr. J. G. Greenfield and Dr. Dorothy Russell will be the opening speakers. On Feb. 19, at 3.30 PM, there will be a joint meeting of the section of obstetrics and gynaecology with the Medico-Legal Society. Judge Earengy, Mr. Eardley Holland, Dr. Letitia Fairfield, Mr. Aleck Bourne and Dr. Robert Forbes will open a discussion on medicolegal pitfalls in obstetrics and gynaecology excluding abortion. On Feb. 20, the section of physical medicine will meet at the Royal Westminster Ophthalmic Hospital, Broad Street, W.C.1. At 11 AM Mr. Montague Hine, Dr. Philippe Bauwens and Mr. Gerald Penman will open a discussion on physical methods in ophthalmology, including orthoptics. In the afternoon Dr. Nellie Lankenau will speak on the rehabilitation of the patient with eye disease.

1. Wesselhoeft, C. and Vose, S. N. *New Engl. Med.* 1942, 227, 277.

## Special Articles

## MEDICINE AND MEANING\*

R. A. J. ASHER, M.B. LOND, M.R.C.P.

ASSISTANT MEDICAL OFFICER TO THE WEST MIDDLESEX HOSPITAL

MAN is superior to the higher apes not only in opposing his thumbs but in the using of symbols, mostly spoken or written words, to convey his meaning. But the power of words has increased till they have become tyrants interfering with the transmission of ideas and of knowledge. Words, like instruments, when used correctly have power for the advancement of science, but when used clumsily and without attention they result in inaccurate work and their own precision and sharpness become blunted. It is worth examining our ability to wield them, but this is no appeal for accuracy of derivation of words, for fine English or for the well-turned phrase; I only wish to criticise methods of expression in so far as they lack clarity, or even meaning.

## THE MEDICAL PROFESSION

The medical vocabulary has arisen more or less haphazard. Doctors, like the White Knight,<sup>1</sup> have always felt that once anything is labelled more is known about it; and if a thing is already labelled that does not deter them from applying another label. As a result of this process when one doctor wishes to inform another what abnormal sounds can be heard in a chest he has the choice of a rich assortment of adjectives:

A r le.—Clicking, consonating, crackling, crepitant, creaking, subcrepitant, guttural, gurgling, indur, redux, mucous, metallic, r le de retour, Skoda's r le, and so on.

There are more than twice that number listed in the medical dictionary and types of rhonchus and crepitation are equally abundant. What chance have we of conveying to each other an accurate impression of sounds heard if we have this ill-defined superfluity of words?

Then, poorly chosen words cause confusion and unnecessary drudgery for the student and the nurse. A housewife labelling her jam will write strawberry, cherry, marmalade and the like upon her labels. If a doctor suggested she should label the pots X, Y and Z and learn that X stood for marmalade she would laugh him to scorn. Yet doctors naming the scurvy vitamin, the rickets vitamin, the pellagra vitamin and suchlike called them by letters of the alphabet. I have been asked in an elementary examination at the end of a viva "What is the vitamin preventing scurvy?" and pleased the examiner by promptly replying "Vitamin C." He then demanded "And what is vitamin C?" Whereupon I told him "ascorbic acid" and passed my viva. Yet all I had done was to say that the substance preventing scurvy was a substance preventing scurvy which was known to be a scurvy-preventing acid. When we name a medical entity we could choose a word which aptly describes it and does not have to be learned like a code. When the bone is shattered the surgeon calls the condition a comminuted fracture. How delightful it would be if he called it a shatter fracture. Red Cross nurses ask "What is a comminuted fracture?" and when they know that it is a fracture with the bone shattered they feel they have learned something; yet one knows nothing more about a cat from knowing it is a pussy: an additional name does not mean additional knowledge.

Examples of the confusion caused by ill-chosen words are common. One would suppose, for example, that a vaccine had something to do with vaccination. To use the word to describe a solution of dead germs is calcu-

lated to deceive the beginner, and words of this kind are a godsend to examiners. Optic neuritis is commonly used as synonymous with papilloedema, and thus puzzles many students. It sounds as if retrobulbar neuritis and papillitis were component parts of optic neuritis, but this is not so. Even the word retrobulbar neuritis is far from ideal. Why the eye, when mentioned in connexion with neuritis, is called the bulb I do not know. Normally one talks of the globe or the eyeball. The word bulb suggests the medulla. We have already four bulbs in the body and need no more. Again, any medical word or symbol should have a meaning as self-evident as possible. It is no longer justifiable (except in the case of words used to spare the patient like neoplasm, autopsy or Neisserian infection) to use symbols of unnecessary obscurity or length. Even the use of Roman figures is an anachronism too long tolerated: Roman figures should be reserved for the numbering of the psalms and not for recording the quantity of urine passed. Then there is the aperient drug agar: some people with plenty of time to spare insist on calling it agar-agar. In this time of economy we could manage with one less agar.

Advances in knowledge are going to make new words necessary, but they should also disencumber us from many redundant words. For example, it is generally believed that a young red blood-cell may appear to be bluish, netted or spotted according to the way it is stained. Surely then the terrifying words polychromasia, reticulocytosis and punctate basophilia by which we call these fledglings could be scrapped in exchange for some simple expression like young cell. Again there is some hope that uveoparotid tuberculosis, lupus pernio, pseudotuberculosis and that jaw-breaking expression osteitis tuberculosa multiplex cystoides of Jungling will all by reason of our increased knowledge become known as sarcoidosis of chest, skin and phalanges.

Such rationalisations of language do not merely represent a saving of words but by giving a true account of what is known make knowledge more easily assimilable. It is nothing but a hindrance to understanding that a certain disease affecting the cranial nuclei, the anterior horn cells or the pyramidal fibres should be called, according to its situation, progressive bulbar palsy, progressive muscular atrophy or amyotrophic lateral sclerosis. We do not give a different name to infantile paralysis depending on whether it affects the tongue or the arm or the leg.

Different observers often use the same word for different entities, especially in haematology. Disagreements as to whether a megaloblast is or is not an abnormal cell would be simplified if both sides knew what cell they were discussing. Let us imagine a child found wandering in the street is adopted by three priests who each christen him separately by the names of Tom, Dick and Harry. One day they meet another three priests who have behaved in a similar fashion with another child whom they have christened Harry, Dick and Tom. Now if those six priests try and have a discussion on the qualities of the two children—whether, for instance, Tom is cleverer than Harry—they are likely to become angry and to settle nothing; and they will probably go home and introduce new words such as protomocyte, pseudodickoblast and megaharryophil. What must be done is to say "Here is a cell, do let us agree what to call it." This agreement should be universal and binding and, if possible, international. Doctors calling a cell names that they have no right to use should be prosecuted for using bad language; the worse crime of publishing wrong names should be dealt with like the publication of obscene literature.

## THE MERCHANT AND THE LAYMAN

Names outnumber substances in commercial medicine to an alarming degree. Consider the sulphonamides. Most of us confine ourselves mainly to four different kinds of these chemical pills: those that make one blue; more powerful ones that make one sick; still more powerful ones that do not make one sick or blue but are much harder to get; and finally those that stay longer inside our guts. These correctly are called sulphanilamide, sulphapyridine, sulphadiazine and sulphaguanidine. Yet the apparent number of sulphonamides grows to alarming proportions<sup>2</sup>; hundreds of them are the same

2. Ardley, D. G. *Lancet*, 1941 ii, 625.

\* Abstract of an address read to the Middlesex County Medical Society on Nov. 23, 1942.

1. "You are sad," the knight said in an anxious tone. "Let me sing you a song to comfort you. . . . The name of the song is called 'Haddock's Eyes.'" "Oh that's the name of the song is it," Alice said, trying to feel interested. "No, you don't understand," the Knight said looking a little vexed. "That's what the name is called. The name really is: 'The Aged Aged Man.'" "Then I ought to have said 'That's what the song is called'?" Alice corrected herself. "No, you oughtn't: that's quite another thing! The song is called: 'Ways and Means': but that's only what it's called you know." "Well what is the song then?" said Alice, who was by this time completely bewildered. "I was coming to that," the Knight said; "The song really is 'A-sitting On a Gate', and the tune's my own invention."—Lewis Carroll "Through the Looking Glass," Chapter viii.

substances with different names, others are sulph-anilamide with a purely decorative chemical group tacked on to the amino side—which gives an excuse for another name. To some doctors and nurses the whole lot are known loosely as "M & B"; so that when a nurse gives a patient a wrong sulphonamide there is every excuse. For sulphanilamide alone there are forty-two different names. For doctors, nurses and dispensers this is a dangerous source of confusion, and many other drugs have as large a variety of names. Consequences may be serious; I have known a doctor scour the hospital for intramuscular 'Luminal' for a status epilepticus, while all around him 'Gardenal' abounded.

From this Tower of Babel it is essential that we soon climb down. Each drug should have one short correct chemical name and no other. If standards of different firms vary we may allow sulphanilamide Smith, sulphanilamide Jones and sulphanilamide Robinson but never 'Prostreptorubrocidosal 221 B' though manufacturers may clamour for it.

Some of the less reputable firms have fed the innocent lay public on ridiculous and incorrect words and so fostered in them an absurd idea of their insides. The layman in his use of medical words is at heart a good deal sounder than the doctor; he has fewer words to choose from. Admittedly he says stomach when he means belly and chronic when he means acute but being constant in the misuse of these words his meaning is usually clear unless he has been corrupted by much reading of advertisements. By reading of the system and of impurities in the system he imagines his inside as something like a large tank. Often he reads about the system being clogged with waste matter, impurities, and sour acids which necessitate the said system being toned, cleansed and flushed with so-and-so's pills. Indeed "system," as used in the lay sense, appears to be derived from the word cistern.

Another burden to the layman is the lack of words caused by prudishness. Though acquainted with congestion and pleurisy, which are meaningless to him, he has no words for anus, penis and other parts of the body except those belonging to the smoking-room or the works of Chaucer. He needs access to words which are neither too esoteric nor too coarse.

#### EMOTIONAL TONE IN WORDS

We use some words with more emotional meaning than precision,<sup>3</sup> and these are a source of unfruitful conflict in medicopolitical discussions. A recent letter in the medical press asked this question: "Whom would you prefer to treat you—the family doctor, whom you know and trust, or a salaried, whole-time state official?" Perhaps you can guess whether the writer of this letter favoured state medicine or not. The second type of doctor sounds profoundly unattractive owing to the emotional associations called up by the words; described as a doctor whose attitude to patients depends entirely on illness rather than income he would appear in a more favourable light. In science and in scientific discussion emotional terms have no place. The poet may say that the fiery blood of Vikings runs in somebody's veins but the doctor concerns himself with the Wassermann reaction.

### MEDICINE AND THE LAW

#### The Ritual of Food Sampling

IN proceedings under a penal statute the defence may succeed by taking points of which the merit is inconspicuous. As a recent case under the Food and Drugs Act shows, the merest technicality may suffice. It is an offence under the act to sell to the prejudice of the purchaser an article not of the nature, substance and quality demanded. Certain arrangements for sampling and analysis are prescribed. On buying the sample, the purchaser must inform the seller that he intends to have it analysed by the public analyst, and he must then and there divide it into three parts which he must mark and seal or fasten up. If required, he must give one part to the seller; he sends another to the analyst and he keeps the third himself for purposes of future comparison. In *British Fermentation Products Ltd. v. Teal*, which came before the Divisional Court last month, Mr. Teal, the local authority's inspector, had bought

from a grocer a substance called egg substitute powder. Having told the grocer that it was bought for analysis, he duly divided the sample into three parts. Deciding upon a prosecution, he opened the part of the sample which he had himself retained, divided it into two and sent one of these subdivided parts to the manufacturers of the powder as the persons primarily responsible for the composition of the article. The act allows the manufacturers to be prosecuted as well as the retailer. Proceedings were taken against the manufacturers. Mr. Teal had, however, not been strict enough in his compliance with the statute, even though his action in subdividing the sample was fair and reasonable enough. Section 80 (4) of the act stipulates that, in proceedings under the statute where a sample has had to be divided into parts, the part of the sample retained by the person who procured it must be produced at the hearing. The manufacturers took the preliminary point that section 80 (4) had not been obeyed; only half of the prescribed part of the sample had been produced. The magistrates thought that the manufacturers had not been prejudiced by what had happened and convicted them. The High Court says the magistrates were wrong. The statute, a penal one, lays down conditions of sampling and analysis in the interests of prospective defendants. The requirements of the section must be strictly obeyed; the non-compliance must vitiate the conviction.

The decision follows previous authority. Among other points it has been held that the sample, when produced in court, need not be in a state capable of analysis. In a Scottish case the marking of a wrong date on the sample was declared not to matter. The article need not be sealed up so as to be air-tight. On the requirement that it be divided into three parts, it has been decided that to sell sardines in oil is the sale of one article and not two; it is therefore unnecessary for the seller to be given a separate part of the oil as well as of the sardines. An inspector who bought four packets of cream tartar and, after mixing the contents, divided the mixture into three parts, was held to have complied with the section. But a purchaser of six bottles of camphorated oil who put two bottles into each of three bags and sealed up the bags was held not to have made a proper division under the statute. Each bottle was a separate article. Such are the niceties of a penal law.

### TREATMENT OF PHOSPHORUS BURNS

THE following revised instruction has been issued by the Emergency Medical Service (Ministry of Health):—

#### AT THE INCIDENT

- (i) Apply water immediately to the affected part, to extinguish any burning phosphorus and to keep the area moist (water from the water-bottle may be used for this purpose).
- (ii) Apply a clean mines dressing, or clean lint, or clean cloth, soaked in water over the burn. Whatever dressing is used it must be kept wet, as otherwise it may burst into flame.
- (iii) With the wet dressing in place, the casualty, if a sitting case or able to walk, should be conveyed or directed at once to the nearest first-aid post or hospital for further treatment.
- (iv) Stretcher cases must be sent direct to a hospital with the least possible delay. To ensure immediate attention at the hospital, these casualties must be labelled, and the label marked with a P. The attention of the ambulance attendant must be drawn to the case.

#### AT THE FIRST-AID POST OR HOSPITAL

- (i) Immerse the affected part in water, or, if sufficient water is not available, apply a mines dressing soaked in water. Keep the dressing wet until the following treatment can be applied.
- (ii) Thoroughly flood and wash the affected area with bicarbonate of soda solution (roughly two table-spoonsful of the powder to a pint of cold tap water). Pick off with forceps any obvious particles of phosphorus, disclosed by examination in the dark (phosphorescence).
- (iii) Swab the affected area with a 1 per cent. solution of copper sulphate, which will coat any remaining phosphorus particles with a dark deposit of copper phosphide. Remove, with forceps or gauze, as much of this as is possible without damaging the tissues.
- (iv) Immerse the affected area in the bicarbonate of soda solution for a prolonged period. The duration of this soaking depends upon the size and depth of the burn—i.e., small burns  $\frac{1}{2}$  hour, large burns 1 to 2 hours. If immersion is



impossible, keep the sterile dressing repeatedly wetted with the bicarbonate solution.

(v) Finally, re-examine the burn in the dark for phosphorescence. If this is not present, dress as for an ordinary burn. If there is still any doubt about the presence of phosphorus, dress the burn four-hourly with lint soaked in sodium bicarbonate solution (2 tablespoonsful to the pint of water) and retain the patient (if at a first-aid post).

The instruction adds that no oils or greasy dressings and no tannic acid, triple dye or brilliant green must be used in the treatment of phosphorus burns so long as any trace of phosphorus remains in the tissues: oils and greases are solvents of phosphorus and their use while it is present will cause risk of poisoning from absorption.

## In England Now

### A Running Commentary by Peripatetic Correspondents

PATIENTS, speaking generally, are responding well to the exhortation to help their doctor by not making "frivolous or vexatious" (lovely words!) demands upon his services. The number of hysterical night-calls inspired by unreasoning panic has certainly decreased, and in cases of sudden illness relatives are more ready than hitherto to ring up and ask advice coupling this with a request for a visit either tomorrow or even "when the doctor happens to be passing this way." All this is good and sensible and has not, in my experience, led to any alarming increase in the death-rate. There is, of course, the other side of the picture. On his now rarer routine visits to outlying villages the country doctor may sometimes begin to wonder whether he is ever going to see his home and loved ones again, for he finds himself passed firmly from cottage to cottage like a rugger ball in the hands of a competent three-quarter line. Moreover, in every house he visits he usually finds more than one patient awaiting him. The old order "come at once" has changed and given place to the new: "now you're here, Doctor, perhaps you'll see"—John's toe, Mary's eye and Bill's throat, providing all the necessary (some think) certificates "and a note for the chemist so that we can get some more glucose for the baby."

Can the presence or absence of any special sense of humour be taken as evidence of mental capacity or mental defect? This problem has been exercising me for some little time to a disturbing degree. If a man presently accounted sane finds himself unable to appreciate or even to understand jokes which convulse a large section of the population, is he to deduce there is something wrong with him, or can it be that the majority are deficient? Let me start at the beginning. About Christmas time I spent some days' leave with some distant relatives who are radio fans. I have never listened to the radio (except the news) for a variety of reasons now irrelevant, and so it was all quite fresh to me. Just before one particular broadcast all the family gathered round the radio with every evidence of pleasant anticipation. "You will like this," they said; "it is one of the most popular programmes on the air. This is the funniest thing you ever heard." I was prepared to enjoy myself. But I listened with ever-growing surprise and puzzlement. The whole thing was completely devoid of meaning. I could find no significance in any of it, yet the family laughed, and heartily at that. Now the point is that I was not failing to see the joke from any inherent lack of a sense of humour, for I can enjoy a joke with any man. Mr. Will Fyffe, Mr. Arthur Riscoe, Mr. Bob Hope and Messrs. Abbotts and Costello can roll me in the aisles at any time. But this stuff which came out of the loudspeaker was incomprehensible, for though the words often appeared to make sentences (though not always) the sentences had no meaning in themselves, nor were they connected with those in front or behind. At one point I asked my laughing friends what was the joke and what was its meaning. "But it doesn't mean anything, that's why it's so funny," was the reply. So I thought further investigation on these lines would be profitless and continued to listen. Then a sense of familiarity began to be felt; I had heard something like this before and with an effort recalled a brief stay as a locum in a mental hospital where a most engaging maniac used to talk to me earnestly and at great length something

along the following lines. "And so we came to the North Sea, and there was the green pencil. We boxed the compass NNE, NNW, and due south to the green pencil. And the North Sea and the waves and the green pencil and the compass in its box and out its box and so we came to the shore." The motifs recurred. Now the only difference detected in this programme was that there were more people talking and there were more motifs, otherwise the resemblance was very close. I then investigated the matter among other friends and discovered that, while they did not particularly care for the special programme, they could assure me that it was indeed one of the most popular among the public. One medical colleague I asked about this looked at me curiously, then heaved a sigh of relief, saying, "Thank God you feel that way too. Honestly I have had some doubts about my own sanity lately when so many patients said that they found this funny. To me it is incomprehensible. I am not sure what it all means, but whatever the significance of this popularity is, I am sure it is very sinister." It is to be hoped that this conclusion is at least exaggerated, though I have an uncomfortable feeling that there is something in it. We have heard lately of certain increases in social pathology. There are more women in jail today than before the war; juvenile delinquency is alleged to be increasing; petty pilfering from railways, hotels and the like is commoner. There has been a rise in the VD figures (yet I am convinced that sex morality in this war is better than it was in the last). Now I am trying my best not to exaggerate, but I cannot help concluding that there is something wrong with the mental make-up of people who find such a type of humour as I have described uproariously funny. If I am wrong, then it follows that I must have hitherto unsuspected psychological defect—a conclusion which I am naturally loth to accept. A Latin tag from the distant past recalls itself, *Stulti ridunt quod ignotum est*. This ought to be applicable, but unfortunately I cannot make up my mind whether it is the radio public or I to whom the matter is *ignotum*.

When schoolmaams teach that certain words stand for certain realities, that diagrams and formulae represent structure or action, they ought to remember that many of the poor children, although they will grow up in other ways, will always carry in their minds these symbols and skeletons as the whole and living truth. Of such are they, who while the governments were planning an uppercut on the Axis, clamoured for a second front. It is wrong to call them "Fireside Fusiliers"—there is no lethargy about them—they are myopes of the mind's eye with an exuberantly healthy sense of their own importance, who, because they see a diagram so exclusively, must show it to others and make converts. At the moment they are well squashed by events, but they'll bob up again, almost cyclically, for the urge behind them is emotional, not intellectual. Possibly the others who cannot simplify at all are more to be feared—those who are so appalled by the thickets and the trees that they cannot make a map of the wood. Of such were the tetrarchs of the thirties.

Some years ago I went to a prize-giving at a prep school and was nauseated to see a smarmy little beast come up and get a prize for "the most popular boy." That lad for life will come to the call of the mob and his mind will be the lowest common denominator. The great way to character and independent thinking is by hardship, injustice and ostracism, and with good reason do some native tribes initiate the adolescent by turning him out into the wilderness to fend for himself. The Conservative party have done great service in training our PM by ejecting him from office in the last war and keeping him in exile for a decade before this. It would be nice to pay tribute to the PM's magnanimity towards them now, but that isn't the right word. Marlborough always tried to keep in friendly touch with his opponents and enemies and not let matters get beyond reconciliation point. Conceivably they might come in useful.

Why can't we learn a little about the common animal diseases, instead of learning about the anatomy of the frog and the dogfish? Every doctor gets asked for advice about cats, dogs, sheep, and the like; besides some of the surgical procedures are fascinating and quite easy. *Far from the Madding Crowd* gives a fine

description of tapping the air from the stomachs of sheep which have "blasted themselves" by eating young clover. Thomas Oak who did it, used a "holler pipe with a sharp pricker inside," and used it "with a dexterity that would have graced a hospital surgeon." Apparently this procedure is still used for blown sheep. I was recently talking to a farmer who told me all about it. The condition is easily diagnosed, the patients lie on the ground extremely dyspnoeic, visibly distended and in great pain. Cows are affected as commonly as sheep; in them the distended stomach is seen through the hide. An enormous trocar and cannula is used, being thrust straight into the stomach, a rush of air and green slime greets the withdrawal of the trocar. Medical treatment, he told me, consists of driving the patients up a hill until they bring up the wind, but if they start going downhill "the wind lifts the heart" and they collapse.

\* \* \*

Tonight's talk after the news will be given by a young house-surgeon who has just returned from a particularly hazardous reconnaissance of the lower abdomen.

Well it was at 8 o'clock that the chief called me and Jackson into operational headquarters and gave us our orders. We were to attack low down in the right abdomen where a number of enemy bacilli were thought to be holding a strong position in the appendix. We had reason to believe the target was strongly defended; increasing numbers of leucocytes had been detected moving along the arterial roads in the target area, and it was probable that the enemy had sent up at least two divisions of omentum to surround the objective. I admit I was a little nervous as I donned my kit, and saw my companion getting the oxygen apparatus ready. Though I had experienced one or two dust-ups with sebaceous cysts and paronychias, this was my first flight over enemy occupied peritoneum. I was due to make my attack at 9 o'clock. Jackson was scheduled to start five minutes earlier with a gas attack designed to wipe out all resistance from the surrounding muscle divisions. Here the first difficulty was encountered, the enemy had two gas-proof curtains which he shut together immediately he detected the gas. Consequently when I reached the target area the muscle divisions were putting up such enormous resistance that I could not attack. I hovered over the objective waiting for things to quiet down a bit, when I heard Jackson's voice. "Mind out! There's some nasty stuff coming up from below." I had hardly time to shield my face when up came a burst of flak, . . . mostly steak and flaming onions. I heard Jackson's voice. "Are you hit?" "I'm all right, what about you?" Jackson had got hit fairly badly in one eye, but most of the stuff had gone over his gas apparatus. However he carried on gamely, and ten minutes later I was able to start. After several trial incisions I penetrated the outer defences. I pressed home the attack and found that the objective had already been blown up by enemy bacilli, and that the target area was obscured by free fluid: we would have had to bale out if it hadn't been for the vacuum flask that was part of our outfit. I completed the attack as best I could, and had the satisfaction of dropping a big sulphanilamide bomb right in the middle of the wreckage before we finally packed up. The whole thing was just a straightforward operational fight, just part of the day's work, and I'm sure anyone else would have behaved as I did in the circumstances.

\* \* \*

Fred's a gude varmer, no doubt 'bout that. Roughish chap, mind you. Doan waste a lot o' time wi' the razor—nor wi' soap and water, come to that. Works 'ard five and 'arf days ivvery week, but likes to drink 'isself priddy nigh mazed Saturdays and Sundays. (You oughter yur 'is missis crackin' orf 'bout un and 'is vile ways!). Wull, when us come to ring the bells for the victory in Egypt, wot wi' 'arf the ringers called up and the rest out o' practice, Vicar weren't too plazed wi' the re-sult, so, come Christmas, 'e calls vor volunteers to reinforce the ringers and Fred sez 'e'll come for wan—though not much of a churchgoin' chap, mind you. Sure 'nough, Fred turns up Christmas mornin', veelin' not too vitty arter the night before, wi'out 'is collar'n tie, kep on zide of 'is 'ade, chin all vuzzy and wearin' 'is old rubber boots as per usual. Een 'e goes into the belfry along wi' t'others and starts to pull away for dear life. But trouble was 'e keeps forgettin' to let go the rope arter pullin' so 'e spends 'arf 'is time danglin' in mid-air with 'is rubber boots kickin' t'others on the yurs and all swearin' and blastin' something turrible. Proper ole caper 'twas I can tell 'ee!

## Parliament

### ON THE FLOOR OF THE HOUSE

MEDICUS MP

Sir KINGSLEY WOOD has drawn for us the shape of things to come. In answer to a motion of Lord Winterton asking for the direction of economic and financial policy for the increase and development of "employment, industry and trade" after the war, the Government have outlined what will need to be done. To some the prospect may be a bleak one, to others stimulating, for it is a call to hard work and endeavour. But to all it is an indication that in the opinion of His Majesty's advisers, as the old phrase has it, the time has come to look beyond the time of conflict to the period of building for normal living. Sir Kingsley outlined what will be the foundation of our social, political and economic life, and it is a foundation intended to bear the weight of a great superstructure of civilised living. Lord Winterton asked only for "a rough ground plan" and stressed the tremendous losses we have suffered in foreign investments, the need for international co-operation with the USSR, China and the United States as equal partners. Sir Kingsley gave fuller measure. Our basic objective, he said, must be to secure "active employment" for all the people of this country. There will be a shortage of all kinds of goods for civilian requirements—and emphasis was laid on the need for more houses. It is significant that the Minister of Health has just announced a plan for building 3000 cottages for farm-workers because the need is so urgent. Sir Kingsley also spoke of progressively raising our standard of living, of giving priority to export trade, of paying "more attention to training and scientific research" and of advances in industry such as the chemistry of oil, the development of plastics, the use of light alloys and the processing of foodstuffs. The House is soon to have the opportunity of discussing the Beveridge report, in a debate which may extend over three days, and the Chancellor's economic foundation for the future is one on which the proposals of the Beveridge report can be erected.

Sir Kingsley also spoke of our contribution to the armed forces which will be necessary after the war for international security to prevent a repetition of evil and aggression. "Victory in Peace" will have to be achieved by the United Nations remaining together as strongly and firmly as in war. Mr. Pethick Lawrence speaking for the Labour Party did not disagree with the Chancellor but laid more stress on the social side of the Government pronouncement. Sir Kingsley had spoken of the continuance of controls and war planning. Mr. Pethick Lawrence pointed out that in war we have set up a basic nutrition policy which we cannot abandon.

There is indeed a large measure of agreement on all sides of the House. Conservatives have modified their conservatism, Liberals have abandoned their old laissez-faire attitude and advocate forms of economic planning which would have given Mr. Asquith a bad turn, and Labour has turned towards co-operation rather than conflict. During the last few months there has been a spate of plans for the postwar world. The ICI and others have weighed in and Mr. Pethick Lawrence quoted from one put forward by Lever Brothers in which it is urged that it is "incumbent on politicians to safeguard economic policy from those influences that will make it haphazard or failing in international spirit."

More than ever before are the citizens of this country expressing their views on what should be done. In medicine we have now a list of projects and the Ministry of Health has been giving careful attention and sustained study to what is generally accepted as the most important social service. Everywhere in the House it is assumed that some form of socialised medicine will emerge from the present discussion. The next few months are likely to give opportunities for debates on a series of social proposals of great interest—perhaps including a statement on the medical services. And it becomes abundantly clear that there will be more calls on the medical profession in peace than in war. It may perhaps be necessary to ask those doctors who have retired from practice to come back for the time being to relieve younger men for more arduous duties.

## QUESTION TIME

## Maternity Beds in London

Dr. E. SUMMERSKILL asked the Minister of Health whether he could now state what action was being taken to increase the hospital accommodation for maternity cases in London.—Mr. E. BROWN replied: During 1942 the maternity beds in the LCC hospitals were increased by approximately 220, bringing the total number to approximately 627. During the same period the maternity beds in the voluntary hospitals in the County of London were increased by 165, bringing the total number to approximately 515. These are in addition to the 2700 beds in emergency maternity homes in reception areas and the houses in the country to which many London homes have been removed. Both the LCC and the voluntary hospitals hope to provide more maternity beds in the near future if staff can be found.

Mr. W. W. ASTOR: Is the Minister aware that many expectant mothers are now being sent to country hospitals to have their babies and are not being given their fares back? Will he remedy that situation?

Mr. BROWN: I have already considered the position.—Mr. E. WALKDEN: What positive action is the Minister taking to provide the necessary staff for these maternity wards? Is he aware that hospitals in the County of London area cannot even get the staff to satisfy their needs, and that some wards remain closed because of that problem?—Mr. BROWN: The action is a continuing process.—Dr. SUMMERSKILL: Will the Minister remember that maternity is also a continuing process?

## Shortage of Midwives

Sir FRANCIS FREMANTLE asked the Minister of Labour if, in view of the grave shortage of practising midwives and the serious consequences likely to arise, he would take steps to direct qualified midwives, not at present acting as such, into midwifery practice during the war.—Mr. BEVIN replied: I am aware of the shortage of practising midwives, and I am in consultation at the present time with the Minister of Health and the nursing and midwifery organisation concerned with a view of securing a better supply and distribution both of midwives and of nurses.—Sir F. FREMANTLE: Is the Minister aware that the appeal that has been made by the Minister of Health to nursing associations for midwives to remain as midwives has been quite useless, and that many young nurses who are trained as midwives volunteer, after their training is finished, for general military service, or go into munitions? Could the Minister not direct them to practise as midwives at present?—Mr. BEVIN: That is a matter which the Minister of Health and I are attempting to organise.

## Clyde Valley Scheme for Wales?

Sir HENRY MORRIS-JONES asked the Minister of Health whether he would make arrangements for the provision of free diagnostic assistance for young insured persons in Wales, between the ages of 15 and 25, who were referred to the regional medical service by their panel doctor and, where necessary, hospital and convalescent home treatment in a state-aided hospital on the lines of similar provision by the Scottish Department in the Clyde Valley.—Mr. BROWN replied: The staff of the department's regional medical service is engaged on various war duties, and consequently the procedure is not practicable in England and Wales. The diagnostic and other facilities of hospitals in England and Wales have been augmented in a number of ways under the Emergency Hospital Scheme, and I have no reason to suppose that they are not available to patients referred by their doctors.

## Milk Pasteurisation at Buxton

Dr. SUMMERSKILL asked the Minister why the Buxton local authority was refused a grant towards a pasteurisation plant, in view of the fact that the medical advisers to his ministry were of the opinion that the pasteurisation of milk would reduce the incidence of non-pulmonary tuberculosis.—Mr. BROWN replied: The Buxton town council have not asked me for a grant, but they asked whether sanction would be given to a loan for the purpose mentioned. I am advised that there is no statutory authority under which the council could establish such an undertaking and the council have been so informed.—Dr. SUMMERSKILL: Does the Minister intend to acquire powers to help local authorities which are anxious to provide milk free from tuberculous infection?—Mr. BROWN: I am in consultation on this matter with the Minister of Food.—Mr. D. ADAMS: Does not the Minister consider the position

highly inconsistent that he authorises large expenditure on the cure of milk-borne diseases whilst he is unable to agree to aid in the purchase of machinery for the prevention of these diseases?—Mr. BROWN: There is no question of refusing a grant here.

## Shortage of Optical Lenses

Major B. A. J. PETO asked the Minister of Labour whether he was aware of the increasing shortage of optical lenses; and whether, in view of the importance of individual visual efficiency in maintaining and increasing the output of war factories, he could give an assurance that sufficient labour was left available for lens production.—Mr. E. BEVIN replied: I am fully aware of this problem, on which my department is in close touch with the Ministry of Health and Supply.

## Confidential Post-mortem Reports

Lieut.-Colonel A. MARLOWE asked the Minister of Pensions, seeing that when a post-mortem examination was held on the body of a man who had died while in any of the services a copy of the report of such post-mortem examination was made available to the ministry but not to the relatives, whether he would take steps to ensure that copies of such reports would be supplied to the relatives so that they might judge whether the ministry was justified in refusing a pension.—Sir W. WOMERSLEY replied: Except in cases where the examinations are conducted by the civil authorities, the reports referred to form part of the Service medical record and as such are regarded as strictly confidential and privileged. While the documents are only temporarily in my custody, and I am not, therefore, primarily responsible for preserving their confidential character, I am in complete agreement with the ministers concerned, that it is in the public interest to maintain the principle that these records are confidential.

## Compulsory Notification of Venereal Disease

Dr. SUMMERSKILL asked the Secretary of State for Scotland whether he was aware that the Lanarkshire Joint Committee on Venereal Disease, representing the county and all the burghs in Lanarkshire, had approved a motion in favour of the compulsory notification and treatment of venereal disease; and if he would take steps to make notification of this disease compulsory.—Mr. T. JOHNSTON replied: I am aware of the Lanarkshire motion. As regards the last part of the question I would refer to my reply on Nov. 17, and to the Government statement in connexion with Regulation 33B.

## Medical Services in Abyssinia

Captain C. TAYLOR asked the Secretary of State for Foreign Affairs whether any arrangements were being made by HM Government to assist in the provision of adequate medical services in Abyssinia.—Mr. A. EDEN replied: At the request of the Emperor of Ethiopia a senior member of the Colonial Medical Service was seconded on Feb. 1, 1942, for service under the Emperor who appointed him director-general of the Ethiopian medical services. At the request of the Ethiopian government the names of four senior non-British medical practitioners have been proposed to them for medical appointments. Every effort has been made and will be made, within the limits imposed by the man-power situation in this country, to meet the Ethiopian government's further requirements. In addition the British Red Cross maintains a hospital in Addis Ababa and the Friends Ambulance Unit has recently dispatched an important unit of doctors and medical assistants to undertake medical work in the capital and in the provinces; they have also supplied considerable quantities of urgently needed drugs.

## Skin Diseases among Middle East Troops

Sir JAMES GRIGG replying to a question said that 23 officers and 198 other ranks were returned from the Middle East in 1942 with skin diseases. It is not known how many of these contracted the diseases before they left this country but the number is likely to be small. I am satisfied that a complete system of medical inspection of troops going overseas is in operation, and that no-one suffering from a serious skin disease is sent abroad.

## Tomlinson Report

Sir L. LYLE asked the Minister of Labour whether, in view of the fact that the report of the Interdepartmental Committee on the Rehabilitation and Resettlement barely touches the position of the middle class, he will instruct the committee to explore further the remedial services which would more exactly apply to this section of the community.—Mr. M. S.

**McCORQUODALE:** The report makes no class distinctions. Its recommendations include the provision of higher education, training for the professions, training for semi-professional, technical, executive and clerical occupations, and in assessing the handicap of disability account is taken of the person's previous experience and qualifications.

#### Hospital for Seamen at Murmansk

Commander R. T. BOWER asked the Parliamentary Secretary to the Ministry of War Transport what facilities existed at Murmansk for the treatment of sick and wounded British merchant seamen.—Mr. NOEL BAKER replied: Until the late summer of last year, our merchant seamen who were wounded or ill in Murmansk were received in Russian hospitals, the facilities of which were generously placed at our disposal by the Soviet government. We were then enabled to arrange for the establishment of a British hospital unit in Northern Russia. This unit, which is staffed by British naval officers and ratings, now deals with all sick and wounded British merchant seamen at Murmansk. We have also proposed to the Soviet government the establishment of a second British hospital unit at another port in Northern Russia. This has been agreed to in principle, and I hope that it may shortly be at work.

## Public Health

### Houses for Health

A MEMORANDUM, drawn up by the Royal College of Physicians of London, at the request of the central housing advisory committee of the Ministry of Health, sets out the opinion of physicians on the design of dwelling-houses. The task of compiling it was entrusted to the committee on social and preventive medicine, and is mainly the work of Prof. James Mackintosh, Dr. J. C. Spence, Dr. W. A. Daley and Dr. J. A. Charles. These four are authorities on housing problems and the administration of the Housing Acts, and have kept the recommendations within practical limits. Their proposals will have much in common with those reaching the central committee from other bodies concerned with social welfare, but some will strike the public as coming unexpectedly from physicians.

The memo objects to the standards laid down in section 136 of the Housing Act 1936. The college do not regard the room areas as adequate; suggested minima are apt to be accepted as maxima, and the smallest bedroom area allowed (65 sq. feet) is not fit for sleeping; no bedroom should have a floor area of less than 100 sq. feet. They strongly oppose the provision in the act which allows two children to count as one adult and ignores infants. "The pernicious doctrine that children require less air-space than adults must be finally scotched. . . . There is no conceivable ground for estimating the space requirements for a child as less than those for an adult; on the contrary, the special liability of children to contract infectious disease calls for the most generous consideration. For the same reason the practice of disregarding the infant in calculating housing space is to be deprecated." Economic reasons for counting children as half and ignoring infants had carried the framers of the act, so it is necessary for the physicians to show that the medical grounds for giving these young citizens full space must overrule those which governed the act. To give full space to children materially increases the expense of housing, so the physicians must be prepared to fight for it.

The suggestion that the charges for gas and electricity should be reduced to the lowest possible level for "reasonable family use," but that higher charges should be made for consumption above that necessary, may be adopted as a war measure and prove to be workable. "Partly on psychological grounds, there should be at least one open fireplace capable of burning smokeless fuel or coal." The last two words probably owe their place in the memo to the war, for the objections to the use of raw coal in domestic grates are overwhelming and in peace-time it is possible to have an open fire which gives all the amenities of the coal fire without the dust and smoke. The physicians favour the Garchey system by which household refuse is removed by water carriage to a collecting station where the water is extracted and thence to an incinerator plant. The

whole process takes place within the bounds of the housing unit. At first considered fantastic this system has proved in practice to be cheap, reliable and sanitary. The most modern methods of internal sanitation are favoured, and the memo recommends that "if a sufficient water-supply and sewer are available a water closet shall invariably be provided." This might have been expressed even more forcibly. The college recommend that the water closet should be in the bathroom and not in a separate compartment. This will be a surprise to most people, but the habit of washing after passing excreta should be universal and acquired early; every child should be taught to go straight from the water closet to the wash basin. Moreover, it has been found that when the closet is in the same room as the bath it keeps (or is kept) in a more wholesome condition.

The long paragraph on homes for the old is kind without being sentimental and really does suggest a better world. The care of the aged, apart from its humanitarian aspect, is becoming an increasingly important medical problem, so the physicians are well within their province in dilating on it.

In regard to the housing of undesirable—that is to say, mentally defective, dirty or antisocial—tenants, the physicians are mainly concerned with the psychological aspect. They suggest that these tenants, who need special care and supervision, should live in specially built houses with concrete floors and impermeable walls and no awkward corners where vermin might be happy to lurk. Fittings will be simple and able to resist wanton damage. This plan has been tried with success in Holland. The tenants are encouraged to show by their care of their special houses that they are ready to graduate to a more comfortable one; and the physicians are anxious that this stimulus to do better should be strong. These bleak houses must not be houses of correction, but houses of education. In external appearance and in placing, they should conform as nearly as possible to normal houses. The physicians hope to see their recommendations incorporated in a new Housing Act. They ask for nothing extravagant or which runs counter to other social interests, but it is a long road from the committee room to the Statute Book, and doctors must be prepared to argue their cause, which is also the cause of social medicine.

### Infectious Disease in England and Wales

WEEK ENDED JAN. 30

**Notifications.**—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2272; whooping-cough, 1790; diphtheria, 809; paratyphoid, 33 (27 at Hastings); typhoid, 6; measles (excluding rubella), 12,601; pneumonia (primary or influenza), 1528; puerperal pyrexia, 162; cerebrospinal fever, 113; poliomyelitis, 10; polio-encephalitis, 1; encephalitis lethargica, 4; dysentery, 178; ophthalmia neonatorum, 104. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Jan. 20 was 2231, including scarlet fever, 641; diphtheria, 272; measles, 527; whooping-cough, 211; enteritis, 97; chicken-pox, 86; erysipelas, 39; mumps, 47; poliomyelitis, 1; dysentery, 27; cerebrospinal fever, 18; puerperal sepsis, 21; enteric fevers, 9; german measles, 3; osteomyelitis, 1; glandular fever, 2.

**Deaths.**—In 126 great towns there were no deaths from enteric fever, 5 (0) from scarlet fever, 17 (3) from measles, 12 (2) from whooping-cough, 24 (1) from diphtheria, 33 (3) from diarrhoea and enteritis under two years, and 125 (18) from influenza. The figures in parentheses are those for London itself.

Birmingham had 7 deaths from influenza, Nottingham and Hull each 5. There were 3 fatal cases of diphtheria at Liverpool.

The number of stillbirths notified during the week was 242 (corresponding to a rate of 37 per thousand total births), including 22 in London.

**FACULTY OF RADIOLOGISTS.**—The diagnosis section of the faculty will meet at 32, Welbeck Street, London, W.1, at 10.30 AM on Saturday, Feb. 20, when Dr. J. Blair Hartley will open a discussion on stress fractures. Major Eric Samuel will be the opening speaker in a discussion on the significance of some developmental abnormalities of the hip-joint.

## Letters to the Editor

### REHABILITATION

SIR,—I would like to congratulate Nemo on his thoughtful analysis, and to express my surprise at the modesty underlying his choice of pseudonym. Perhaps the most important advance which the war has brought about in the medical mind is the realisation that the future of doctoring must be concerned as much with the achievement and maintenance of health as with the treatment of disease. This awakening is finding expression in a series of terms, which are either new or are revivals with a modern application—rehabilitation, social medicine, positive health, preventive medicine. The fervour with which this new approach is being discussed is a reflexion on the hitherto restricted outlook of British medicine.

Before the war the whole armamentarium of hospital service—operating theatre, laboratory and pharmacy—was unstintedly at the disposal of the patient for the cure of his specific malady. He then left the ward and attended the outpatient department. Here he was usually faced with the alternative of taking the responsibility of cutting short his treatment in order to save his job, or of continuing his treatment with the risk of losing it. More important, during all this period his general condition was often allowed to lapse to such an extent that he returned to work in far worse shape than when he entered hospital. There comes a time, in the convalescent stage of all serious disease and disability, when an assessment must be made as to whether the patient can return to his former employment, whether some modification of his original work is necessary, or whether he must find—and, in that case, be taught—a new vocation. For this purpose the doctor must assess not only the man's present and probable future performance but also the demand to be made on him by the various sections of industry.

Equally important is the problem of prevention. Many hospital cases are the result of sudden medical catastrophe in previously fit people, but many others are the result of deviations from the normal which have progressed insidiously, until symptoms have necessitated advice. Must the medical profession confine itself to the reconstruction of damage when this has reached a stage at which normality is no longer possible? Must the state, therefore, be content with only partial salvage? Surely any system of planning must encompass a prophylactic aspect, embracing not only the educational services and the control of youth centres but also labour as a whole.

Medicine should be purposeful and applied. Both physical fitness and rehabilitation are social issues which concern medicine, the ministries, and those responsible for physical education. But throughout all phases, including prophylaxis and final reinstatement, medicine must exercise a controlling influence.

Harley Street, W.1.

FRANK HOWITT.

SIR,—The Tomlinson report and that part of the Beveridge report which deals with rehabilitation make a new proposal which departs from the fundamental principle laid down by the BMA fracture committee, the joint BMA-TUC rehabilitation committee, the Delevingne report on rehabilitation, the recent British Orthopaedic Association memorandum on rehabilitation, and indeed every important report on this subject which has been published hitherto. The Beveridge report says that "rehabilitation must be continued from the medical through the post-medical stage till the maximum of earning capacity is restored." Such an observation would be admirable if the post-medical stage implied resettlement in industry, vocational retraining and sheltered occupation—that is to say, the re-establishment in industry of a patient whose treatment is finished. But the Tomlinson report makes it clear that this interpretation is not intended. It is proposed to split rehabilitation itself into that which goes on in hospital (medical rehabilitation) and that which goes on in special centres (post-medical rehabilitation). "Post-medical rehabilitation" is a contradiction in terms. Rehabilitation is treatment; that is to say, it is one phase of medicine, and it is impossible to have post-medical

medicine. In the case of injuries it is unimportant whether the incapacity is a broken bone in need of operative treatment, or a stiff joint or weak muscle in need of gymnastic treatment; it is a medical incapacity and treatment in continuity by the same team is imperative. To do otherwise, to differentiate medical rehabilitation under the Ministry of Health from post-medical rehabilitation under the Ministry of Labour, is to perpetuate the very fault which originally made the case for rehabilitation—namely, the separation of two unrelated stages of treatment—surgical under the control of the surgeon, followed by remedial under the control of the masseuse, with a break in continuity which left the surgeon in ignorance, the patient in doubt and the masseuse in despair. New words will not change this situation; remote and detached post-medical rehabilitation centres will be no less disastrous in the future than remote and detached massage departments were disastrous in the past. The orthopaedic surgeon with his team must treat the case to a conclusion; the physician, the cardiologist, the general surgeon, the neurosurgeon, all must treat their cases to a conclusion: at no stage must they hand over to an expert who specialises, not in a region or a disease but in a treatment, which is of course the worst form of specialism.

The same principle underlies the proposal that universities and royal colleges should institute a diploma in rehabilitation. Again the original mistake would be perpetuated, with the sole difference that failure of treatment would be covered not by a harassed masseuse, but by a Bachelor of Reconditioning or a Licentiate of Rehabilitation! Moreover rehabilitation is not a defined subject which is capable of examination test; it is not a special form of treatment; it is ordinary medical and surgical treatment with a new emphasis, a new determination to treat the whole disability and not part of it, a new endeavour to treat the disability to a conclusion, and a new concentration on psychological as well as physical disability. It is therefore practised by physician, surgeon, nurse, masseuse, medical gymnast, almoner and every single member of the team. It cannot be the specialty of any one member, or of any newly created "reconditionist" or "rehabilitationist."

It has been suggested to me that some of the proposals of the Tomlinson committee have been based on developments of rehabilitation for which I have been responsible. This is probably quite inaccurate, but lest there is misunderstanding I would make two observations as to the plan on which rehabilitation has been developed in the Royal Air Force medical service under the director-general, Sir Harold Whittingham. (1) In no RAF rehabilitation centre is treatment directed by non-medical personnel; treatment is under the whole-time supervision of medical officers and surgical specialists who are part of one surgical team responsible for treatment from the day of injury to the day of return to duty. (2) Rehabilitation orderlies in the RAF are not specialists who will one day seek a diploma before setting up in private practice; they are nursing orderlies, corresponding to nurses in civilian hospitals, who have shared with masseuses, medical gymnasts, medical officers and surgeons a special training in the rehabilitation approach.

Liverpool.

R. WATSON-JONES.

### DISTRIBUTION OF EXPENSIVE REMEDIES

SIR,—I wonder whether you could not persuade contributors to consult the medical division of the Ministry of Supply or the therapeutic requirements committee of the Medical Research Council before publishing formulæ in your columns? I cannot believe that either triethanolamine or cod-liver oil is freely available enough to justify use on the scale recommended by Heggie and Abbott (*Lancet*, Jan. 30, p. 159). Provision for first-aid immobilises material which may be completely wasted. Tannic-acid paste, of which large stocks were distributed in the earlier part of the war, is now outmoded and already there are doubts about the supremacy of sulphonamide dressings for burns. Expensive remedies cannot be distributed on a wide scale when fashions change so quickly. Medical treatment in war-time is governed by the supply position, and while pure research is and should be untrammelled, results cannot be applied to the war effort unless they are easily practicable.

DOCTOR DON.

## PERIPHERAL NERVE INJURIES

SIR,—The publication of the special atlas of "Aids to the Investigation of Peripheral Nerve Injuries" reviewed on p. 179 of your last issue cannot be considered a progressive step in the history of British neurology and anatomy. The atlas bears no sign of the critical judgment, clinical ability or anatomical knowledge of the distinguished members of the nerve injuries committee of the Medical Research Council, for whom it was prepared, and is a sad sequel to the M.R.C. Report No. 54, on the Diagnosis and Treatment of Peripheral Nerve Injuries, published in 1920.

The anatomical diagrams of the distribution of the nerves to the limbs are modifications of the indifferent and often inaccurate diagrams attributed to Testut and Pitres in the 8th edition (1930) of Testut's *Traité d'anatomie*, edited by Latarjet. Not one of these five modified diagrams has any indication of the spinal segmental value of the nerve. There are 37 photographs of the muscles of the upper limb in action and 18 photographs of the muscles of the lower limb. Of the former the segmental nerve-supply which is given is definitely wrong, inadequate or doubtful in 21 cases; of the latter the segmental supply which is given is definitely wrong, inadequate or doubtful in 16 cases. The position in which the limb is placed to demonstrate the action of the muscle is often unnatural. Muscles which are named by reason of their visible subcutaneous contour—e.g., triceps brachii and pronator radii teres—are described as "can be felt and sometimes seen." The term "belly" in the singular as applied to the deltoid, gastrocnemius and soleus is misleading. The fold of the nates, which never misleads the examiner of the hip or buttock, is not mentioned. The bicipital fascia which never belies the condition of the biceps is ignored. The vastus medialis, the best index of the condition of the knee-joint, is omitted.

The photograph of the supinator longus (brachioradialis) is most misleading, as the forearm is shown in supination. This muscle is best demonstrated in action by steadying a glass whilst raising it to the mouth. The photographs illustrating the actions of the long and short muscles of the thumb and fingers leave much to be desired, for these digits must be put through their movements individually whilst all the other digits are tethered and obscured from view. No attempt is made to dissociate the actions of the lumbricals and interossei. No significance is attached to those muscles which enjoy a dual nerve-supply such as the adductor magnus, biceps femoris, soleus, brachialis and pectoralis major.

The whole picture of the upper brachial plexus injury, familiarised by the work of Erb and Duchenne on the newborn child, is distorted by attributing to the nerve-supply of the rhomboids, supraspinatus and infraspinatus muscles-fibres from the fourth as distinct from the fifth and sixth cervical segments. The fourth cervical nerve sends no motor fibres into the musculature of the upper limb, for it has a heavy task, as the main constituent of the phrenic nerve, in innervating the diaphragm by day and by night, and some of the accessory respiratory muscles in any special effort.

In the 19 line drawings of the approximate areas in which sensory changes may be found following lesions of the nerves there is no evidence of any appreciation of the work done subsequent to that of Head and Sherrin—the protopathic and epicritic levels still reign triumphantly. The last two line drawings, representing the ventral and dorsal axial lines in the upper and lower limb, offend against every law, principle or working hypothesis that has held sway since John Goodsir held the chair of anatomy in Edinburgh a century ago and enunciated the first of these principles, that the higher nerves of the plexus did not extend as far into the limb as the lower nerves.

No mention is made of those cutaneous nerves which can frequently be seen through the skin—e.g., the musculocutaneous or superficial peroneal in the leg and foot, and the sural or short saphenous. No mention is made of the pressure points at which the nerve can be felt, such as the funny-bone for the ulnar nerve, the neck of the fibula for the lateral popliteal nerve, nor of those pressure points at which cutaneous nerves such as the superficial radial or dorsal cutaneous of the ulnar suffer

from the pressure of careless splinting or bad plastering.

The absence of any reference to vasomotor, sweating and trophic functions is astounding, for these are three factors which loom large in the cortex of the patient. Trophic ulcers following nerve injuries do not respond well to any fads or fashions and are resistant even to sulphanilamide dressings. The memorandum as a whole suggests a need for research into the great tradition of our British neurologists.

Cambridge.

H. A. HARRIS.

## DARWIN AND PSYCHOTHERAPY

SIR,—As one who read with profit and pleasure the urbane article on Charles Darwin by Dr. Hubble, it is with reluctance (acting on the maxim "never trouble Hubble till Hubble troubles you") that I intervene upon the last section of it. Won by his charm and cogency even the elect may be deceived by the subtle non-sequitur of his conclusions. Stripped of special pleading, the point he raises in this last section is a real one: does psychotherapy, in removing a neurosis, destroy at the same time the conditions in which alone the patient's talents, or in rare cases his genius, can efficiently function?

The question cuts deep. Those of us not yet fatally bitten by the collectivist bug are watching with concern the decline of individual values, and the emergence of a brave new world in which the ultimate values are those of the state. In this process, if Dr. Hubble's implications were sustained by facts, psychotherapy would be proved to play a small but sinister part. The question is surely begged at the outset when the methods of psychotherapy when inappropriately applied are defined in the words of Aubrey Lewis as "superficial dabbling, harmful probing, and crude ploughing and plugging," and the result on the patient's mind is indicated by a quotation of Middleton Murry's (*que diable allait-il faire dans cette galère?*) to the effect that the chamber is swept and garnished only that seven devils may enter in. Dr. Hubble genially admits his own failure along the three lines laid down by Aubrey Lewis, reaching thereby a foregone conclusion with disarming friendliness. Over the whole section lies the jovial assurance that the concepts of Freud, Jung, and Adler are now much blown upon.

But the danger of destroying a socially valuable talent by removal of its protecting neurotic wall is a situation not uncommonly encountered by all experienced psychiatrists. In practice the danger is far less than one might suppose. Neurotic personalities are so rarely lit by any inward flame that even a fugitive gleam is scarcely to be missed in the preliminary anamnesis. Once found, the technique of so dealing with the neurosis as to keep that flame alight, and perhaps to brighten it, is the guiding principle of a treatment which is by that very fact made simpler than is usual. Certainly there are situations where little can be done owing to the paramount protecting and rewarding functions of the neurosis. But even in the case of Darwin, it is hard to believe that it would have been impossible to release for the service of his genius some at least of the powers he wasted in profitless inner friction. To take but one point: many men, and among them his intellectual peers, have recognised the right of their highest powers to claim priority of time and service over all other earthly ties, without feeling the need of buttressing that right with the symptoms of neurotic illness. It would not, I suggest, have been beyond the wit of man to make that simple thesis acceptable to Charles Darwin.

Godalming.

ALAN MCGLASHAN.

SIR,—I venture to challenge the conclusions drawn in the last section of Dr. Hubble's interesting article on the following points:—

1. Analytical psychotherapy could not, if it would, modify the inherent sensitivity of anybody's mind.
2. If a patient complains, it is the doctor's job to offer him the most appropriate treatment he knows of. For "clumsy, ineffective or even noxious" adaptations some kind of psychotherapy is invariably indicated: if it fails, the kind attempted, the technique and the indications on which it was prescribed will be critically reviewed; but the possibility of failure from a constructive approach would not excuse a failure to make the attempt.

3. The patient's wellbeing deserves priority over the benefits which (the doctor thinks) the community might derive from allowing the disability to run its natural course.

I would suggest that it is from their nervous sensitivity that both the conflicts and achievements of great men derive and that the solution of the former cannot abort the latter.

Llandow.

J. F. COOPER.

#### ANÆSTHETIC METHOD

SIR,—Your review (Jan. 30, p. 144) of Johnstone's *Textbook of Midwifery* refers to certain "curious anomalies" in the text, one being "the author . . . still advocates inhalational anæsthesia for cæsarean section." It would be unfortunate if the student of operative midwifery were led to believe that inhalation anæsthesia for cæsarean section had become obsolete. I have found gas-oxygen-trichlorethylene anæsthesia very satisfactory for this operation. There is no postoperative vomiting, the uterus contracts well after delivery, and the child cries when born. Alternatively, using the Oxford vapouriser it is possible to give so light an ether anæsthesia that the patient is little distressed and the usual ill effects of ether are avoided. Flagg tells us that the experience of any one practitioner is an insufficient basis on which to build a statistical estimate for use by others, and it is evident that only a comprehensive survey of the value and safety of different anæsthetic agents and techniques, carried out by an independent body, can give us real guidance. At the same time, a study of British, American and Continental authors is not without value, and from such a study two facts cannot escape attention. First we notice how often the claim that a certain anæsthetic method is the one of choice is based on slender evidence, and second we find that spinal analgesia is not without its own special complications. On the evidence at our disposal it would to my mind be incorrect to assume that inhalation anæsthesia is not the best technique at our disposal.

New Barnet.

JOHN ELAM.

#### TRANSPLANTED TEETH

SIR,—With reference to the annotation (Jan. 23, p. 115) and the remarks of one of your peripatetic correspondents in the following issue (p. 155) I think the following extract from Abernethy's lectures at St. Bartholomew's Hospital, published in 1823, would be of interest to your readers.

"Mr. Hunter has devoted a chapter of his book on the venereal disease to this subject, the appearance of constitutional symptoms from the infection of morbid animal matter, in which he mentions the evils which sometimes follow from the transplantation of teeth. It used to be the fashion, if a lady or gentleman wanted a front tooth, to apply to a dentist, who found some poor girl of the town, or chimney sweep, who had a front tooth of about the same size, and, by offering them money, got them to consent to part with it. The tooth was drawn from the poor person's mouth and put into the socket of the rich; the gum would adhere very firmly for a time to the surface of the tooth, and appear to do very well, but after a certain time, the gum would separate, the tooth get loose, and drop out, an ill-conditioned ulcer form in the part, followed by sore throat, eruptions, and nodes, symptoms of pseudo-syphilis, as I call them. This soon put a stop to the transplantation, and glad am I that such iniquitous practices were punished. It is a subject well worthy of attention, and I hope that you will not only receive it because I tell you of it, but investigate the matter strictly and impartially for yourselves."

Parkstone, Dorset.

H. D. KELF.

#### ANÆSTHESIA FOR CYSTOSCOPY

SIR,—The suggested use of 'Pentothal Sodium' for cystoscopy (*Lancet*, Jan. 23, p. 111) may give the impression that anæsthesia is either necessary or desirable for routine outpatient cystoscopic examination. This idea is in keeping with the common and growing practice of producing anæsthesia for this simple manoeuvre in a variety of ways—e.g., by the instillation of cocaine or its analogues into the urethra, or by sacral, low spinal, intravenous or inhalation anæsthesia. To my mind the performance of cystoscopy in the average case can very well be compared to the passing of a rubber

catheter. How often do we find it necessary to give an anæsthetic for this? There is of course the occasional freak hypersensitive case which may require special treatment. Having personally carried out cystoscopy in over 12,000 outpatients attending my clinic at the Western Infirmary, I should like to state emphatically my opinion that anæsthesia of any kind was neither necessary nor desirable in over 95% of these patients. The use of a small cystoscope, properly lubricated and passed and manipulated slowly and correctly, causes only minor discomfort except in patients suffering from acute inflammation of the urethra or bladder and certain cases of tuberculous cystitis. In the former cystoscopy usually is inadvisable but when it is necessary some form of anæsthesia may be used and this applies equally to many cases of tuberculosis.

In cases where an anæsthetic is required it should produce complete anæsthesia lasting throughout the whole procedure. After a careful trial of the various methods, including pentothal sodium, I have found that low spinal anæsthesia by the method advocated by Dickson Wright is simple, safe, effective and eminently suited for outpatients. In over 100 outpatients so treated I have never observed any ill effects.

Glasgow.

WALTER W. GALBRAITH.

#### Obituary

##### STCLAIR THOMSON

KT, M.D LOND, F.R.C.P., F.R.C.S., LL.D.

Sir StClair Thomson once said he had two ambitions. One was to till, to the best of his ability, the corner of the field of medicine in which he laboured; the other was to do this in such a way as to retain the esteem and regard, and perhaps the affection, of his fellow-workers. Both ambitions were fulfilled.

Son of a Lowland father and a Highland mother, he was reared on the West Coast of Scotland and attended the village school at Ardrishaig till he was ten. He was then sent to the King's School at Peterborough, and on leaving served his medical apprenticeship with a practitioner of that town. From Peterborough he was to have gone to Edinburgh, to become, like his elder brother, a pupil of Lister's; but Lister came south, and Thomson, following him, entered King's College—in time to hear his inaugural address, entitled *Experiments on Fermentation*, delivered on Oct. 1, 1877, to an audience that saw little need for such inquiries. As pupil Thomson soon became a disciple, and when he presently had a chance to apply antiseptic methods at Queen Charlotte's Lying-in Hospital he was so successful that no mother or infant was lost while he was resident medical officer.

An interlude followed in which, for two years, the young man travelled the Continent with a wealthy invalid of artistic tastes and wide social connexions. For the next seven years he practised at Florence in winter and St. Moritz in summer; but "it led to nothing" and he set off for Vienna to learn laryngology under Schrötter, Stoerk and Hajek, and otology under Pollitzer. In 1893 he settled in London.

Thomson's new specialty was then little studied in England. He had taken his degree without seeing the vocal cords or the drum of a living ear, and he had unpleasant memories of primitive operations for tonsils, adenoids and polyps. Before he could establish himself there had to be lean years, and these he spent in taking the FRCS in research at the Lister Institute on the bacteriology of the air-passages, in clinical work at the Royal Ear Hospital and at Golden-square, in lecturing, in sub-editing the *Practitioner*, and in helping to found the National Association for the Prevention of Tuberculosis. In 1901 he was rewarded by election to the throat department of King's College Hospital; but



Howard Coster

within a year he had developed tuberculosis. His larynx was affected, and he was probably the first patient in this country to carry out the regimen of complete silence. He was dumb for six months.

Hardly had he recovered from this illness when he lost his wife, four years after marriage. He turned with greater energy to his clinics at King's and the Seamen's Hospital. Private practice soon prospered, especially when he became throat physician to King Edward VII, and his standing in the profession was assured by his *Diseases of the Nose and Throat* which made its bow in 1911. At the Royal College of Physicians he delivered a Mitchell lecture on Tuberculosis of the Larynx as a Prognostic Factor, was awarded the Weber-Parkes medal and prize, and served on the council. He was president of the Medical Society of London in 1915-16, president of the section of otolaryngology of the British Medical Association three times between 1909 and 1932, president of the Tuberculosis Association, and president of the Royal Society of Medicine for 1925-27. On this last election he received a loving-cup from 175 colleagues in the same branch of practice as himself. They had reason to honour him; for (as one of them said) by his researches, his writings, his many journeys abroad, his fluency in languages, his friendships with Continental and American workers and his membership of foreign societies, he had won recognition for British laryngology. He had been knighted in 1912.

Sir StClair Thomson was a beautiful writer, and his text-book is a model. His particular interests, which it naturally reflects, were laryngeal tuberculosis and laryngeal cancer, on which, with Mr. Lionel Colledge, he wrote a separate manual. Nearly thirty years' devoted service to the King Edward VII Sanatorium at Midhurst also resulted in an illuminating publication by the Medical Research Council. "His work on laryngeal tuberculosis," writes Sir Arnold Lawson, "was truly great. It is, however, about Thomson's human qualities, so grafted upon those allied to his profession as to be part and parcel of them, that I would write. He was indeed human in the very best sense of the word. He had an extraordinary sense of gentleness, not only in his professional touch, but in his approach. He exhaled sympathy and understanding, and always there was that outstanding quality of inspiring hope and of winning the confidence of his patients, which often meant so much to them when hope seemed futile and the future black with despair. Outside his consulting-room he was dignified and courteous in debate and an excellent speaker, with a fund of wit and humour. When amongst his friends he was a splendid companion, bubbling over with the gaiety and the joie-de-vivre of a boy. His favourite recreation was dancing. He used to say that his dancing was a means to an end, regarding it as the best way of keeping his health as age advanced; but he derived a tremendous amount of enjoyment from it all the same, and it always seemed to me to be an expression of his innate gaiety and fun." Even in late years, however, dancing was only one of many energetic recreations; though "never an athlete, nor very vigorous," he could still be seen, when over 81, riding in the Row, the New Forest, the Bois de Boulogne, at Fontainebleau, or on the hills by Vittel, and every summer he took a holiday on the upper Thames, often sculling from Clifton Hampden to Abingdon and back. He kept himself in condition, he said, "by temperance in all things except sound sleep."

An amateur of the drama, music and literature, he had close associations with the stage: in the palmy days of Covent Garden he knew and treated many of the great singers, and he was friend to Beerbohm Tree, George Alexander and Charles Wyndham. The contents of his spacious and hospitable Georgian house revealed his collector's love of furniture and objets d'art, some of which have already found their way to professional institutions and national collections. He was something of a medical historian, and the Lambeth and majolica jars of pharmacists were a special hobby. At heart, perhaps, he was a romantic; and, for all his success in social life, he could put himself among those who "wander in the ways of men, alike unknowing and unknown." He once wrote of his regret that "I have never shown my fellows the gratitude and appreciation I owe them."

Two years ago Thomson went back to the North, and

it was in Edinburgh that he died, on Jan. 29, after a street accident, in his 84th year. "Since coming to Scotland," writes Dr. Douglas Guthrie, "he had renewed old friendships and had made many new acquaintances, as was natural to one so approachable and so friendly. Before settling in Edinburgh he spent some months in his native county of Argyllshire, but he found it 'too quiet for a young fellow like me.' Despite his eighty-odd years his heart was ever young and he loved the society of youth. An invitation to address the Students' Medical Society of Edinburgh University gave him the keenest satisfaction, his pleasure being shared by all who were privileged to hear his sparkling description of a house surgeon's memories of Lister. It was characteristic of Sir StClair that one of his last acts was to visit, in a sanatorium near Edinburgh, a medical man suffering from tuberculosis of the larynx. 'Not that I can do much for him,' he remarked, 'but I can at least tell him of my own experience, and that always cheers a patient up.' Sir StClair Thomson was the embodiment of cheerfulness, and what sweeter memory could he leave with us, his friends and colleagues?"

#### DUDLEY VAUGHAN PHILLIPS

MA CMB, MRCS; LIEUTENANT RAMC

Lieutenant Phillips, only son of Mr. and Mrs. T. Vaughan Phillips of Cyncoed Road, Cardiff, died during January as the result of an accident at a battle school in Scotland. He was born at Gowerton in 1917 and educated there and at Pontypridd secondary school and Emmanuel College, Cambridge, where he took a second class in the medical tripos. He qualified from St. Mary's Hospital last year, and before joining the RAMC spent six months as house-physician to Dr. A. Hope Gosse who found him "exceedingly conscientious as he was also capable in his medical work." One of Phillips' friends writes: "Though modest and retiring Dudley was always cheerful, with a happy smile and twinkling eyes. Kind and gentle, he radiated goodness, and though he had several narrow escapes in the air raids on London he did not know the meaning of fear. He realised the dangers he had to face and stood up to them with courageous cheerfulness."



Whitlock, Cardiff

#### PERCIVAL JOHN HAY

M D EDIN

Dr. P. J. Hay, president of the Ophthalmological Society of the United Kingdom and consulting ophthalmic surgeon to the Royal Hospital, Sheffield, died on Jan. 17. He graduated from the University of Edinburgh in 1901, taking his MD with high commendation three years later, and after holding resident appointments at the Birmingham and Midland Ear and Throat Hospital he settled in practice at Sheffield, where he served his patients and his colleagues well till his death. Soon after he came to the city he was appointed to the staff of the Royal Hospital and to the lectureship of ophthalmology at the university. He also became ophthalmic surgeon to the Beckett Hospital, Barnsley, to the King Edward VII Hospital, Sheffield, and to the Sheffield education committee.

Any organisation, scientific or social, which brought his colleagues together could always count on Hay's support. He was the founder of the North of England Ophthalmological Society and much of its continuing success is due to his keenness and drive in the office of secretary. From 1938 to 1942 he was master of the Oxford Ophthalmological Congress, and during the 'thirties he organised three tours for British ophthalmologists to visit clinics in Central Europe, in Scandinavia and in America. He was also the first secretary of a joint staff club which has largely through his influence become a meeting-place where the staffs of all the local hospitals foregather. During the last year or two Hay's health had been failing, but he insisted on continuing his work for the Ophthalmological Society and his private practice, and even returned



to help his old hospital for the duration. Sir Arthur Hall writes: "Hay was interested in all that concerned his speciality and was alert to make use of every advance which satisfied his ripe and critical judgment. He was a kindly man, somewhat shy and reserved, and he never completely got over the death of his wife a few years ago. In all the gatherings which he loved to organise his chief pleasure was to make sure that others should have a good time."

#### WALTER JOHN TURRELL

D M OXF, D M R E

Dr. W. J. Turrell, who died on Jan. 27 at the age of 77, was in charge of the electrotherapeutic department at the Radcliffe Infirmary, Oxford, from its beginning in 1912 till he retired in 1938. He was educated at Turrell's Hall, where his father the Rev. H. J. Turrell was master, and at Exeter College, Oxford, where he read for degrees before he started his medical course at the London Hospital. A versatile athlete he represented his university at cycling, swimming, skating, and cross-country running, and was also commodore of the sailing club. In 1890 he graduated BM and took his DM two years later. The following year he set up in practice at Oxford and for over forty-five years lived at "the house on Magdalen Bridge." He had always been interested in electrotherapy and he has told how it was his success in the treatment of endometritis by galvanic current after the failure of other methods which convinced him of the curative value of electricity. When in 1903 he decided to give all his time to this new speciality he found his experience in general practice a valuable background against which to assess the value of electrical treatment. He looked upon the cure and relief of disease by these methods as due not only to the electricity but also to the known physical and chemical changes which it produces and in his *Principles of Electrotherapy*, first published in 1922, he sought to base the therapeutic action of electricity on rational and physiological principles. The new department at the Radcliffe grew under his direction and when he retired the annual number of treatments had risen to almost 50,000. His reputation as a pioneer was international and in 1933 he was presented with the highest award of the American Congress of Physical Therapy.

Turrell spent all his spare time on the river, for he was an enthusiastic angler and keenly interested in natural history especially aquatic birds. His *Ancient Angling Authors* was widely read and he also wrote the section on pike fishing for the volume on coarse fishing of the Lonsdale Library. One of his colleagues writes: "Everyone who met Turrell, whether at the bedside or at the riverside, was impressed by the simple directness of his perception which enabled him to get at the roots of his problems." Turrell married in 1897 Margaret Sybil Lywood of Andover and they had one son who was killed in the last war.

#### MAURICE CAY

M B EDIN; SURGEON LIEUT.-COMMANDER RN

Lieut.-Commander Cay, who has been posted as missing, presumed killed, graduated from the University of Edinburgh in 1934. A fellow student recalls his kindness and good nature and writes "Cay had a rare tolerance for the foibles and weaknesses of others; he would sympathise or help if he could, and if he did criticise would do so in a constructive way. He was a loyal and dependable friend and a charming companion. On the rugby field he was a hard-working intelligent forward, always in the thick of the fray, but with an eye to an opening. He played a clean, clever game and even the hottest engagements could not disturb his even temper." Soon after qualification Cay was appointed assistant medical officer at the Hope Hospital, Salford, and in 1935 he joined his father's old service and entered the medical branch of the Royal Navy. He leaves a widow.

#### CHARLES JOHNSTON SMITH

C B E, M B EDIN, F R C S E

Mr. C. Johnston Smith who died on Jan. 25 in London at the age of 62 was the son of E. Johnston Smith, mathematics master at the Royal High School, Edinburgh. Charles graduated in medicine from the University of Edinburgh in 1904 and took his Edinburgh

fellowship five years later. On entering the Malayan Medical Service in 1911 he was appointed medical officer at Seremban and during the last war he held the chair of clinical surgery at Singapore, becoming senior professor of surgery in 1918. When he retired he was awarded the CBE and settled in Guernsey as consulting surgeon to the island. He married Kathleen, daughter of Mr. A. E. Scott of Manchester, and they had two daughters.

Lady CHEATLE, who died on Dec. 24, was president of the Ladies' Guild of the Royal Medical Benevolent Fund for the ten years between 1930 and 1940, and her charm as a speaker drew members to attend the meetings, even from long distances. She accompanied her husband Sir Lenthal Cheatle on a visit to the United States, which lasted two years, and addressed many groups of people there. Her happy use of our common tongue won her many American friends, and recalled the skilful prose of her cousin, Robert Louis Stevenson.

## Notes and News

### Malaria Control in India

Speaking at the Royal Society of Arts on Feb. 5 Sir Rickard Christophers, FRS, pointed out that India covers an area 15 times the size of the British Isles and has more inhabitants than Africa, South America and the United States combined. The fundamental malaria problem is endemic infection of the rural population. In endemic areas the children have malaria but the adults, having developed immunity in childhood, suffer little from the disease. The degree of endemicity is indicated by the percentage of children with an enlarged spleen, and some areas are termed hyperendemic. Over almost the whole of India malaria is to some extent endemic. But even low endemicity is dangerous, for when children grow up for a decade without immunity the disease may suddenly assume epidemic form. Epidemics are confined to the part of India least affected by endemic malaria; but, when they come, they cover thousands of square miles and the mortality is colossal (even 40% or more). Formerly epidemics occurred every eight years or so, being mainly caused by overflowing of rivers and flooding of great tracts, which may bring mosquitoes and malaria to districts that were previously semi-desert but malaria-free. Administrative action, however, should suffice to minimise this and other evil side-effects of irrigation.

In view of the risk of subsequent epidemics, attempts to sterilise the blood of malarious communities by giving quinine to the entire population are probably unwise unless we are prepared to alter the whole face of malaria as we know it. For endemic infection it is probably better to see that quinine or an alternative drug is available for every person with acute sickness, and this could be done in India through the marvellous dispensary system. At present there is a tendency to issue quinine on a restricted basis. More dispensaries and more quinine are needed, and the people must be persuaded to use the drug. In conclusion the lecturer said that research has vitalised everything connected with malaria control, and it would be most damaging to eliminate or subordinate research with the idea of concentrating on practical results. The first essential in an organisation for control should be a first-class organisation for research.

### Royal Sanitary Institute

A meeting of the institute will be held on Saturday, Feb. 20, at 10.15 AM, in the council chamber of the Town Hall, Leicester. Dr. J. C. H. Mackenzie, medical superintendent of the city isolation hospital and sanatorium, will read a paper on tuberculosis in war-time and Mr. W. W. Baum and Mr. F. G. McHugh, chief sanitary inspectors for the county and city of Leicester, will speak on the milk-supply of the future. Further information may be had from the local secretary, Dr. E. K. Macdonald, Health Department, Grey Friars, Leicester.

**MEDICAL FILMS, PLEASE.**—The British Council are anxious to have particulars of any medical films not already listed in the catalogues of the British Film Institute or the Kodak Medical Department. The council sends news about life in this country to the Dominions and colonies and to foreign countries, and the film department makes and distributes every year films dealing with different aspects of British life. They would like to keep a record of medical films, measuring 16 mm. or 35 mm., which would be available and suitable for showing overseas. Those who can give any help are asked to write to the Secretary, Film Department, British Council, 3, Hanover Street, London, W.1.

### Royal College of Physicians of Edinburgh

A meeting of the college was held on Feb. 2, with Dr. Charles McNeil, the president, in the chair. Dr. John George Selater (Edinburgh), Dr. Adam Patrick (Dundee) and Dr. John William McNea (Glasgow) took their seats as fellows of the college. Dr. John Alexander Mortimer (Hamilton), Dr. George Alexander Grant Peterkin (Edinburgh), Dr. James Ronald (Stirling) and Dr. Thomas Alfred MacGibbon (Norfolk) were elected fellows.

### Biochemical Society

A meeting of this society will be held at the British Post-graduate Medical School, Ducane Road, London, W.12, on Saturday, Feb. 20, at noon.

### British Institute of Philosophy

On Friday, Feb. 9, at 5 PM, under the auspices of the institute, Prof. H. H. Price will speak on belief. The lecture will be held at 14, Gordon Square, London, W.C.1, and cards of admission may be had from the director of studies at that address.

### Pharmaceutical Society of Great Britain

On Thursday, Feb. 18, at 7 PM, a charter centenary meeting of this society will be held at 17, Bloomsbury Square, London, W.C.1, when the president, Mr. W. Spencer Howells, will give an address.

### Medical Society of London

A meeting of this society will be held at 11, Chandos Street, W.1, on Monday, Feb. 15, at 4.30 PM, when Dr. Horace Evans will open a discussion on advances in the knowledge of Bright's disease.

### Medical Casualties

Lieut.-Colonel Charles Frank Burton, MC, MRCS, RAMC, who has been missing since the action in Malaya last February, is now posted as presumed killed. An Admiralty list of casualties "sustained in meeting the general hazards of war" includes Surgeon Lieut.-Commander David Simpson, MB Lpool, RN, among the killed.

### Medical Honours

A special list of awards for bravery and distinguished services in the evacuation of Burma includes the following medical men:

**CIE.**—Lieut.-Colonel Eustace Trevor Neave Taylor, MB EDIN., IMS, was posted in February, 1942, to Kalewa on the refugee organisation, where, by untiring efforts, he checked a cholera epidemic among the refugees which might have brought work on the India-Burma road to a standstill and resulted in great loss of life. When the advanced refugee camps were withdrawn he became responsible for the medical arrangements in the Manipur area, at a time when reductions of staff and the state of exhaustion and disease in which the refugees were arriving, made his task particularly difficult. Before leaving he had re-established the civil medical administration in Manipur. Throughout he displayed tireless energy, complete disregard of hardship, and outstanding organising ability.

**OBE.**—Lieut.-Colonel David Kenneth Llewelyn Lindsay, MD EDIN., IMS, civil surgeon, Lashion; and Major William McAdam, MB GLASG., IMS.

**MBE.**—Jehangir Ardeshir Anklesaria, MB BOMBAY, port health officer, Rangoon; Douglas James Lapping, MRCS, MO to the Jokai Tea Company, Panitola, Assam; James Wallace Lusk, MB EDIN., medical practitioner, Rangoon; Arthur Mobsby, MB, assistant district health officer, Mandalay.

**GM.**—Amar Singh Gill, sub-assistant surgeon, Mandalay Hospital, Burma.

The MBE has been awarded to Flying-Officer Alan James Fuller Eberle, BM Oxf, RAFVR.

One day last November when two aircraft were taking off in formation, the one leading struck another which was standing on the side of the runway, causing it to be thrown into the path of the second aircraft which was taking off. The three aircraft caught fire and the pilot of one was stunned and trapped in his cockpit by the hood which had become locked. Fire engines which came to the scene immediately were unable to subdue the flames. At this stage Flying-Officer Eberle and an army officer leapt on to the wing but, despite frantic attempts to open the cockpit hood, they were unable to do so before being forced to retire owing to the flames. Seizing an axe these officers returned to the aircraft which was burning furiously with ammunition exploding in both wings, and succeeded in smashing a panel. An airman then leapt on to the wing and with great presence of mind pulled the hood release enabling the officers to extricate the pilot from the blazing aircraft. Flying-Officer Eberle and his army companion displayed courage and complete disregard of their safety in saving the pilot from certain death.

Air Vice-Marshal ANDREW GRANT, MB, has been appointed an honorary surgeon to the King in succession to Air Vice-Marshal William Tyrrell, who has vacated the appointment on his retirement from the RAF.

### Gifts for our Allies

The Wellcome Foundation have given £2500 worth of medical supplies to Mrs. Churchill's Aid to Russia Fund and the same amount to Lady Cripps's United Aid to China.

### London Conference on Health

The London Trade Union and Labour Movement is sponsoring a conference on health which is to be held on Sunday, Feb. 21, at the Conway Hall, Red Lion Square, W.C.1. At 2.30 PM, Dr. T. O. Garland will open a discussion on health in industry, and at 5 PM Dr. Joan McMichael will speak on health in the boroughs. Further information may be had from the conference secretary c/o the Conway Hall.

**MIDDLESEX COUNTY MEDICAL SOCIETY.**—A meeting will be held at 3.30 PM on Feb. 20, at Hillingdon County Hospital, Uxbridge, when Mr. L. Fatti will speak on extrapulmonary bronchial cysts, Dr. E. B. Jackson on Schaumann-Boeck's sarcoidosis, and Mr. Howard Hanley on stress incontinence in women.

**Corrigendum:** PROPHYLAXIS OF ACUTE SPECIFIC FEVERS.—Dr. A. W. Downie points out that the prophylactic dose of killed *Haemophilus pertussis* usually given in the United States for the prevention of whooping-cough is 80,000 million organisms (not 8000 million as stated in the report on p. 153 of our issue of Jan. 30). Though other workers have tried "smaller doses in 2 injections at a month's interval, combined with diphtheria prophylactic," Dr. Downie has not himself done so. Nor was the pertussis vaccine used by Bell in the United States combined with diphtheria prophylactic.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

### Appointments

BLOMFIELD, G. W., MB CAMB., FRCS, MRCOG, DMR: acting director of the radium department at the Leeds General Infirmary.  
DAVIS, HAROLD, MB CAMB., MRCP: temp. physician to outpatients at the Hampstead General and North-West London Hospital.  
DAVIS, HILDA M., MD LPOOL, DPH: temp. asst. MO for Bucks.  
GILL, R. A., MBLOND.: RSO at Addenbrooke's Hospital, Cambridge.  
HANDLEY, W. SAMPSON, MD, MS LOND., FRCS: medical director of the Bournemouth cancer clinic.  
LAMB, H. V., FRCS: medical superintendent at Doddington Hospital, Cambs.  
LEWIS, ARNOLD, MD PRAGUE: resident obstetric officer at Cheltenham Emergency Hospital (maternity).  
SCOTT, G. BODLEY, MRCS: temp. MOH for Dorset.

### Births, Marriages and Deaths

#### BIRTHS

AYLWARD.—On Feb. 2, at Southborough, the wife of Dr. R. D. Aylward—a son.  
BARNES.—On Jan. 29, in London, the wife of Lieutenant Gerard Barnes, RAMC—a son.  
BYWATERS.—On Jan. 30, in London, the wife of Dr. E. G. L. Bywaters—a daughter.  
LINNELL.—On Feb. 2, at Carlisle, the wife of Captain Louis Linnell, RAMC—a son.  
MACARTNEY.—On Jan. 22, at Crumpsall Hospital, Manchester, the wife of Major Donald Macartney, RAMC—a daughter.  
MACNAIR.—On Jan. 31, at Bowdon, the wife of Dr. F. G. Macnair, of Marple—a son.  
NESFIELD.—On Feb. 2, at Sandhurst, Kent, the wife of Captain J. C. B. Nesfield, RAMC—a daughter.  
OWEN.—On Jan. 28, at North Harrow, the wife of Captain E. N. Owen, RAMC—a son.

#### MARRIAGES

FRANKLIN—VAISEY.—On Jan. 30, in London, Alfred White Franklin, FRCP, to Ann Grizel Vaisey.  
HARRIS—DORMON.—On Feb. 4, Edward Ellis Harris, MRCS, to Rosemary Dormon (née Rice).  
LUNN—CURRIE.—On Jan. 18, at Cheam, George Maurice Lunn, MB, Lieutenant RAMC, to Ina Currie.  
MASON—JOHNSTON.—On Feb. 3, at Harpenden, Herts, Richard Michael Mason, BM, to Heather Johnston.  
MOORE—BATES.—On Jan. 30, at Sanderstead, John T. Moore, Lieutenant RAMC, to Joan Bates.

#### DEATHS

ADAMS.—On Jan. 29, at Knutsford, Cheshire, Alfred Adams, MD LPOOL, DPH, aged 69.  
ARMSTEAD.—On Feb. 2, at Seaton, Hugh Wells Armstead, MD LOND., FRCS, aged 77.  
BUIST.—On Feb. 5, at Brighton, John Martin Buist, MB EDIN., DPH, DTM & H, major RAMC ret'd.  
ELDERTON.—On Jan. 28, at Ryde, I. of W., Frederick Dundas Elderton, LRCP, major RAMC ret'd, aged 81.  
NORTON.—On Jan. 30, at Hove, Everitt Edward Norton, MD DUREL, aged 74.  
STEPHEN.—On Feb. 1, at Grimsby, Lessel Phillip Stephen, MB ABERD., FRCS, DPH, DTM & H, lieut.-colonel IMS ret'd.  
SYLVESTER-BRADLEY.—On Feb. 3, at Weymouth, Charles Reginald Sylvester-Bradley, MRCS, lieut.-colonel RAMC ret'd, aged 64.

## THE PSYCHOLOGY OF PAIN

E. GUTTMANN

W. MAYER-GROSS

MD MUNICH, L.R.C.P.E.

MD HEIDELBERG, L.R.C.P.E.

PAIN is fundamentally a psychobiological phenomenon; in other words, apart from its anatomical and physiological aspects, where our knowledge has made considerable progress during the last decade, it has a psychological side. This needs separate study, the results of which have to be integrated with those of biological research before they can find application in medicine.

The subjective phenomenon of pain is not easily classified as either sensation or emotion. Pain is similar to a sensation in that it has a threshold, is localised and referred to a stimulus. In contrast to other sensations such as touch, it is experienced much closer to the centre of the personality. In this respect it resembles emotions such as fear or disgust, which however cannot be measured or localised. This double aspect is often neglected in laboratory investigations; these are mainly concerned with cutaneous pain, which is the most "objective" type of pain (i.e., most distant from personality) and therefore resembles sensation more than other varieties of pain. Time and again, writers have attempted to separate the pain sensation from its emotion, to hand over the latter—under names like "unpleasantness," or "reaction to pain"—to the psychologist, and to treat pain as a chapter of sensory physiology. The specific problems of pain have thus disappeared into the gap between two compartments of science.

Pain being close to the centre of the personality needs further explanation. Pain as a sensation, though the most important danger signal, gives only scanty information on the objective nature of a danger threatening from outside: it informs us almost solely about the state of our own body. No qualities of objects perceived by the sense of pain exist comparable to "red" or "cold" or "smooth" in the other senses. We call sensory experiences, for instance of vision or hearing, "painful" if they are so strong or so disagreeable that attention is diverted from the perceived object towards our own body—that is, towards the perceiving organ. When competing with other sensations, pain always wins: it distracts attention and interferes with observation. It gets into the foreground and tends to occupy the whole field of consciousness. Vegetative responses accompanying pain—those of respiration or circulation for example—are much more definite and general than with any other sensation. The sufferer may be aware of these symptoms, which are part and parcel of the pain experience. In many instances pain is inseparable from a defensive motor impulse. It calls the whole person into immediate activity. In this respect pain can be compared with other kinds of instinctive behaviour like hunger or sex, in which it is impossible to separate the sensory from the motor part of the reaction. Like some instincts, pain can be "spiritualised": it can become a motive force in the highest forms of human conduct, in ethics and religion; hence its rôle in torture and in martyrdom. Traces of such attitudes—resentment or heroism—often colour the pain reaction as observed in the physician's every-day experience, demonstrating how closely it is linked with the personality of the sufferer.

Following, with some modifications, Sir Thomas Lewis's suggestions,<sup>1</sup> we propose to deal with quality, intensity and localisation of pain, and its relation to the total personality. Such subdivisions are obviously schematic, as various aspects blend into each other. Increasing intensity, for instance, is often accompanied by irradiation in space, by alteration of quality, and by increasing absorption of the whole personality.

## QUALITY

The wealth of words expressing painful sensations point to the variety of subjective experiences. Pains and aches, with such modifying adjectives as sharp, dull, burning, pricking, pinching, stinging, throbbing, crushing, lightning, boring, cutting, gripping, colicky, are the expressions commonly encountered in a medical textbook. Some of them—like "colicky" or "lightning" may not mean difference of quality, but, of what Lewis

called the time-intensity curve of pain. On the other hand, time-factors associated with the hope of relief and fear of recurrence certainly qualify the subjective pain experience. The descriptive value of expressions like "crushing" or "tearing" has been doubted because they refer probably more to the causation of pain than to a special kind of pain. Finally, admixtures of touch, heat or other skin sensations may modify the pain which in itself remains the same. In spite of these objections, our present knowledge is too scanty to discard the usual descriptions of pain as unscientific and sterile. No doubt the small change of ready-made words often enough prevents us from observing and describing facts; but we should also put some trust in the centuries-old wisdom of language. Many identical adjectives are used in all civilised languages, and that they are so willingly adopted by the person experiencing the pain speaks against their being arbitrary.

Pain is such a common experience that we can grasp its presence without verbal explanations. We can understand its finer qualities, generally conveyed by comparisons "as if," by some sort of identification which need not necessarily be based on our own experience. Though no particular type of pain is specific of any mechanism or of any particular disease process, the exact description of the sensation is often a useful, and within limits, a reliable help in medical diagnosis. The lightning pains of the tabetic, the agonising pain after abdominal perforation, the dull headache in brain tumour are common examples. The fact that we fail to understand a patient's description of painful sensations may in itself be of diagnostic importance. The minute description of his sufferings obtained from a hypochondriac or neurotic may be the first positive sign to suspect a psychological illness. Where the similes and metaphors which the patient uses become increasingly strange, bizarre and incomprehensible, they signify the insidious onset of schizophrenia. We are unable to judge what sensory experiences are at the bottom of his hypochondriacal descriptions, whether the sensations in themselves are abnormal, or whether the description is the response of an abnormal personality to more or less normal sensations. The latter seems more probable, although the former cannot be entirely ruled out, considering the bizarre experiences of hallucinating psychotics in other sensory fields. Peculiar pain sensations defying any description or comparison have been observed in lesions of the central part of the pain apparatus, the optic thalamus, without any psychosis.

How far the pain-seeking of severely demented patients is due to a changed quality of the sensation, or only to a reduced pain perception, is difficult to say. Some low-grade mental defectives can only with great care be prevented from wounding or biting themselves, or from tearing their own hair; paretics and seniles sometimes show a similar perverse reaction which has been termed pain-asyndromia.

## INTENSITY

The term hyperalgesia is used to denote two things: a lowering of the pain threshold, and the painful character of other sensations, such as touch. The latter form, although little understood, is of greater medical importance, and is often encountered in affections of the peripheral nerves. Patients with trigeminal neuralgia, for instance, describe very clearly how they cannot endure the touch of the razor, because it produces violent pain.

The question of threshold obviously introduces a quantitative element. Worked out for the skin only, and more accurate for the determination of reduction or loss of pain regarded purely as a sensation, it has not much practical application, and yields no measure of the intensity of a patient's pain. It allows, however, conclusions with regard to the pain-perceiving and pain-conducting apparatus. From our own and our patients' personal observations we know it is possible to compare the intensity of two pains, simultaneous or closely following each other. We can easily tell if a pain increases or decreases, but to be precise about two pains of different quality and localisation—for example, headaches and gripping—is more difficult. Another difficulty in comparing successive pains is the quick loss of emotional value of a past pain and with it the oblivion of the experience itself.

1. Lewis, *T. Brit. med. J.* 1938, i, 321.

Simultaneous comparison is also impeded by the tendency of a strong localised pain to extinguish other painful sensations. Pressing, pinching or scratching helps to relieve painful sensations, and many common non-vocal expressions of pain, like biting the lips or clenching the fists, originate from this mechanism. The mechanism itself appears identical with the influence of one stimulus on another in other sensory fields, like colour contrast or the drowning of a sound in a stronger noise. It is peculiar to the psychology of pain that it is relieved by localising it more sharply and more at the periphery of the body, or by adding movements—"it made me squirm"—as a kind of motor discharge.

Lewis and his colleagues have tried to compare the quality of spontaneous pains with pain artificially induced by injection of hypertonic solutions in symmetrical parts of the body; we do not know of any similar attempt to compare intensities in a systematic way. Any biological estimate of pain is based on interference with function. Interference with interests and mental concentration, disturbance of appetite and sleep, make a fair assessment possible of the subjective importance of pain, and indirectly of its intensity. The interaction of sensations such as light and noise, with pain, provide another indicator of intensity. Lastly, the influence of non-painful emotions helps in assessing pain. It must, however, be kept in mind that the influence of emotion does not allow one to draw definite conclusions about the origin of pain: a good joke may divert the patient's attention from a mild organic, as well as from a hysterical pain.

#### LOCALISATION

The localisation of liminal stimuli on the body surface is exact. Very strong superficial stimuli however lead to an irradiation of the sensation. Away from the surface localisation becomes much less accurate; it is difficult, even with concentrated attention, to find out which tooth aches, and sometimes even to tell whether it is in the upper or lower jaw. Headache deep in the skull may be quite diffuse or may be roughly localised right or left, front or back. Where the sensation bears more local character it tends to be nearer the surface. In chest and abdomen the localisation is similarly rough. Only when inner pain is referred to other structures can it be more exactly localised. Although this referred pain is of great diagnostic value in organic disease it is not internal pain from the patient's point of view and his evaluation of the danger signalled by the referred pain can be misled, as in the case of brachial pain in angina pectoris. Generally speaking, the local factors influencing the subjective evaluation of a pain are distance from the centre of the body image and the presumed importance of the organ to which the pain is, rightly or wrongly, referred.

Pain in an extremity may be experienced as quite detached from the self. "My finger is sore," or "my foot aches"—facts which can be observed and their importance coolly judged. But a person with severe abdominal pain is absorbed by this experience, and the difficulty in answering questions about the exact localisation, for instance, is partly accounted for by the difficulty or impossibility of exact self-observation. Severe headache such as that seen in brain tumour is more liable still to occupy a patient's consciousness to the exclusion of anything else. The organ-determination is most clearly seen in cases with pain in the left side of the chest, which is always regarded as heart pain by the patient, and endowed with all the importance that danger to so vital an organ implies.

It is easily understood how fear for a vital organ and the vagueness of localisation of internal pain can favour a tendency to imaginary aches, and to illusions and hallucinations of pain. The best studied pain hallucinations, however, and the only ones of undoubtedly perceptive character—namely, pain in the phantom after amputation of a limb—are sharply localised. Pain is often so prominent and localised in the corns and scars of the phantom limb that some regard the phantom as based solely on pain sensation. Closer observation has disproved this view, although patients with a painful phantom are particularly likely to consult a surgeon.

#### CLASSIFICATION

If one tries to grade or classify pain for medical purposes, one has to use intensity as well as localisation

as distinctive factors, and to include the motor reaction, which is an integral part of the pain experience. The following scale is based on suggestions of Achelis.<sup>2</sup>

*Overwhelming pain.*—This is only vaguely localised and diffusely perceived. Apparently purposeless movements, rolling about, aimless struggling, crying or yelling may accompany it. There is clouding of consciousness. The patient's behaviour is not influenced by his surroundings.

*Severe pain.*—The patient is more aware of his surroundings. Tense bodily fixation, groaning, wincing and sighing may be conspicuous. The pain is localised vaguely. It is influenced by environment: noise, bright light, movements are unpleasantly experienced; sympathetic nursing is appreciated.

*Sharp short pain.*—Pain such as that produced by a pinprick or the sting of an insect is immediately followed by a flight reaction, which in fact is so much in the foreground of the total experience that primarily the pain is localised very roughly only, whereas subsequently with a special effort exact localisation is possible; in other words, consciousness can then be narrowed down and focused on the pain experience.

*Negligible pain.*—This comes nearest to a pure sensation, is accurately localised, does not lead to any motor reaction, does not impair consciousness and is experienced as on the person's body, but detached from the personality.

Some common kinds of pain, like the sensation of a foreign body on the cornea or the throes of childbirth, are not easy to place in such a classification, but it illustrates well the wide span of physical pain experiences between instinctive and perceptive behaviour.

#### PERSONALITY AND PAIN

People differ in their ability to tolerate pain; but, interestingly enough, these differences seem to disappear if the pain threshold is measured under experimental conditions. Schuhmacher and his colleagues<sup>3</sup> tested the pain threshold in 150 subjects of both sexes under average conditions of well-being, by measuring the intensity of radiation from a strong lamp focused at the subject's forehead at the moment when a sensation of heat changed into a distinct sharp stab of pain. They found a relatively stable and uniform threshold value. It was independent of sex, was uniform throughout the twenty-four hours despite varying moods and vicissitudes, and unaffected by feelings of lethargy and tension or by lack of sleep. Variations as far as they were present did not correlate with the subject's estimate of his sensitiveness to pain. If some worker could arrange a similar experiment with the emphasis on individual differences, our knowledge on the relation of pain and personality would be less fragmentary and we might be able to control pain individually. Apart from some general statements, scattered observations, mostly from the psychiatric border line, is all that can be gathered at present in a field which still belongs more to the art of medicine than to medical science.

Differences in sensitiveness have always been related to differences in personality, so much so that reaction to pain has often been included in personality tests. Consequently the factors influencing susceptibility to pain are those forming personalities, constitutional and environmental. Of the latter the most significant are the life situation at the time, and the habits reflecting manners and customs of the person's environment. The subject's attitude to pain is a part of his personality make-up and can only be separated artificially from the pain experience itself, which it is liable to colour "in statu nascendi."

Insensitiveness to pain as seen in hysterics has not yet found a conclusive explanation. The theory that the hysteric is able to repress pain under the influence of other interests or emotions puts stigmatisation near to the normal behaviour of the soldier in battle who only feels his wound when the fighting subsides. Hysterical analgesia is quite different in origin from the lack of response to pain seen in catatonics and epileptics, where it is part of a general emotional callousness. The perverted feeling-tone of pain as experienced by the masochist is another variant of apparent indifference; masochistic traits have probably a greater influence on differences in sensitiveness among normal individuals than is commonly believed.

2. Achelis, D. D. Z. *Sinnesphysiol.* 1925, 56, 31.

3. Schuhmacher, G. A., Goodell, H., Hardy, J. D. S. and Wolf, H. *G. Science*, 1940, 92, 110.

Weakness in tolerating physical pain is often, though not always, part and parcel of an over-sensitive, mawkish and anxious character. Some persons who are otherwise composed and masters of their emotions respond to physical pain in a highly exaggerated way. Athletes, sports champions, and others whom one would expect to resist pain easily, often lose all control under negligible pain. Such reactions may have some connexion with the over-sensitivity of the autonomic nervous system demonstrated in these persons by other means.

Expressing pain by words, gestures or tears has the effect of relieving it. The greater natural talent of women for expressing their feelings in these ways enables them to tolerate pain well—as in childbirth. But if men use the same device for alleviating pain, custom decrees that they shall be regarded as effeminate, however well they actually tolerate the pain. The difference between races is really a difference in the degree of expression which custom allows; Latin and Jewish patients are known to make a fuss about pains, but that does not mean that they are unable to tolerate pain. The misunderstanding seems to come from the phrases "bearing pain" or "standing pain" which can mean both "tolerating" and also "not expressing" or "not showing" pain.

An interesting test of the influence of personality is provided by the affective psychoses. In patients suffering from a mental depression physical pain may add to their distress; other depressives welcome it as a help to rationalise their never ending, vague complaints. Others again whose depression is centred around moral self-reproaches can be so indifferent towards physical pain that the physician may overlook a complicating physical disease. This danger is even greater in manics, and the hypomaniac puffed up with his exemplary physical health can present a difficult problem if pain is an important diagnostic symptom of any intervening illness.

Just as sensory physiology of pain remains inadequate if the psychological observations and their working rules, roughly outlined above, are neglected, so our moral judgment on suffering and sufferer is bound to be erroneous and the application of ethical standards and ideals unsubstantial unless we have some knowledge of the psychology of pain. That it is so often taken for granted or simply overlooked is easily understood from its logical position between two mighty neighbours, physiology and ethics, which both claim it as their own.

## INNERVATION AND FUNCTION OF THE THENAR MUSCLES\*

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It is the purpose of this paper to draw attention to the importance of clinical estimation of the function of the thenar muscles in cases of median paralysis. Several cases of complete division of the median nerve have been referred to this centre with a faulty diagnosis of incomplete or recovering lesion because of good action in one or other of the thenar muscles, which according to the classical descriptions should be innervated by the median nerve. In these cases faulty diagnosis led to unnecessary delay in the performance of nerve suture.

The muscle which gives rise to most difficulty is the flexor pollicis brevis. Wood-Jones (1941) has drawn attention to the great confusion in the clinical descriptions of the action of this muscle, as follows. "From the practical point of view, the greatest difficulty in dealing with these muscles is the fact that when the clinician reports the flexor brevis muscle to be acting it is impossible to be certain exactly what muscle slip he recognises as the flexor brevis and exactly what movement he expects it to produce. Indeed, it will often be found that the clinician himself has no very precise idea. This confusion arises for the most part in connexion with cases of recovering function after repair of nerve injuries, and it would certainly appear to be a better plan in clinical medicine if we recognised the flexor brevis as a muscle that is inserted into the radial sesamoid and which is innervated by the median nerve." Stopford (1920) says the flexor pollicis brevis "is composed of several slips, some supplied by the median, others by the ulnar,

which are subject to considerable individual variation, and it is consequently difficult to give a reliable opinion as to the presence of voluntary power in the flexor brevis pollicis from a clinical examination." It is essential that clinicians should adhere to a constant formula in describing the action of the thenar muscles.

### ANATOMY OF THE THENAR MUSCLES

In Gray's *Anatomy* (1938) and Cunningham's *Text-book of Anatomy* (1937) the thenar muscles are described as follows.

*Abductor pollicis brevis* is the most superficial of the thenar group and occupies the anterolateral portion of the thenar eminence. It is strap-like in form and inserted by a short tendon into the radial side of the proximal phalanx of the thumb and into the lateral border of the tendon of extensor pollicis longus.

*Opponens pollicis* lies deep to and is almost entirely concealed by abductor brevis. It is partially united with flexor pollicis brevis which lies medial to it, and the separation of the two muscles (by dissection) is usually difficult. It is inserted into the whole length of the radial border and the radial half of the anterior surface of the first metacarpal.

*Flexor pollicis brevis* lies on a deeper plane than abductor brevis, which covers its lateral half. It takes origin from the distal border of the flexor retinaculum (anterior annular ligament) and sometimes from the crest of the trapezium. It is inserted into the radial side of the base of the proximal phalanx of the thumb and lies superficial to the tendon of flexor pollicis longus.

*The first palmar interosseous* is a slender slip of muscle which arises from the ulnar side of the base of the first metacarpal, passes deeply between the first dorsal interosseous and the oblique head of adductor pollicis, and is inserted into the ulnar side of the base of the proximal phalanx of the thumb.

*Adductor pollicis* consists of transverse and oblique heads which converge on a common tendon inserted into the ulnar side of the base of the proximal phalanx and both heads of the muscle lie deep to the tendon of flexor pollicis longus. From the oblique head of adductor pollicis a slip of muscle passes deep to the tendon of flexor pollicis longus to gain insertion into the radial side of the proximal phalanx. This slip was formerly called the deep or inner head of flexor pollicis brevis.

Accordingly the muscles fall into two groups. (1) Those lying superficial to the tendon of flexor pollicis longus—abductor brevis, flexor brevis and opponens—the first two being inserted into the radial side of the proximal phalanx. (2) Those lying deep to the tendon of flexor pollicis longus—adductor pollicis and the first palmar interosseous both gaining insertion into the ulnar side of the proximal phalanx. However, one slip of adductor pollicis is inserted into the radial side of the proximal phalanx after passing deep to the tendon of flexor pollicis longus.

According to the classical description all muscles of the first group are supplied by the median and all of the second by the ulnar nerve, but the dissection of the thenar muscles and of their nerve-supply is very difficult and considerable variations are found.

Brooks (1886) carried out a detailed dissection of the thenar muscles in 31 cases and described their innervation. He employed the old terminology, whereby flexor pollicis brevis is divided into an outer and inner head, the latter corresponding to what is now called a slip of adductor pollicis passing beneath flexor pollicis longus to the radial side of the proximal phalanx. In one case abductor brevis, opponens and both parts of flexor brevis were supplied by the ulnar nerve alone. In 5 cases the outer head of flexor head was supplied by the ulnar alone. In 19 cases the outer head of flexor brevis received a double innervation from the median and ulnar nerves. In 5 cases the outer head was supplied by the median alone and the inner head by the median and ulnar. In 2 cases the median gave twigs to both heads of flexor brevis—the inner head receiving in addition an ulnar innervation. Thus in 19 out of 31 cases the outer head of flexor brevis received a double innervation from the median and ulnar nerves, and Brooks concluded that this should be regarded as the normal arrangement. In 24 of the 31 cases the outer head of flexor brevis received the whole or part of its innervation from the ulnar nerve.

Hovelacque (1927) summarised the variations described in the innervation of the thenar muscles. It is evident that

\* Section of Jacksonian prize essay, Roy. Coll. Surg. 1941.

there are numerous variations and that many anatomists have departed from the classical description.

Foerster (1929) stressed the frequency of anomalous and double innervation of the thenar muscles and mentioned an anastomosis described by Frohse and Frankel between the deep branch of the ulnar and the motor branch of the median which passes over the oblique head of adductor pollicis and flexor pollicis brevis. He described cases of complete division of the median without paralysis of any of the thenar muscles and said he had often found clinical evidence of the ulnar innervation of flexor brevis and opponens pollicis. He also mentioned that Bruns described an occasional atrophy of the thenar eminence in cases of ulnar palsy.

#### MOVEMENTS OF THE THUMB

*Flexion at the interphalangeal joint* is performed by flexor pollicis longus, which can also bring about flexion of the metacarpophalangeal joint and ulnar adduction of the whole thumb.

*Extension at the interphalangeal joint* is performed by extensor pollicis longus aided by the slip of abductor brevis which passes to the lateral side of the tendon of the long extensor. Thus in cases of complete radial paralysis some "trick" extension of the terminal phalanx is often carried out by abductor pollicis brevis, but the action is always weak.

*Flexion at the metacarpophalangeal joint* is performed by abductor brevis, flexor brevis, adductor pollicis and by flexor pollicis longus after flexion of the interphalangeal joint.

*Extension at the metacarpophalangeal joint* is performed by extensor pollicis and extensor pollicis longus.

*Ulnar adduction of the thumb*—i.e., adduction of the thumb in the plane of the palm—is performed by adductor pollicis aided by the medial portions of flexor brevis and opponens, by flexor pollicis longus and by extensor pollicis longus.

*Palmar adduction of the thumb*—i.e., adduction of the thumb in a plane at right angles to the plane of the palm—is performed by the first dorsal and the first palmar interosseous muscles. The movements of ulnar and palmar adduction of the thumb are usually combined. In cases of ulnar paralysis adduction is always possible in spite of paralysis of adductor pollicis and the interossei. The part played by flexor pollicis longus in adduction of the thumb is the basis of Froment's sign for paralysis of adductor pollicis. In cases of combined median and ulnar paralysis adduction of the thumb is possible by extensor pollicis longus.

*Radial abduction of the thumb*—i.e., abduction of the thumb in the plane of the palm—is performed by abductor longus and extensor pollicis brevis.

*Palmar abduction*—i.e., abduction of the thumb in a plane at right angles to the plane of the palm—is performed by abductor brevis and flexor pollicis brevis; opponens pollicis probably assists in palmar abduction. These muscles are assisted by abductor pollicis longus. In radial paralysis where abductor pollicis longus is inactive palmar abduction of the thumb, though of full range (about 60°), is always weaker than normal.

In median paralysis where abductor brevis, opponens and flexor brevis are inactive palmar abduction is negligible, abductor pollicis longus causing only well-marked radial abduction. In median paralysis where flexor brevis is active palmar abduction of about 30–40° is always possible by the combined action of abductor longus and flexor pollicis brevis, but a full

range of palmar abduction is not possible unless abductor pollicis brevis is active (fig. 1). In cases of combined median and radial paralysis where abductor pollicis longus and brevis are inactive, but where flexor pollicis brevis is active, palmar abduction is negligible, and flexor pollicis brevis causes only flexion of the metacarpophalangeal joint and medial rotation of the thumb (fig. 2). It would appear that where abductor pollicis brevis is inactive palmar abduction can be carried out only by the combined action of abductor pollicis longus and flexor brevis.

*Opposition of the thumb* is a complex movement consisting of (a) palmar abduction, (b) ulnar adduction, (c) flexion at the metacarpophalangeal joint, and (d) rotation of the thumb as revealed by rotation of the thumb-nail through about 60°. This rotation is performed chiefly by opponens pollicis, but when this muscle is paralysed, rotation by flexor pollicis brevis is still possible. Only slight rotation is carried out by the slip of adductor pollicis passing to the radial side of the proximal phalanx, but the rotation by flexor brevis is considerable. Full opposition entails approximation of the volar surface of the distal phalanx of the thumb to the volar surface of the distal phalanx of the 5th digit, when this digit is held in a position of flexion at the metacarpophalangeal joint and extension at both interphalangeal joints, and is possible only when abductor brevis, opponens and flexor pollicis brevis are active (fig. 3). Full opposition is possible in cases of complete ulnar and complete radial paralysis. In median paralysis opposition is faulty except in rare cases where all the thenar muscles receive an ulnar innervation (fig. 3).

In cases where flexor brevis and opponens receive an ulnar innervation but abductor brevis is paralysed, opposition is carried out very well but is never perfect owing to slight limitation of palmar abduction of the thumb. The tip of the thumb can be approximated to the volar surface of the straight 5th digit not at the tip but at about the level of the terminal interphalangeal joint; to obtain approximation of the tip of the thumb to the tip of the 5th digit the latter must be flexed slightly at its interphalangeal joints (fig. 6).

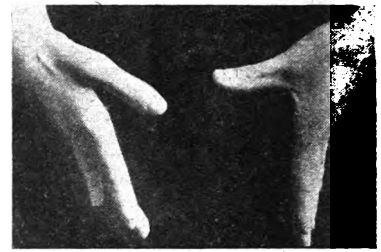


Fig. 1.—Palmar abduction against gravity. The left side is normal. On the right side the median nerve was completely divided at the wrist. Flexor brevis is active (action similar to that in figs. 9 and 10). Palmar abduction is carried out by flexor brevis and abductor pollicis longus, but is less than on the normal side.

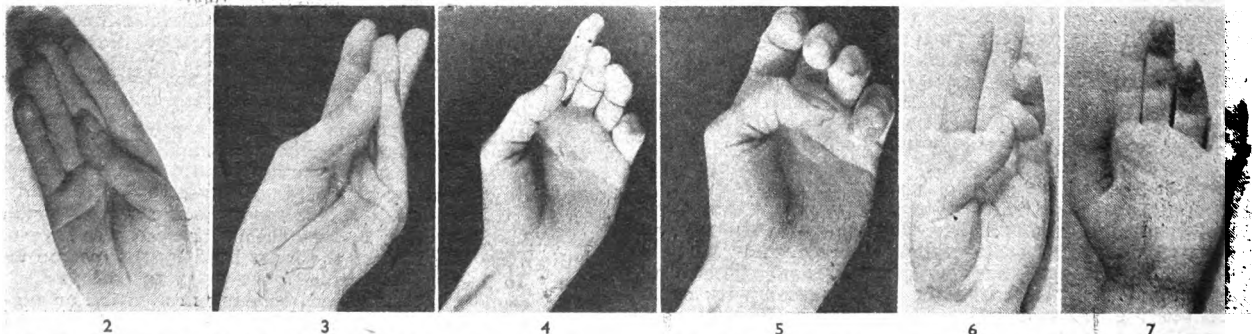


Fig. 2.—Complete division of the median and radial nerves in the axilla. Flexor pollicis brevis is active and is able to produce some medial rotation of the thumb, but on account of paralysis of abductor pollicis longus no palmar abduction is possible.

Fig. 3.—Complete division of the median nerve in the lower forearm. All thenar muscles are active; there is no wasting and opposition is normal.

Figs. 4 and 5.—The same case after ulnar nerve block. The action in all thenar muscles has been abolished. The photographs show attempted opposition.

In fig. 5, flexor pollicis longus is causing flexion of the interphalangeal and metacarpophalangeal joints of the thumb.

Fig. 6.—Complete division of the median nerve above the elbow. Of the thenar muscles, only abductor pollicis brevis is wasted and inactive. Opposition is not normal, since the interphalangeal joints of the 5th digit are flexed.

Fig. 7.—The same case after ulnar nerve block, photographed during attempted opposition.

In cases where abductor brevis and opponens are paralysed but flexor brevis is active, opposition is again faulty, and though rotation of the thumb takes place the tip of the thumb cannot be approximated to the volar surface of the straight 5th digit but only to the radial side of this digit (figs. 8, 9 and 10).

#### CLINICAL INVESTIGATION OF MEDIAN PARALYSIS

Paralysis of abductor pollicis brevis leads to obvious wasting of the anterolateral part of the thenar eminence, and palmar abduction of the thumb is imperfect. Paralysis of opponens in addition to abductor brevis leads to increased wasting of the anterolateral part of the thenar eminence; palmar abduction and opposition are imperfect and no contracting muscle may be palpated over the anterior surface of the first metacarpal. If flexor pollicis brevis is active an obvious contracting muscle belly may be palpated and seen passing from the flexor retinaculum to the radial side of the proximal phalanx of the thumb. This muscle is superficial to the tendon of flexor pollicis longus and readily distinguished from it; some palmar abduction and rotation of the thumb is possible but opposition is faulty (figs. 8, 9 and 10). When all three muscles are paralysed no active muscle may be seen or palpated in the thenar eminence superficial to the tendon of flexor pollicis longus. Palmar abduction of the thumb is negligible and no appreciable rotation of the thumb-nail is possible (figs. 11 and 12). When presented with a median nerve injury in which

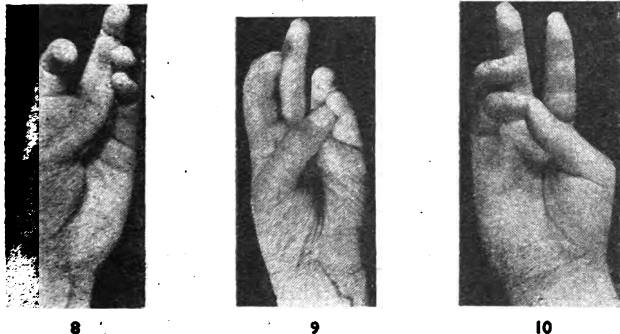


Fig. 8.—Complete division of the median nerve at the wrist. There is obvious wasting of abductor pollicis brevis. Flexor brevis is active and there is possibly some action in opponens.

Fig. 9.—Complete division of the median nerve in the mid-forearm. Flexor pollicis brevis is active, and is able to bring about imperfect opposition with palmar abduction and rotation of the thumb.

Fig. 10.—Complete division of the median nerve in the mid-forearm. Flexor brevis is active and imperfect opposition is possible.

some activity is preserved in one or other of the thenar muscles which according to the classical description should be innervated by the median, we must have some means of deciding whether the innervation of the thenar muscles is anomalous or whether the median injury is incomplete. The decision may be difficult not only on account of the motor paralysis but also because the area of sensory loss is smaller than usual.

There are two methods of investigation. In the first, bi-polar percutaneous faradic stimulation of the ulnar nerve just above the pisiform bone may produce a response in all intrinsic muscles of ulnar innervation. Thus in cases where flexor brevis and opponens, or flexor brevis alone, are innervated by the ulnar they will contract and the contraction may be seen and palpated. In the second we resort to peripheral nerve block. A few c.c.m. of 2% procaine with 1/100,000 adrenaline is injected percutaneously in or around the nerve to be tested. If the technique of injection is satisfactory all conduction may be abolished for 2-4 hours in the nerve tested. The nerve block may be performed in two ways. The injured median nerve may be blocked immediately above or below the site of injury; this method is open to the serious objection that we have no means of determining whether the block is complete. A better method is to block the nerve which we believe is responsible for the anomalous innervation of the thenar muscles (in all of our cases this has been the ulnar nerve). The ulnar nerve may be blocked very easily at the level of the

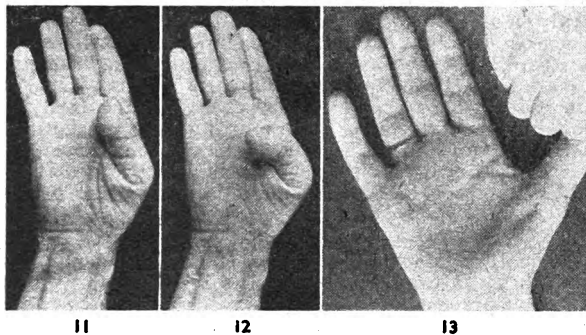


Fig. 11 and 12.—Complete division of the median nerve at the wrist. Paralysis of abductor brevis, opponens and flexor pollicis brevis. Attempted opposition. In fig. 12, flexor pollicis longus is acting. Note no rotation of the thumb, and no palmar abduction.

Fig. 13.—Complete division of the ulnar nerve at the wrist. Obvious wasting of flexor pollicis brevis, most easily shown by opposition of the thumb against resistance.

medial epicondyle. At this level there is no danger of the procaine spreading to involve other nerves such as the median, and the completeness of the nerve block may readily be tested. We have performed ulnar nerve block in 8 of the cases described below and have thus been able to demonstrate ulnar innervation of the thenar muscles which remained active in median lesions. In figs. 3, 4, 5, 6 and 7 attempted opposition of the thumb is shown before and after nerve block of the ulnar nerve.

#### ANALYSIS OF 20 CASES OF MEDIAN DIVISION

We have selected for analysis only those cases of complete division of the median nerve where detailed examination of the thenar muscles was carried out before and immediately after nerve suture. In all cases the paralysis was of the same extent at both examinations.

There were 20 cases in all. Flexor pollicis brevis was active in 16 cases and inactive in 4. In 4 cases there was certainly some action in opponens pollicis, in addition to flexor brevis. In 2 cases there was some action in abductor pollicis brevis, in addition to action in flexor brevis and opponens. In one of these cases there was no paralysis or wasting of any of the thenar muscles (fig. 3), but in the other case abductor brevis, though certainly active, was slightly wasted. In several of these 20 cases the opportunity was taken to stimulate the ulnar nerve exposed at operation. Ulnar stimulation produced a contraction in the unparalysed thenar muscles. We have not yet observed a case in which the thenar muscles received an anomalous innervation from the musculocutaneous nerve. This has been described by Foerster. Nor have we observed a case in which the radial nerve innervated the thenar muscles. This has been described by Stookey, but Foerster states that he has never once observed it. In all of our cases we have been able to demonstrate that the anomalous innervation of the thenar muscles has been from the ulnar nerve. Furthermore, in 16 cases of complete division of the median and ulnar nerves there was complete paralysis of all intrinsic muscles of the hand including the thenar muscles.

Thus in 20 cases of proved division of the median nerve, flexor pollicis brevis was shown to be innervated by the ulnar nerve in 16 cases (80%). This corresponds with the anatomical findings of Brooks who found that the flexor brevis received an ulnar innervation in 24 out of 31 cases (77%).

Of 25 cases of proved division of the ulnar nerve only one case (fig. 13) showed obvious wasting of flexor pollicis brevis. Our failure to note paralysis and wasting of flexor brevis in cases of division of the ulnar nerve may appear at first sight irreconcilable with the findings in cases of median division. However, it must be noted that Foerster found no obvious wasting or paralysis of the superficial thenar muscles in his cases of ulnar division and merely mentioned that Bruns described occasional atrophy of the thenar eminence. The absence of obvious wasting and paralysis is not surprising since flexor brevis usually receives its innervation from both median and ulnar nerves. In cases of median division the activity of the muscle is due to the preservation of

its ulnar innervation and is readily noted because of the paralysis and wasting of abductor brevis and opponens. In cases of ulnar division the muscle is still active because of its median innervation and any wasting is obscured by the overlying abductor brevis. Only in rare cases where the muscle is innervated entirely by the ulnar can we expect obvious wasting or paralysis (fig. 13). Our clinical findings support the conclusion of Brooks that normally the flexor pollicis brevis receives a double innervation—from the median and ulnar nerves.

#### SUMMARY

Clinical investigation shows that the classical description of the innervation of flexor pollicis brevis is faulty. It is of great practical importance to recognise the frequency of double innervation of this muscle by the median and ulnar nerves, and in the diagnosis of median nerve lesions one must be prepared to find ulnar innervation not only of the flexor brevis but occasionally of opponens and abductor pollicis brevis.

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### FOOD TABLES

#### THEIR SCOPE AND LIMITATIONS

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THERE are two schools of thought about food tables. One tends to regard the figures in them as having the accuracy of atomic weight determinations; the other dismisses them as valueless on the ground that a food-stuff may be so modified by the soil, the season or its rate of growth that no figure can be a reliable guide to its composition. The truth, of course, lies somewhere between these points of view. Food tables have a very real value. They may safely be used, for instance, to show how the organic nutrients of a cabbage differ from those of a potato or a piece of meat. But naturally they have their limitations, and the composition of a cabbage purchased in the market may be very different from the figures given for this vegetable, even in the best possible tables. It is the purpose of this paper to show how nearly the composition of a diet, as calculated from food tables, may be expected to approximate to its true composition, as determined by chemical analysis, and also to show the errors which can be introduced into the calculated results by neglecting to take into account extraneous sources of nutrients.

Workers in Finland (Sundström 1908, Tigerstedt 1916) seem to have been the first to attempt to assess the value of food tables for calculating the composition of diets. They made direct analyses of the protein, fat and carbohydrate in the diets of 121 families and compared the results for calories with those obtained by calculation, presumably from food tables compiled by themselves. They found very wide variations between the two answers for any one day's diet, but when all the results were averaged, these differences cancelled out.

During the past ten years or so groups of American workers (Donelson et al. 1931, Porter-Levin 1933, Bray et al. 1934, Bassett and Van Alstine 1935, Hawks et al. 1937, Gutman and Low 1939, Hummel et al. 1942) have made more detailed comparisons, particularly of protein, calcium and phosphorus. Sherman's 1926 or 1937 tables were usually used for the "calculated" values. These tables give the composition of raw food, and workers who have made up their composite diets from raw foods have quite naturally found better agreement than those who have taken cooked foods for their chemical analyses, but raw foods for their calculations. The general consensus of opinion seems to be that analytical figures for nitrogen agree closely with calculated values. The figures for calcium, calculated from Sherman's tables, tend to be higher than the corresponding values determined by direct analysis (see par-

ticularly Bray et al. 1934, Bassett and Van Alstine 1935, Gutman and Low 1939, Hummel et al. 1942). The agreement for phosphorus is usually better than that for calcium. Many workers have found disagreements when they have compared the diet of one person over a period of less than one week, but when they have averaged the results for a number of persons, or for a single person over a period of several weeks the agreement has become a great deal better. Iron has also been considered, but for this element the agreement has not been so good. Thus Rose and her colleagues (1930) found Sherman's values 30% higher than the results of their own analyses and Bassett and Van Alstine (1935) found them 11-24% higher. Pepe and Perrelli (1937), working in Italy, stated that the average daily consumption of iron by boys and girls was 10 times as great as the values calculated from Sherman's tables. Heavy contamination of the food which they analysed is the most likely explanation of this discrepancy (see later). Ohlson and Daum (1935), using other American food tables, say that the results which they obtained by analysis were within 10% of the calculated values.

During the past few years a number of human metabolism experiments have been carried out, both in the biochemical department of King's College Hospital and the department of medicine at Cambridge. In these, composite samples of mixed diets have constantly been analysed for minerals, and sometimes also for organic nutrients. Advantage has been taken of this data to test the value of our food tables (McCance and Widdowson 1940) for the calculation of the chemical composition of mixed diets. Food was dealt with in the ordinary manner, and "made" dishes were prepared without necessarily weighing each constituent. Precautions, however, were taken to avoid extraneous contamination. We have described fully (McCance and Widdowson 1937, 1942) details of metabolic and analytical technique. Table I gives a comparison of the analysed and calculated food intakes of 6 persons over a period of 7 days. The averages are exceedingly close except in the case of iron and calcium. The iron discrepancy is probably due to the curried fish which entered rather largely into this week's menu, for curry powder is known to have a large and variable amount of iron in it. The calculated calcium intakes are consistently too low and this is to be attributed to the fact that, although the subjects drank distilled water, London tap water was used in the preparation of the food and no allowance was made for this (see later). This last cause of discrepancy is no reflection on the value of the tables.

In addition to the comparisons given in table I, many data are available for diets in which 40-50% of the calories were derived from flour. Metabolism experiments have been carried out on 8 people for 9 months on such diets. In these experiments distilled water or soft water was used for cooking and no curry was eaten. Table II shows the results for calcium and iron for 1 week, chosen at random, when brown bread formed a large part of the diet. In column A the figures used for the composition of the staple cereal were the correct ones, as determined by analysis of the bread actually eaten. In column B the values we gave (McCance and Widdowson 1940) for wholemeal bread were used in the calculations. In table II, the analysed and calculated values for calcium agree better than those in table I and the discrepancies are not always in the same direction. The calculated iron intakes tend to be higher than the values obtained by analysis, but the results, taken as a whole, show that the use of a balance and food tables is a legitimate method of assessing an individual's food intake for most dietary constituents. Serious errors are only likely to arise when the diet consists largely of some staple food which differs in composition from the figures taken for the calculations. This might happen in a study of native diets.

#### CALCIUM FROM TAP WATER

London water contains about 10 mg. of calcium per 100 c.cm. If this water is just brought to the boil, which is the usual procedure in making tea, a little of the calcium is precipitated. If it is boiled for 15 minutes, 50-75% of its calcium is deposited as "fur." A cup of tea, therefore, made from freshly boiled London water, with the addition of 15 c.cm. (1 tablespoon) of



TABLE I—COMPARISON OF THE CHEMICAL COMPOSITION OF MIXED DIETS AS DETERMINED BY DIRECT ANALYSIS AND BY CALCULATION FROM FOOD TABLES

Subject		Protein g./wk	Fat g./wk	K g./wk	Ca g./wk	Mg g./wk	Fe mg./ wk	P g./wk
1	Anal.	520	820	32.6	4.20	2.12	76.0	7.62
	Calc.	532	861	34.3	3.99	2.21	78.1	7.92
2	Anal.	456	990	29.8	4.34	2.21	70.0	7.95
	Calc.	495	936	28.7	3.91	2.22	63.1	7.67
3	Anal.	610	870	32.5	4.44	2.38	80.0	8.60
	Calc.	535	909	33.3	4.21	2.13	73.0	8.46
4	Anal.	433	840	29.4	4.57	2.29	71.0	7.15
	Calc.	431	917	28.7	3.92	2.02	65.3	7.23
5	Anal.	406	699	21.2	5.75	1.59	39.0	6.77
	Calc.	418	852	24.4	5.04	1.88	44.2	6.96
6	Anal.	400	640	23.7	4.80	1.96	54.0	6.30
	Calc.	358	706	23.4	3.57	1.70	45.8	5.53
Aver- age	Anal.	469	810	28.2	4.68	2.09	65.0	7.40
	Calc.	462	827	28.8	4.11	2.03	61.6	7.26

Anal. = analysed. Calc. = calculated.

milk contains approximately 36 mg. of calcium; 18 mg. of this will come from the milk and 18 mg. from the water.

Inquiries have been made among a number of adults living in various parts of the country as to the quantity of water which they habitually drink as water, as tea and as other beverages. From these data it has been possible to calculate the approximate amounts of calcium that people must be deriving from their water-supply. The Water Engineer's Handbook (1939) classifies all the main water-supplies of the country according to the "hardness" of the water. In Bedford for example the water is excessively hard and it is probable that the inhabitants are getting nearly 200 mg. of calcium a day from their drinking water. London, Hull, Portsmouth, Rugby and Brighton are examples of places with "hard" water-supplies. Here the amount of calcium derived from the water is probably of the order of 100 mg. a day. Towns such as Bristol, Bournemouth, Derby, Cambridge, Eastbourne, Newcastle, Oxford, Peterborough, Reading, Stafford and Sunderland with moderately or slightly "hard" water get about half this amount. Moran and Hutchinson (1942) have calculated that the average intake of calcium from the drinking water for the country as a whole is 75 mg. a day.

In order to appreciate the significance of these figures it must be realised that the milk ration of 2 pints a week, which is allowed to adults during the winter

TABLE II—CALCIUM AND IRON IN DIETS IN WHICH 40-50% OF THE CALORIES WERE DERIVED FROM BROWN BREAD

Subject	Ca (g./week)			Fe (mg./week)		
	Anal.	Calc. A	Calc. B	Anal.	Calc. A	Calc. B
7	3.45	3.76	3.60	146	169	165
8	4.42	4.56	4.39	194	221	217
9	3.90	4.00	3.87	145	165	162
10	3.86	3.98	3.83	180	175	172
11	3.90	4.62	4.39	202	244	238
12	3.64	3.63	3.52	142	148	145
13	4.55	4.10	3.95	204	197	194
14	3.86	4.47	4.34	171	208	205
Average	3.95	4.14	3.98	173	191	187

months provides only about 200 mg. of calcium a day. The weekly cheese allowance of 4 oz. provides 130 mg. of calcium a day. It is clear therefore, in war-time at any rate, that the drinking water, which is usually ignored in assessing calcium intakes, may in some localities be almost as important a source of calcium as the foods which are generally considered to be our main sources of this metal. Surprisingly enough the Nutrition Society, at a recent meeting in Scotland (1942), came to the conclusion that 100 mg. of calcium a day from the drinking water was an insignificant contribution to the daily intake. Magee (1937) studied the water intakes of the inmates of two public assistance institutions.

These people took, on average, about 3 pints of water a day, apart from the water in their solid food and milk. It so happened that the water-supply of both these institutions was soft, containing only 1.89 and 0.84 mg. calcium per 100 c.cm. respectively. Magee, therefore, came to the conclusion that the water contributed only a very small proportion (1.9-4.1%) of the daily calcium requirement.

Another way in which calcium "contamination" may occur is from vegetables which have been boiled in hard water (Ziegelmayr 1931). Cambridge water, containing about 5 mg. calcium per 100 c.cm., was used for the following experiments.

Samples of potatoes and fresh peas were boiled in distilled water and in tap water, and their calcium contents compared. A third sample of each was boiled in tap water to which ordinary kitchen salt (containing 329 mg. calcium per 100 g.) had been added. Table III shows the amounts of calcium in the vegetables after these treatments.

It will be seen that both tap water and salt increased the calcium in the vegetables, and the final products, cooked by the ordinary kitchen method, contained twice as much calcium as they would be reckoned to have according to food tables. The practical question however is: does this make any significant difference to a person's daily calcium intake? Taking Widdowson's (1936) and Widdowson and McCance's (1936) values for the average potato intakes of men and women (38 oz. and 21 oz. per week respectively) these amounts will provide men with 7 mg. and women with 4 mg. more

TABLE III—CALCIUM "CONTAMINATION" IN THE COOKING OF VEGETABLES

Boiled	Potatoes	Peas
	Ca (mg./100 g.)	
In distilled water	4.71	22.4
In Cambridge tap water	6.69	38.9
In Cambridge tap water with kitchen salt	9.28	44.9

calcium a day than they would be reckoned to have according to food tables. These quantities are small when compared with the 60 mg. or so that people in Cambridge must be getting from their drinking water every day.

## IRON FROM COOKING UTENSILS

It is well known to all analytical chemists that great precautions have to be taken to avoid contamination when iron analyses are being made, and metabolic experiments involving iron are difficult to carry out for this reason. Tables showing the amount of iron in food-stuffs are based on analyses of foods prepared with the greatest care to prevent contamination with extraneous metal. In the kitchen, however, no such precautions are taken. The housewife has her favourite kitchen knife, she has her mincer, and her chipped enamel pots and pans. Ranganathan (1938) has pointed out the danger of calculating iron intakes from food tables because of this likelihood of iron contamination. McCance, Widdowson and Shackleton (1936) found that dried apricots and 'Sunmaid' raisins contained a great deal more iron than would be expected from an analysis of the fresh fruits, and they suggested that these fruits derived their property of haemoglobin regeneration, not from the iron which they naturally contain, but from iron contamination during the stoning process. Acid fruits might naturally be expected to dissolve more iron than neutral foods such as meat and vegetables.

Two samples of apple were prepared by cutting fruit in half with a stainless steel knife and placing one half of each apple in each sample. One portion was peeled and cut up with a stainless knife, cooked in distilled water in a glass beaker and analysed for iron. The second sample was peeled and cut up with an ordinary kitchen knife and again divided into two portions. One portion was cooked in distilled water in a beaker as before, the other cooked in distilled water in an enamelled saucepan which was slightly chipped. Both were

analysed for iron. Table IV shows the results, which have been corrected for differences in evaporation in the three samples.

It is clear that stewed apple prepared and cooked in this very ordinary manner became as good a source of iron as the best roast beef. 100 g. (3½ oz.) of it is quite a moderate helping, and it would provide about half the daily require-

TABLE IV—IRON "CONTAMINATION" FROM KITCHEN UTENSILS

	Fe (mg./100 g.)
Apples cut up with stainless steel knife and cooked in distilled water in glass beaker	0.31
Apples cut up with ordinary kitchen knife and cooked in distilled water in glass beaker	2.30
Apples cut up with ordinary kitchen knife and cooked in distilled water in chipped enamel pan	6.00

ment of iron. Both the knife and the pan contributed their quota. Vegetables do not take up iron to this extent, probably because they are less acid.

The mincer must always be considered as a possible source of iron. Some raw lean beefsteak was divided into two portions. Half was minced and analysed for iron, and the remainder was analysed without being minced. The beef as purchased contained 2.73 mg. iron per 100 g.; after mincing it contained 4.79 mg. Hence it must be concluded that iron intakes as calculated from food tables will almost certainly be too low, and it is suggested that, among the poorer classes particularly, the kitchen utensils may be an important factor in the prevention of anaemia. No experiments have been made with iron saucepans, but these are often used in Service and institutional kitchens, and it is probable that iron contamination from them would be far higher than from any of the utensils investigated here.

## SUMMARY

The chemical composition of individual mixed diets as determined by the direct analysis of duplicate portions has been compared with the values obtained by calculation from food tables. The results are considered to be sufficiently close to warrant the use of food tables in dietary surveys.

It has been shown that up to 200 mg. of calcium a day may be obtained from the drinking water in districts where the water is very hard. This is as much as there is in the adult milk ration during the winter months.

Iron intakes as calculated from food tables should be regarded as minimum values. The actual intakes must sometimes be a great deal higher because of contamination from various cooking utensils.

We wish to thank all who have helped with this investigation, particularly Miss G. Chappell, who was responsible for the figures in tables III and IV. E. M. W. is in the whole-time service of the Medical Research Council.

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## TREATMENT OF CHRONIC EMPYEMA

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THERE is no well-defined point at which an empyema becomes chronic. At one end of the scale patients obviously come under this heading—for example, the man whose cavity has been draining intermittently for 10 years and whose scars testify to unsuccessful operations in China, Singapore, South Africa and Southampton. At the other end of the scale there is no sharp distinction between chronic and acute cases. Sometimes the transition corresponds to the time at which the surgeon loses interest in the case, and occasionally this is lamentably close to the date of operation. Each case has its own peculiarities and needs treating individually, but the treatment essential to them all in the first place is adequate drainage. Cavities that have been present for years may heal completely with no treatment other than simple drainage. For those that do not heal many operations have been devised and any one of them may be appropriate to a particular case. The aim of this paper is not to present a new operation which is universally applicable, or one which should necessarily displace other and well-tried methods, but to introduce a method of attack which I have found valuable on many occasions, and which has the advantage of being less mutilating than many of the procedures now in use. Some of the most common and difficult cavities to close are those extending upwards from the scapula often as far as the second or third ribs. They may be rather narrow, often not very deep and may communicate with one or more bronchi. They represent the final equilibrium after adequate and continued drainage has produced its maximal result. The capacity of the cavity may be quite small but may require the removal of a large area of chest wall including lengths of 7 or 8 ribs and part of the scapula.

An important advance in the treatment of such cases was made by Roberts<sup>1</sup> who, after resection of ribs, used the hinged flap of parietal pleura and intercostals to help fill in the cavity. The method presented in this paper consists of resecting lengths of one or two ribs at the base of the empyema in order to gain access to the cavity, and then stripping the thick parietal layer of fibrous tissue from the overlying intact ribs and intercostal bundles, depressing it on to the surface of the lung, and holding it there by means of a pack. This obliterates one cavity and makes a second of equal volume, but the walls of the new cavity are fresh and it heals up astonishingly quickly.

## TECHNIQUE

In the first place a simple rib resection and drainage operation is performed, if necessary with excision of the old drainage sinus. If no bronchial fistula is present the cavity is washed out daily with Dakin's solution. For this the patient is placed in such a position that the whole of the cavity is dependant from the point of drainage. The amount of solution necessary to fill the cavity is then an accurate measure of its size and can be charted daily or weekly. If the empyema communicates with a bronchus, the rate of healing can only be estimated by repeated radiological examination after the injection of iodised oil.

If the volume of the cavity remains constant over a period of 2 or 3 weeks, or if the radiogram shows only very slow decrease in size at the expense of the chest wall, then the second stage is done. The operation is carried out under general anaesthesia supplemented by local injections of the intercostal spaces. If a fistula is present an intratracheal tube is used so that suction can be applied should blood accidentally enter the bronchial tree. A drip infusion of plasma or blood is given during the operation. An incision is made down to the ribs over the lowest part of the cavity, usually just above the drainage opening. One, two, or even three ribs are then removed over the base of the cavity, extending beyond its anterior and posterior limits for an inch or two. The number of ribs removed depends on their breadth and on the available space left between ribs. It is only necessary to make a gap in which the bent finger can work. An

1. Roberts, J. E. H. Brompton Hospital Reports, 1936, vol. v, p. 61.

elongated oval piece of thickened parietal fibrous tissue is then excised from the gap over the whole antero-posterior length of the cavity. This will usually include one or two intercostal bundles, in which case the vessels are ligatured and cut at each end of the wound. The intercostal nerves are divided separately, first at their posterior ends and then anteriorly. The nerves should never be included in the ligatures which seal the vessels. The base of the cavity is now widely exposed, and its limits can be explored with the finger.

In the top of the wound the lowest intact rib is seen, and immediately deep to this is the glistening white face of the cut parietal fibrous layer which may be 1-3 cm. thick (fig. 1). A line of cleavage between this layer and the rib can easily be found by nosing in a pair of closed Mayo's scissors and then opening them in a direction parallel to the rib. The cleft so made is then enlarged by repeating the procedure with larger scissors bent on the flat until finally the index finger can be inserted. I have usually found this separation much easier than I anticipated, but although it can mostly be done with a strong finger some further instrumental help is sometimes necessary where the overlying ribs make deep grooves into the hand tissue; for this I have used the spoon end of a Matson rib stripper and elevator.

The flap is freely mobilised until it can be pressed down into even contact with the visceral layer of fibrous tissue over the whole extent of the cavity (fig. 2). Usually this mobilisation is enough, but it sometimes happens that the flap is so thick and the empyema cavity in part so narrow that the two surfaces cannot be accurately approximated. In such circumstances the flap may be incised along either its anterior or posterior attached margin, the incision being made not perpendicular to the surfaces but at such an angle that a bevelled edge is produced, allowing the now hinged flap to slide down into the cavity (fig. 3). If no bronchial fistulae are present the fibrous covering of the lung may be carefully incised in a chessboard fashion but it is better not to do this than to injure the underlying lung.

The mobilised parietal flap is pressed down on to the lung and held in place by packing the cavity between it and the ribs. This packing is best done with dry gauze into which sulphanilamide powder has been rubbed and it must be so tight that it produces uniform approximation of the two layers. The wound in the chest wall is lightly packed and a firm 'Elastoplast' dressing is applied.

Ten days after operation the pack is removed under gas and oxygen anaesthesia. The parietal flap is now seen to be firmly adherent to the lung, and the extrapleural space clean and healthy. Any bronchial fistulae which were present are by now sealed so that irrigation with Dakin's solution is possible. The cavity is treated in much the same way as the pelvic space after perineal excision of the rectum. It is washed out once or twice daily and a very light gauze pack wrung out in Dakin's solution inserted. The volume of the cavity is measured as already described. If healing takes place antero-posteriorly more quickly than from above downwards, it may be necessary in the later stages to insert a tube to keep the drainage free. The success of this method may be indicated by the following case-reports.

CASE-HISTORIES

CASE 1.—A boy of 14 years. At 2 years of age pneumonia was followed by an empyema on the right side which was treated by rib resection and drainage, but the wound continued to discharge. There was a further rib resection at the age of 5 years. On neither occasion had any care been taken to ensure expansion of the lung before removal of the tube, and the empyema cavity persisted. Ultimately the boy developed a chronic cough with much purulent sputum. Investigations revealed that he had on the right side a chronic empyema of about 100 c.cm. capacity with two large bronchial fistulae. There was much collapse of the right chest wall. The cavity extended from the base up to the third rib in the posterior axillary line and was for the most part under cover of the scapula. A satisfactory open drain was made. There was slight decrease of capacity in the first few weeks but the cavity soon became stationary. Closed suction drainage was ineffective as the large fistulae prevented any negative pressure from developing. Cough and sputum ceased almost immediately after drainage. Six months later the lowest part of the

cavity was exposed after resection of parts of 3 distorted ribs, and the layer of parietal fibrous tissue, 1 cm. thick, was mobilised according to the method already described. The pack was removed after 2 weeks. The flap was found to be adherent to the lung, and the fistulae sealed. The capacity of the newly formed extrapleural space was 100 c.cm. and healing of this took the following course:

Days after removal of pack	5	19	32	42	66
Volume of cavity in c.cm.	85	28	15	5	Healed

CASE 2.—A woman of 24. After an attack of pneumonia developed in the left side of the chest and an empyema was not discovered for 11 months.

At operation it was reported that 3-4 pints of pus were removed. Closed drainage was used for 5 weeks and then replaced by an open drain. After 6 months adequate drainage she was left with an irregularly shaped stationary cavity of about 150 c.cm. Parts of the 8th, 9th and 10th ribs were resected over the base of the empyema and the cavity widely exposed by removal of the corresponding intercostal bundles and parietal fibrous layer. The upper part of the cavity extended as far as the 3rd rib at about its angle. The parietal flap was mobilised over this area and treated as already described. The cavity volume records were lost, but the extrapleural space was completely obliterated in 60 days.

CASE 3.—A woman of 36. After a left lower lobe lobectomy, collapse of the upper lobe and a total empyema developed. After 12 months drainage a residual cavity of about 70 c.cm. with a bronchial fistula was left under the axillary border of the scapula and extending up to the second rib in the posterior axillary line. The parietal fibrous layer was 2 cm. thick and even when fully mobilised could not be kept in uniform contact with the visceral layer. It was therefore cut with a bevelled edge along its posterior border as in fig. 3. The pack was removed after 10 days, the fistula was sealed, and the extrapleural space healed up as follows:

Days after removal of pack	9	15	22	29	36	69
Volume of cavity in c.cm.	53	30	20	11	5	Healed

DISCUSSION

This operation was devised in the belief that the chronicity of an empyema depended less on the elasticity of the lung than on changes occurring in the chest wall. It seems that something prevents the inflammatory process at the margin of the cavity from causing further adhesion of parietal and visceral layers. Whatever may be the mechanics of this healing process, it is obviously carried on mainly in the chest wall, as shown by the fact that the fibrous tissue formed there is usually about three

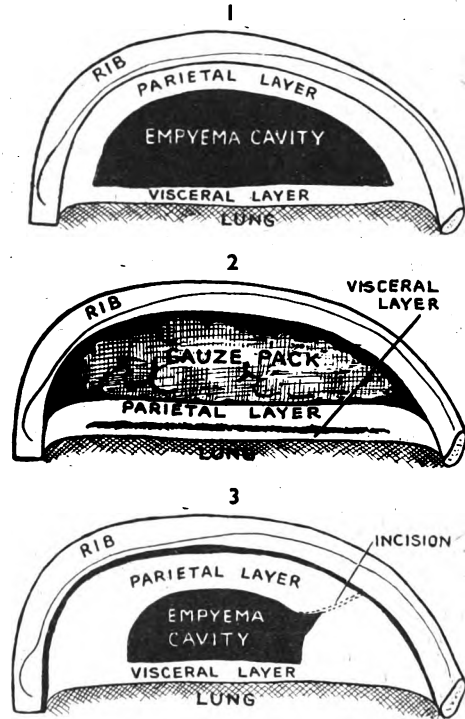


Fig. 1—Chronic empyema cavity in section.

Fig. 2—The thick parietal layer of fibrous tissue has been separated from the ribs, depressed on to the lung and held in uniform contact with the visceral layer by a tight gauze pack.

Fig. 3—The parietal layer of fibrous tissue has been separated from the ribs but is too thick to be depressed into the narrow cavity. A bevelled incision is made along the edge of the cavity as indicated. The flap can now be approximated to the visceral layer.

times as thick as that on the lung. It may be that the dense fibrous tissue tends to strangle its own blood-supply. The operation merely aims at producing fresh walls to the cavity and a fresh healing edge. Where the operation is applicable it has the advantage over other methods that fewer ribs need to be resected, fewer intercostal nerves divided, there are fewer operative stages and less final deformity.

#### SUMMARY

In the operation for chronic empyema described here, the cavity is obliterated by stripping the thickened parietal layer of the pleura from the chest wall and pressing it down upon the visceral layer by means of a pack; the new cavity produced in this way has fresh walls and heals quickly.

To gain access resection of parts of one or two ribs near the base of the empyema cavity is necessary.

Three cases are reported as examples.

### BLAST INJURY OF THE LUNGS WITH A CURIOUS LESION OF THE CEREBRUM

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A GUNNER, aged 26, was injured at Benghazi by the explosion of a small grenade of enemy manufacture. He was seen two hours later. Shock was severe; the radial pulse was weak but could be counted, and the rate was 120. His skin was cold and pale, and he had probably lost much blood. He was quite conscious but apathetic and slow in answering questions, which often had to be repeated. His replies, however, were deliberate and rational. He was unable or disinclined to give a clear description of the accident, but he described the grenade as being like a silver ink bottle.

The external injuries were as follows. The left hand was blown off at the carpometacarpal joint, and the right thumb and neighbouring two fingers and the radial part of the right hand were missing or shattered. The brunt of the explosion had fallen on the left side of the front of the chest, which was blackened and pitted with numerous small wounds, the largest being 2 cm. in diameter; the injuries extended with diminishing intensity across the midline for 4-5 cm.; below the level of the 7th rib in the nipple line there was little damage; no evidence of penetration of the wall of the chest. From the left side of the chest upwards over the neck and left side and front of the face the skin presented the same blackened appearance and many small wounds; the left eyeball had been penetrated and was collapsed, and the right cornea was scratched. The skin of the face was scorched superficially and the hair singed. A little blood still ran from lacerations about the lips and there was blood in the mouth and nose. The belly was uninjured except for scattered superficial scratches. The anterior and inner aspect of both thighs showed many wounds like those elsewhere, but more scattered and smaller.

Clinical examination at this stage was brief. No examination of the nervous system was made, nor of the chest other than inspection. Breathing was quiet; there was no bubbling, and no froth or blood escaped from the nose or mouth other than a few dark drops that appeared to come from the cut lips. The patient could move all his limbs. His condition seemed good enough to allow of immediate operation with the help of intravenous infusion of plasma.

#### OPERATION

Four hours after injury anaesthesia was induced with 'Pentothal' and continued with gas and oxygen. The left forearm was amputated above the wrist. While the amputation was in progress the patient's breathing became embarrassed and the anaesthetist, Major R. W. Cope, had difficulty in maintaining an airway. When he inserted a laryngoscope to pass an intratracheal tube bright red frothy blood was seen coming from the larynx. Once the tube was in position and suction had been applied the patient breathed more easily for a time. The frothy blood seemed to indicate penetration of the lung, and the wounds of the chest were therefore dealt with next. The five largest were excised and carefully explored. None was deeper than the under surface of the pectoralis major; all contained shreds of clothing and scraps of bright metal like aluminium, a few mm. in diameter—a typical finding in injuries due to explosive engines of the money-box class. There was much bruising of the subcutaneous

fat in and about each wound; fat droplets floated in the exudate and the fatty tissue around had lost its normal structure and seemed to be liquefying.

By the time the right hand and face had been dealt with, the operation had lasted 2 hours. The airway had never been satisfactory in spite of repeated suction applied to the intratracheal tube (yielding in all about 3 oz. of frothy blood mixed with mucus). The pulse had become feeble, and during the operations suspiciously little blood had flowed from cut vessels. Plasma had failed to flow smoothly into the internal saphenous vein, probably because the peripheral veins were collapsed; 400 c.cm. of reconstituted plasma was therefore injected through the cannula in the vein by means of a syringe, taking about 15 min. No further surgery was possible on account of the man's poor condition, and the wounds were dressed after liberal dusting with sulphathiazole powder. In the meantime breathing had become laboured. Though the pulse was a little stronger the patient grew more cyanosed and seemed likely to die of anoxæmia. The picture was that of respiratory obstruction, which the anaesthetist attributed to blood in the main air-passages. The man was therefore turned on his left side, half prone and all respiratory distress promptly ceased. A transfusion of 500 c.cm. of fresh blood was begun and the pulse rapidly improved. After half an hour respiratory bubbling began again, to be relieved once more by sucking out the blood from the intratracheal tube. From this time, however, the chest never seemed quite dry; the intratracheal tube was removed and found to be patent. Two hours later the man was returned to bed, lying half prone with the head and mouth low.

Next morning his condition was worse; respirations 40; a little blood continued to ooze from his mouth. In spite of repeated efforts to clear the upper air-passages, and the continuous administration of oxygen with a BLB mask for 4 hours, he died 37 hours after the injury. Though more than 30 hours elapsed from the end of the anaesthetic till death he never regained consciousness.

#### AUTOPSY

At autopsy, 10 hours after death, the operation wounds looked clean. The left pleural cavity contained about 6 oz. of liquid blood and the right about 4 oz. The thoracic wall had not been penetrated; ribs and sternum were intact, and the parietal pleura looked normal. In the loose tissue behind the sternum several small patches of hæmorrhage were noted but there was none in the intercostal muscles or parietal pleura.

Both lungs contained much blood, especially the upper lobes, anteriorly; the two lungs were equally affected. Towards the thin anterior and lower borders of the upper lobes the lung substance was solid with blood. More laterally the surface of the lobe was less affected. On section, however, it was seen that only a thin layer of tissue had escaped, and at a depth of a few mm. the lung was solid with blood through to the mediastinal surface. Those portions of the lungs in relation to the heart and neighbouring parts of the mediastinum had suffered most. Above and behind, towards the thickest parts of the upper lobes, infiltration with blood became patchy, and the visceral pleura related to the lateral and posterior wall of the chest was normal in colour apart from scattered subpleural spots of no depth on the paravertebral surface. The fatty tissue about the hilum of the upper lobes contained a few areas of hæmorrhage. When the lung was incised the heavily infiltrated parts dripped blood, and were seen to be honeycombed with rounded cavities up to 2 cm. in diameter filled with soft clot and fluid blood, without trace of lung tissue. The non-hæmorrhagic parts of the upper lobes and the lower lobes were fairly well aerated, but presented occasional small patches of subpleural and parenchymatous bleeding. Both lower lobes were a little congested and contained some fluid. The appearances commonly noted in lungs in death a day or two after an operation were reversed: thus parts of the upper lobes were solid and dark and did not collapse, whereas the lower lobes were by contrast pale, crepitant and shrunken.

The mucosa of the trachea was injected and there was a little frothy blood in the lumen. In the bronchi there was more blood, and the small tubes, leading to solid hæmorrhagic areas, were full of liquid blood.

The anterior surface of the pericardium was dappled with small hæmorrhages, more evident on the parietal than the visceral surface, and the pericardial sac contained a slight excess of faintly bloodstained fluid. On the anterior surface of the right ventricle towards the root of the pulmonary artery and extending into the areolar tissue above the pericardial

reflection was an irregular area of patchy hæmorrhage about 4 by 3 cm. The bloodstains were heaviest in the epicardial fat, but also extended through the muscular wall of the ventricle, to be seen plainly on the endocardium. The neighbouring part of the interventricular septum was also faintly stained. The other thoracic organs and the abdomen were normal.

The skull was intact and the dura mater seemed normal. The surface of the brain showed signs of increased intracranial pressure. The gyri were distinctly flattened; there was tentorial grooving and a small cerebellar cone. Over wide areas of the hemispheres a little subpial bleeding had taken place and the cortex was superficially lacerated in two spots, in the left temporal region behind the sylvian point, and on the orbital surface of the left frontal lobe behind the olfactory bulb. Two regions on the convexity of the brain (not sites of subpial hæmorrhage already mentioned) were an unusual lilac-pink colour. That on the right involved the whole of the posterior two-thirds of the parietal lobes; on the left the precentral and postcentral gyri were similarly affected. In these parts the gyri were notably enlarged and the brain swollen and soft. On section the lilac tint was found to extend through the depth of the grey matter of the cortex, distinguishing it precisely from the white matter. Though unchanged in colour, the white matter beneath the abnormal cortex was so soft that it could be wiped away from the cortex with ease, and thus the gyri could be readily dissected out intact. The appearance of the surface of the brain suggested that the junction of damaged and normal cortex was abrupt, but section revealed a similar but less intense alteration in colour of the grey matter outside the limits described, fading peripherally. The deeper parts of the cerebrum, the brain stem and the cerebellum seemed to be normal, apart from the signs of raised intracranial pressure already described.

**Histology.**—Vast numbers of recent capillary hæmorrhages were seen in the grey matter of the cerebral cortex. There was no gross change in the nerve-cells however and no appreciable cellular infiltration. The white matter showed little change and only occasional points of bleeding. Such degenerative changes as there were in the nerve-cells probably took place after death. Preparations stained with scarlet red did not reveal any evidence of fat emboli.

#### DISCUSSION

The injury to the lungs in this case can only be accounted for by the blast of the explosion. Though only about a third of the pulmonary tissue was affected the damage was intense; much more so than that described by Zuckerman<sup>1</sup> in animals. There is, however, a difference in the kind of blast to which Zuckerman's animals and this patient were exposed. The animals were subjected to the effect of a relatively heavy charge of explosive several feet away, whereas the distribution of this man's wounds shows that he was holding the grenade in front of his chest, probably in the left hand, and at a distance of not more than a foot. Consequently he received the force of a small explosive charge at very close quarters and on a limited area of his body.

The lesions found in the brain do not resemble any described hitherto as following death from blast.

For example, Zuckerman writes, "No changes were observed in the cortex, mid-brain, pons or medulla of monkeys subjected to pressures" (i.e., blast pressures), "as high as 110 lb. per square inch. . . . Changes in nervous tissue are more pronounced in rabbits exposed to high pressures. Pial hæmorrhages occur on the surface of the cortex, and hæmorrhage from the tela choroidea, filling the ventricles, has been observed. Hæmorrhages have not been seen, however, in either the grey or white matter of the brain." O'Reilly and Gloyne<sup>2</sup> describe a case of blast injury fatal in 4 hours in which the autopsy revealed a brain congested with small submeningeal hæmorrhages over vertex and base, with a little free blood in the ventricles, and no lesion in the substance of the brain. In the case described here there is no factor other than the effect of the explosion to account for the changes in the cortex. They were not due to fat emboli.

#### SUMMARY

In a fatal case of multiple injuries due to the explosion of a hand grenade at very short range, the external

injuries were not in themselves fatal. There was extensive hæmorrhagic infiltration of the lungs, typical of the kind due to blast. An unexpected finding at autopsy was a peculiar discoloration of large areas of the cerebral hemispheres, due to great numbers of minute hæmorrhages confined to the grey matter of the cortex.

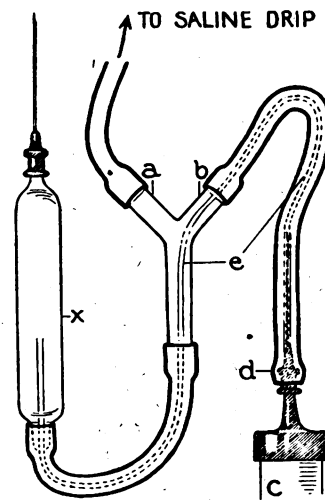
### NEW METHOD OF ADMINISTERING PENTOTHAL SODIUM FOR A LONG PERIOD

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FOR surgical procedures, which will take longer than the time afforded by a single dose of 'Pentothal Sodium,' the drug may be given either continuously, in the form of a weak solution, or intermittently in solution of normal strength, in which case the vein is kept patent by a saline drip and pentothal added to the saline from time to time as may be indicated clinically; this latter method is considered to have advantages over the former.

The principle employed here makes use of ordinary saline-drip technique, with gravity feed, the pentothal being added by means of a syringe through a branch tube. A standard commercial intravenous saline apparatus has been employed, modified as necessary, and a dye added to the pentothal so that its presence in the apparatus can be checked visually. The apparatus can be assembled from materials easily obtained in any hospital. A 'Vacoliter' (Baxter) or 'Sterivac' (A&H) is used as the source of saline (see figure). The glass drip mechanism, tubing, needle, &c. supplied for use with these can also be employed. Some 3 in. from the glass connexion between the intravenous needle and rubber tubing the tubing is cut and a glass Y piece introduced;



Apparatus for giving pentothal intermittently into the vein.

one limb (a) going to the saline drip, while the other (b) is connected to a syringe (c) containing the pentothal. The tail of the Y is attached to the glass tube carrying the intravenous needle. The syringe is fitted with a hypodermic needle; pushed over the shaft of the needle is a length of fine rubber catheter or stitch tubing, or if these are not available a length of ureteric catheter, which passes through the Y piece at (b) and ends half way down the glass tube (x) attached to the intravenous needle. The whole is rendered watertight by attaching a piece of rubber tubing to the limb of the Y piece and stretching the other end over the butt of the needle (d).

The syringe acts as a reservoir from which minimal quantities of pentothal solution can be mixed with saline entering the vein. By employing the fine tube as a channel for the pentothal, dead space is greatly reduced and the bulk of the solution remains under perfect control in the syringe. The mixture of pentothal solution with the saline takes place where it can be observed—in the glass tube attached to the needle. To make this obvious 1 c.cm. of a solution of indigo carmine, such as is used for renal investigation, is added to each 20 c.cm. of pentothal solution. The rate of injection of pentothal is regulated so that the saline in that part of the tube traversed by the catheter is not coloured by the dye. In this way the administration of the drug is kept under constant visual observation up to the moment it enters the vein.

The complete apparatus can be sterilised by boiling (unless a ureteric catheter is employed, in which case it should be autoclaved). To prepare it for use the drip regulator is attached to the vacoliter and the whole apparatus filled with saline. A 20 c.cm. syringe is filled

1. Zuckerman, S. *Proc. R. Soc. Med.* 1941, 34, 171.

2. O'Reilly, J. N. and Gloyne, S. R. *Lancet*, 1941, ii, 423.

with the normal 5% solution of pentothal; 1 c.cm. of the distilled water used for making the solution is replaced by an equal quantity of the dye. A second syringe similarly charged may be held in reserve. When it is necessary to change a syringe, this is easily accomplished by disconnecting the empty one from the hypodermic needle and replacing it with a full one; the resulting loss of saline from the apparatus is trifling.

## COMMENT

This intermittent method of administering an intravenous anaesthetic possesses the following advantages over the continuous administration of a weak solution:

1. A greater control over the depth of anaesthesia is possible. If the patient is too deep, no anaesthetic need be given for a period; alternatively, the depth of anaesthesia can be rapidly increased without it being necessary to introduce a large bulk of fluid into the blood-stream. In other words a wide change in the concentration entering the vein is readily achieved.

2. The intravenous anaesthetic can be given to a patient who is already receiving saline or plasma. In the latter case the drip feed is attached to the plasma bottle and plasma replaces the saline.

3. Anaesthetic agent is economised since only a small quantity need be mixed at a time.

4. By the simple expedient of changing a syringe other drugs may be introduced into the blood-stream (e.g., picrotoxin, nikethamide).

In evolving the apparatus the following points have been taken into consideration. It is essential that the dead space between the source of pentothal and the patient be reduced to a minimum, because only a small quantity of solution is employed and it is desirable that as a great part of this as possible should remain under control. Once the pentothal has left the syringe it should be in the patient's blood-stream, otherwise it is a potential danger. The internal diameter of the intravenous needle is the principal factor deciding the rate of entry of fluid into the blood-stream. No reasonable amount of pressure will result in a high rate of flow if a fine needle is employed. Let us suppose, for example, that 5 c.cm. has left the syringe; the whole quantity need not be in the patient. If the rate of flow into the blood-stream is slower than the speed of injection into the apparatus, a column of pentothal will build up in the tubing. Owing to the slow rate of entry into the vein the patient might still not be deep enough, so a further injection of pentothal would be made. Eventually a large (but unknown) dose would find its way into the circulation with probably serious results. The addition of dye to the pentothal solution acts as a safeguard against this, because as long as coloured fluid can be seen passing the inspection window, near the needle, it is known that pentothal is free in the apparatus and can gain access to the patient's circulation.

It is common practice to choose for infusion a vein in the antecubital fossa, but if an unwise choice is made the needle may readily become displaced during the course of the operation. Under light pentothal anaesthesia it is not unusual for the patient to respond to a painful stimulus by moving his arm. Although it is easy to prevent flexion at the elbow it is more difficult to prevent pronation and supination of the arm. These movements consist of rotation round the upper end of the ulna. In other words while the tissues in the neighbourhood of the flexor aspect of the head of the ulna undergo only a small degree of movement during the action of pronation and supination, the disturbance in the neighbourhood of the head of the radius is considerable. Consequently a vein should be selected in the antecubital fossa running upwards and medially—i.e., in the axis of rotation; not at right angles to it, which is the case if a vein running laterally is chosen.

## SUMMARY

The method of giving an intravenous anaesthetic over a long period here described makes use of a commercial saline infusion apparatus modified with materials which are readily available. A dye is added to the anaesthetic to act as a visual indicator of the presence of anaesthetic agent in the infusion system.

Intermittent dosage is to be preferred to continuous administration of a weak solution.

The vein chosen for the infusion should run medially in the antecubital fossa—that is, in the axis of rotation—so that it will not be disturbed by pronation or supination of the arm.

## THE CLINICAL APPLICATION OF ELECTROMYOGRAPHY

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THE work of Denny-Brown and Pennybacker (1938) has shown that the recording of action potentials from voluntary muscles in certain pathological conditions gives useful additional information concerning the nature and position of the underlying pathological process. The purpose of this paper is to illustrate further the value of electromyography in clinical medicine.

As a preliminary study we have carried out a considerable number of animal experiments in order to determine the nature of the electrical activity present in muscles after denervation by complete crushing of the nerve of supply, and during the course of nerve regeneration until functional recovery has taken place. Further, in one case of muscle denervation by nerve crushing in man (R. E. P. as subject) under experimental conditions the electrical activity was observed until functional recovery was complete. In the light of these studies, electromyographical observations have been made on a number of clinical cases. A detailed report of the results of the experimental and clinical studies is to be published in the near future.

In confirmation of the work of Denny-Brown and Pennybacker and others we have found that the action potentials from motor unit activity can be sharply distinguished from those of fibrillation. When a small concentric needle electrode (Adrian and Bronk 1929) is connected through a shielded lead to the input of a high-gain amplifier connected to a cathode ray oscilloscope and loud speaker, a motor unit action potential takes the form of a broad (5–10 millise.) and sometimes polyphasic spike up to one millivolt in amplitude, and is heard as a low-pitched sound in the loud speaker. Highly polyphasic clumps of sharp spikes occur in the earlier stages of recovery and represent "nascent" motor units. A fibrillation action potential, on the other hand, appears as a sharp, regularly repeated spike of about 1–2 millise. with a height up to 50 microvolts, and is heard as a sharp click in the loud speaker: it is not affected by the contractions of neighbouring normal muscle-fibres. The time of onset of fibrillation after denervation has been determined. It has also been found that action potentials similar to those derived from fibrillating (denervated) muscle are provoked in denervated muscle by the insertion of the needle electrodes, before the constant action potentials indicative of fibrillation become apparent. This mechanical irritability is present before continuous fibrillation begins and also after it has ceased. The cessation of most constant fibrillation action potentials is found to occur immediately before the appearance of nascent motor units and of signs of functional recovery.

A variation observed by ourselves and others from muscle to muscle in the same animal in the number and frequency of the fibrillation action potential spikes prompted us to investigate the activity of denervated muscle in several types of laboratory animal and also in man. This has shown that the time of onset of fibrillation activity after denervation is related to the size of the animal and suggests that the activity is related to the metabolic rate. For instance, in the peroneal muscles of the mouse fibrillation begins 3½ days after denervation, in the rat 4 days, in the rabbit 6 days, in the monkey (brachioradialis) 8 days, and in man (brachioradialis) 18 days after denervation. Moreover, the mechanical irritability indicated by the outburst of fibrillation-like action potentials upon insertion of the needle electrode begins correspondingly earlier and follows a similar time-course. Confirmatory evidence

was provided by the observation that in thyroidec-tomised rabbits in which the metabolic rate was lowered by about 30%, fibrillation action potentials are delayed in onset for about 14 days.

That the electrical activity observed in denervated muscle is indicative of fibrillation in the case of laboratory animals has been confirmed by visual inspection of the muscle. In addition, many denervated muscles in man have been inspected at operation for the presence of visible fibrillation. Denny-Brown and Pennybacker (1938) describe fibrillation as a "restless agitation without either apparent rhythm or obvious centre of activity." While the description is appropriate for small laboratory animals it is not entirely accurate for man. Our own observations on clinical cases have shown that in man fibrillation does not express itself visually in a continuous rippling of the muscle but appears as scattered and intermittent contractions of isolated fibres. Indeed, in one instance at operation no fibrillation was seen or recorded electrically in a completely denervated muscle which histologically appeared to be unaffected by any other pathological process. On the other hand, the muscle showed fibrillation-like action potentials which were indicative of an increased mechanical irritability upon insertion of the electrode. Our observations show that there is no direct correlation between the degree of fibrillation and the rapidity of muscle atrophy. Together with the studies of Solandt and Magladery (1940) these results cast doubt upon the theory suggested by Langley (1915-16) and Tower (1939) that the atrophy following denervation is in part due to over-activity consequent upon fibrillation.

As already stated, the number and frequency of the action potential spikes present variations from one species of animal to another and also in different-sized animals of the same species. The possibility was considered that the difference might be related to a variation in the average diameter of the muscle-fibres from animal to animal and even from muscle to muscle in the same animal. However, histological study of the experimental material failed to show any such correlation. The time course seems to be related to the metabolic activity of the muscle, and the number and frequency of the action potential spikes recorded are also probably dependent on this fact.

Finally, it has been found that while some electrical activity is always present in denervated muscle when muscular tissue has been proved histologically still to be present, where this has been replaced by fibrous tissue no electrical activity whatever can be obtained.

#### USE IN CLINICAL DIAGNOSIS AND PROGNOSIS

From a preliminary study it seems clear that electromyography may be of aid in clinical diagnosis and prognosis. The following points have been established as a result of our experimental and clinical studies.

1. The presence, more than three weeks after injury, of slight sustained motor unit activity on attempted movement (even in the absence of perceptible movement) and the absence of fibrillation action potentials indicates that no axons have been severed—e.g., transient block.

2. A mixture of fibrillation and motor unit action potentials indicates a partial nerve interruption or incomplete regeneration. In cases of doubt as to the presence of fibrillation a nerve block can be performed and the motor unit activity excluded.

3. Fibrillation action potentials in the absence of motor unit action potentials indicate complete lower motor neurone denervation of the muscle. In those cases where denervated muscle fails to respond to percutaneous galvanic stimuli, electromyography is of particular value.

4. A mixture of fibrillation and nascent motor unit action potentials indicates that muscle re-innervation has taken place.

5. The presence of fibrillation-like action potentials provoked by the insertion of the needle electrode in the absence of motor unit action potentials indicates complete nerve interruption. As already stated, such activity is found either before the onset of continuous fibrillation or after the cessation of continuous fibrillation, and immediately before the appearance of nascent motor unit action potentials. However, it must also be realised that in certain instances in man con-

tinuous fibrillation may never become apparent,<sup>1</sup> and from time to time increased irritability alone may be present.

6. When no electrical activity whatever can be obtained from a muscle more than a few weeks after nerve injury, severe morphological changes may be assumed to have taken place—e.g., fibrosis.

7. The identity of the muscle under examination is first established by stimulation down the copper-wire core of the electrode.

#### CASE-RECORD

The following case illustrates the application of electromyography in diagnosis and prognosis. It is a case of some interest in view of the nature of the lesion and the resulting disability.

A sapper, aged 26; peace-time occupation, engine-driver. He was admitted to a military hospital on Sept. 4, 1942, complaining that he could not raise his right foot sufficiently to allow him to do heavy physical training or long route marches. He gave the following history concerning the disability.

About 6 years previously he first had difficulty in raising his right big toe. He believed, but was not certain, that this disability followed a fall from his bicycle. Soon after this he noticed that he had to throw his foot forward when walking to prevent his toes catching on the ground. The condition, he believed, had become somewhat worse during the ensuing years, but was insufficient to prevent him playing football (kicking mainly with his left foot) up to a year ago. His incapacity had been so slight that he did not seek medical advice. He was able to carry out all his duties on the railway, being successively greaser, fireman and engine-driver. At the outbreak of war he was called up, but he was released after a few weeks because of the more im-

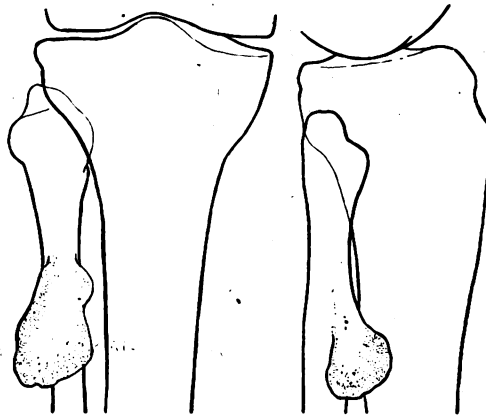


Fig. 1.—Radiographic tracings showing extent and position of the osteoma. Left: anteroposterior; right: oblique.

mediate importance of his civilian occupation. Three months ago he was recalled to the Army but found that his disability prevented him doing long route-marches or strenuous physical training. There has never been any pain associated with the condition. Nothing relevant noted in personal or family history. No history suggesting poliomyelitis and none of over-indulgence in alcohol, nor had his trade brought him in contact with conditions predisposing to peripheral neuritis. He could perform all the usual mental tests satisfactorily. Physically he was a healthy-looking man of powerful physique. No abnormal physical signs were detected in his head, neck, chest or abdomen. The upper extremities and the left lower limb were normal.

Neurological examination showed no abnormality of the cranial nerves, arm or abdominal reflexes. Both knee- and ankle-jerks were present and equal. The plantar response was flexor on both sides. Sensation was normal with one exception (vide infra). There was 1 in. of wasting of the right leg and complete paralysis of the right extensor hallucis longus, peroneus tertius and extensor digitorum brevis. There was also well-marked weakness of tibialis anterior. All other muscles were normal.

A sensory test showed hypoaesthesia to superficial pinprick and hypoaesthesia to a von Frey hair over the medial side of the second toe and lateral side of the first toe on the right side. A thermo-regulatory sweating test (Guttmann 1940) showed hypohydrosis over a similar area. Careful palpation of the right leg revealed a hard swelling 3.5 inches distal to the head

1. Our recent work has shown that in cases of lower motor neurone degeneration continuous fibrillation action potentials can always be obtained if the muscle being sampled is placed under a radiant heat lamp for some time.

of the fibula. The tissues overlying felt gritty and non-resilient. There was slight shortening of the Achilles tendon. X rays showed a poorly calcified cancellous osteoma arising from the upper third of the fibula, extending anteriorly and medially towards the tibia (fig. 1).

An interruption of the anterior tibial nerve at the site of the osteoma might have been expected to give rise to the clinical findings on anatomical grounds. The anterior tibial nerve gives separate muscular branches to the upper, middle and lower thirds of the anterior tibial muscle and the branch to extensor hallucis longus arises from the anterior tibial nerve in its middle third. The branch to extensor digitorum longus would escape, for this comes off above the level of the lesion.

**Electrical reactions.**—Extensor digitorum longus contracted briskly to faradism while tibialis anterior gave a feeble contraction. Extensor hallucis longus, peroneus tertius and extensor digitorum brevis gave no reactions to faradism or galvanism. All other muscles examined showed normal electrical responses.

**Electromyographic examination.**—Extensor digitorum longus: outbursts of motor unit action potentials normal in appearance and number. Tibialis anterior, upper third, above the swelling: normal motor unit action potentials on voluntary contraction. Middle third, just below the swelling: a single repetitive motor unit action potential only was obtained; also abnormal fibrillation—like irritability and a number of fibrillation action potentials. Lower third: no electrical activity obtained. Extensor hallucis longus: no electrical activity obtained (fig. 2). Extensor digitorum brevis: wasting was so gross that it was found impossible to insert the needle electrode into it with certainty. Below the swelling the substance of the tibialis anterior was hard to penetrate with the electrode and felt gritty.

The diagnosis was a cancellous osteoma, growing from the upper third of the fibula and interrupting the anterior tibial nerve supplying the extensor hallucis longus, the lower two-thirds of tibialis anterior, peroneus tertius, extensor digitorum brevis, and the skin between the first two toes.

With regard to treatment, the small degree of shortening of the Achilles tendon and the apparently slow progression for at least six years, together with the electromyographic findings, indicated that no useful purpose would be served by exploration and excision of the osteoma. It was inferred that the muscles below the point of lesion, since they showed no electrical activity, must have undergone severe structural change. In order to confirm this, small fragments of the tibialis anterior above and below the osteoma were removed for examination.

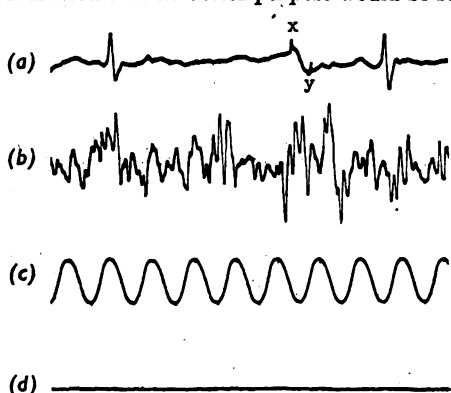


Fig. 2.—Electromyographic tracings. (a) From tibialis anterior distal just to the osteoma, showing a single repetitive motor unit action potential and two small fibrillation spikes (x and y). (b) From the same muscle proximal to the lesion, showing motor unit activity of normal muscle. (c) Calibration 100 microvolts 50 cycle/sec. AC. (d) "Noise level" of instrument.

The exposed muscle above the lesion looked normal and contracted when pinched. Below the osteoma the tissue looked yellow, was rubbery in consistency and did not contract when pinched.

**Histologically** the biopsy material from a position proximal to the lesion showed normal muscle-fibres. That distal to the osteoma showed fibrous tissue, with fatty infiltration and a number of fibrous strands intermingled with elongated nuclei resembling those of the endomysium (fig. 3).

This case illustrates the value of electromyography in precise diagnosis and prognosis and in making decisions for disposal. The man's trade was important and he could hardly be spared from his job. If it had been found that the muscles below the point of lesion were in good condition, an operation and a somewhat long convalescent period would have been indicated. How-

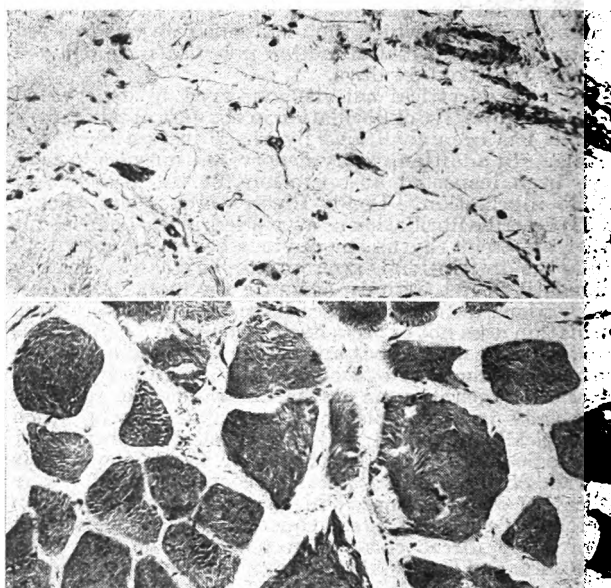


Fig. 3.—Photomicrographs of sections from tibialis anterior (x 120). Above distal, below proximal, to the lesion.

ever, operative interference was contra-indicated and the correct disposal of the patient was an immediate return to duty, being excused those physical exercises which he is unable to carry out.

The question why the tibialis anterior muscle below the point of lesion should have undergone fibrotic changes is interesting. In general, denervated muscles retain their muscular elements and may continue fibrillating for a considerable time. Tower (1939) kept a muscle experimentally denervated in a cat for a year, and ventures the statement that there seems to be no reason why a muscle should not continue to remain a potentially contractile tissue indefinitely after denervation. Our experimental observations have shown that the blood-supply to muscle is an important factor in relation to atrophy and also in relation to fibrotic changes, and further details concerning this are in course of publication. In this case, it is possible that the osteoma may have interfered to some extent with the blood-supply to the tibialis anterior and the other muscles involved.

SUMMARY

The electrical activity of voluntary muscle has been examined in man and a series of animals after experimental denervation.

The clinical value of electromyography is discussed from both the diagnostic and prognostic point of view.

The presence more than three weeks after nerve injury of slight sustained motor unit activity on attempted voluntary effort (even in the absence of perceptible movement) and the absence of fibrillation action potentials indicate that no axons have been severed (transient block).

A mixture of fibrillation and motor unit action potentials indicates a partial nerve interruption or incomplete reinnervation.

Fibrillation action potentials in the absence of motor unit action potentials indicate complete lower motor neurone denervation of the nerve to the muscle.

A mixture of fibrillation and nascent motor unit activity indicates that muscle reinnervation has begun.

When no electrical activity whatever can be obtained from a muscle more than a few weeks after nerve injury, severe morphological changes, such as fibrosis, may be assumed to have taken place.

We are grateful to Lieut.-Colonel G. O. Chambers for permission to publish this case; to Prof. W. E. Le Gros Clark, Prof. H. J. Seddon and Brigadier Hugh Cairns for advice

2. In man we have obtained fibrillation action potentials from a muscle more than 7 years after denervation.



and criticism. The expenses of this investigation were defrayed by a grant to one of us (G. W.) by the Medical Research Council.

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## SPONTANEOUS HÆMORRHAGES IN CHRONIC NEPHRITIS

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A HÆMORRHAGIC tendency may develop in cases of chronic nephritis and give rise to simple symptomatic purpura or purpura hæmorrhagica. In a second but rare group of cases extensive ecchymoses and severe hæmorrhages appear. This second type may be chronic, lasting for years, or may be acute and fatal within two months. No typical blood changes are seen in these patients. There are no purpuric spots and Hess's tourniquet test is negative. The platelets are usually normal, but may be increased or diminished. The coagulation-time is normal or slightly delayed (Minot and Lee 1937).

Gross spontaneous hæmorrhages were the only presenting symptoms in the following case. Chronic nephritis was only diagnosed at the autopsy and had not given rise to any other symptom during life.

## CASE-HISTORY

A turner, aged 21, was admitted to hospital complaining of weakness in his legs and severe attacks of epistaxis for two months. He had become gradually weaker and was confined to bed for 4 days before admission. On the morning of admission he was seriously ill with epistaxis, abdominal pain, and hæmatemesis. His bowels had been open regularly and the stools were of normal colour. He passed urine normally. There was no frequency of micturition and the urine contained no abnormal constituents according to the routine ward tests. He had been treated by his private doctor with liver injections and ferrous sulphate tablets for the past two months.

On examination he was very pale. His scleras were pearly white. The tongue and throat were normal. The heart was of normal size with a soft systolic murmur at the apex which disappeared on sitting up. Nothing abnormal was felt in the abdomen. Liver, spleen, and kidneys were not palpable. There was no purpura and Hess's tourniquet test was negative. Blood-count: red cells 760,000 per c.mm.; Hb. less than 20% (Haldane); white cells 7300 (polymorphs 75%, eosinophils 2%, lymphocytes 20%, monocytes 3%); reticulocytes 0.5%; no nucleated red cells or abnormal white cells seen. Icteric index 3.5.

He was given 1080 c.cm. of group 2 stored blood (3 days old). He started bleeding from his nose again next day and the bleeding could not be controlled for any length of time by local measures, which included Russell viper venom. He had another transfusion of 1080 c.cm., and 6 days after admission his red-cell count was 2,560,000; Hb. 55%; colour-index 1; white cells 8500; platelets 192,000. His sternal marrow on the same day contained: myelocytes, neutrophil 18.5%, eosinophil 4%, basophil 0.5%; metamyelocytes, juvenile neutrophil 8%, stab neutrophil 16%, eosinophil 1%; polymorphs, neutrophil 14%, eosinophil 2%, basophil 0; premyelocytes 4%; hæmocyto blasts 1.5%; lymphocytes 5.5%; normoblasts 25%; megaloblasts 0. Mitotic figures were seen in myelocytes.

Nine days after admission the patient started passing bright red blood per rectum. He continued bleeding from nose and rectum until he died 12 days after admission. His mental condition had been normal all the time.

*Autopsy.*—No wasting, no œdema, no petechiæ. Subcutaneous fat of normal colour. Heart slightly hypertrophied. Aorta contains a few atheromatous patches. Lungs of normal colour, no hæmorrhages. Hilar glands enlarged, apparently owing to an old tuberculous lesion. Stomach and intestine normal. Liver congested. Spleen of normal size. Kidneys small and sclerosed; capsule firmly adherent all round, cannot be stripped off; cortex reduced in width, markings irregular; distinction between medulla and cortex

seen with difficulty. On microscopical examination the spleen shows a slight excess of hæmosiderin and fibrosis to a degree exceeding the normal for the age of the patient. The hilar gland shows an old quiescent caseous tuberculosis. The kidneys show advanced chronic glomerulonephritis. The kidney destruction is so advanced that life could not have been prolonged for more than a few years. Small deposits of hæmatoidin and hæmosiderin are present.

## DISCUSSION

Anæmia in chronic nephritis was mentioned by Bright (1836), who said: "after a time the healthy colour of the countenance fades." Ceconi (1905) proposed the theory that the anæmia of nephritis is due to a deficiency of the hæmatopoietic system caused by retained toxins. Parsons and Ekola-Strolberg (1933) found that anæmia is an almost constant accompaniment of azotemia and has the same prognostic significance as high blood-urea values. If the anæmia was due to retained toxins depressing the bone-marrow one would expect this to be aplastic or hypoplastic. Isaacs (1937) found in his studies of sternal marrows of chronic nephritis that maturation is orderly but only a few cells mature. This was not found in our case where the bone-marrow showed a normal activity. Townsend and his colleagues (1937), in their studies of sternal marrow, came to the same conclusion, and state that the bone-marrow is either normal or hyperplastic in appearance.

The cause of the hæmorrhagic tendency is unknown. Brown and Roth (1922) found that the blood platelets in chronic nephritis are reduced in number, averaging 152,000 in 8 cases, and they thought that this may have some bearing on the hæmorrhagic tendency in some of the more severe cases of chronic nephritis with anæmia. But Parsons and Ekola-Strolberg (1933) found no material reduction of platelets in their cases and describe a woman whose outstanding clinical feature was bleeding from the gums until further study proved that she had chronic nephritis. This patient's platelets numbered 274,000. In our case the platelet count was 192,000 after the administration of 2 litres of blood.

## SUMMARY

A case of spontaneous hæmorrhages due to chronic nephritis is described, where the presence of a kidney lesion was not suspected during life.

Findings in the sternal marrow showed that the anæmia was not due to aplasia of the bone-marrow, but to inhibition of cell release.

I wish to thank the Medical Officer of Health for Coventry and the Medical Superintendent of the hospital for their permission to publish this case, and Dr. W. C. MacC. Wilson, deputy medical director of the Coventry Joint Laboratory, for his report on the sections.

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ELLA SACHS PLOTZ FOUNDATION.—During the nineteenth year of this foundation for the advancement of scientific investigation 44 applications for grants were received, of which 36 came from the United States and 8 from 6 different countries in Europe, Asia and North and South America. The total number of grants made during the year was 26. Grants are made to researches on problems in medicine and surgery. They may be used for the purchase of apparatus and supplies that are needed for special investigations, and for the payment of unusual expenses incident to such investigations, including technical assistance, but not for providing apparatus or materials which are ordinarily a part of laboratory equipment. Stipends for the support of investigators are granted only under exceptional circumstances. The maximum grants will usually be less than \$500 and applications for the year 1943-44 should be sent before April, 1943, to Dr. Joseph C. Aub, Massachusetts General Hospital, Fruit Street, Boston, Mass., USA.

## Reviews of Books

### Gas Warfare

*A Monograph for Instructors.* W. K. FITCH, MPS, editor, *Pharmaceutical Journal*. London: Pharmaceutical Press. Pp. 103. 2s. 6d.

THIS excellent booklet is for the expert. The author knows that the instructor must have a large and well-defined background of anecdote and knowledge if he is to teach his classes to the best advantage, and if he is to get the trainee to view the gas menace through the eyes of the chemist as something which need arouse no anxiety. Mr. Fitch has achieved that rarest of styles which combines brevity with clarity. The longest chapter deals with the general properties of war gases, and includes all those which have been used in war. Some striking notes are given on those used during 1915-18 and the results obtained by each. The detection and identification of war gases, respirators, protection in the home, treatment of contaminated food and drugs, treatment of casualties, decontamination, and the care of animals are also covered. The appendices include some practical questions for the use of the instructor, and a bibliography; the index is good. Even those familiar with gas training in the Territorial Army, Home Guard and Civil Defence will find here much that is new to them.

### Health for the Young

LINDSEY W. BATTEN, MB Camb, MRCP. London: George Allen and Unwin. Pp. 176. 6s.

THE path of the medical author writing for a lay public is beset with pitfalls—which Dr. Lindsey Batten sees and neatly avoids. He indicates what is accepted medical teaching and what his own personal view; does not confuse religious or moral precept with medical principle when discussing sexual problems; and writes in a style that is neither illiterate, condescending, nor obscured by technical terms. His main concern is the avoidance of disease in adult life by proper hygiene in childhood and adolescence, and though the thesis is almost as old as the art of medicine itself it is examined freshly from a personal angle which cannot fail to make it stimulating. Dr. Batten started his professional career by having to think seriously about health as MO to a combatant unit in the last war, and came to the conclusion that the Army understood and inculcated the art of healthy living far better than the civil state. Newly fledged doctors who find themselves in the Services and expected to know more about health (a subject receiving scant attention in the medical curriculum) than disease, might well profit by his experience. He is sensible, shrewd, and practical; and if only for the advice on how to get the best out of a doctor's visit and when to call him, his book deserves to be read by a large lay public and to receive the blessing of every busy practitioner.

### Blood Substitutes and Blood Transfusion

Editors: STUART MUDD, MD, professor of bacteriology, University of Pennsylvania, Philadelphia; WM. THALHIMER, MD, director of the human serum division, Public Health Institute, New York. London: Baillière, Tindall and Cox. Pp. 407. 27s. 6d.

THIS book is based on the papers read to the American Human Serum Association in June, 1941, but also contains other material and an effort has been made to bring it up to date. Over 80 authors are represented, and since their contributions are not coördinated in any way the result is an uneven standard. Some chapters are interesting, original, and point the way to further advances; some are just American reflections on experiences that we have already met with in this country; and some few might well have been omitted. The section on shock has been contributed by authors who have often written on this subject and have nothing new to say here. All the methods using desiccation and freezing for preservation of plasma and serum are described; the section includes quite out-of-date techniques and does not describe spray drying, which deserves mention in a work dealing with large-scale techniques. The section on hæmoglobin, serum albumin and casein digests as blood substitutes is the most original part of the book, even if the mention of matters like "electrophoretic schlieren patterns" makes things puzzling for the physician. Amberson

describes work on the lyophile drying of hæmoglobin and claims that regenerated solutions of such hæmoglobin can be used with safety and will maintain both oxidation and osmotic pressure; E. J. Cohn reviews the prospects of using bovine serum albumin and thinks something may come of this; Whipple reports successful results with a casein digest. The section on "blood substitutes in the world emergency" is scrappy and better reports of experience with the Forces have been given elsewhere, but included in this section is a detailed description by Johnson and Meleney of the technique for bacteriological control of these blood substitutes; they concluded that there is no preservative that will ensure sterility for long. They mention the "plasma for Britain" scheme in which merthiolate was used, but a high percentage of the flasks were contaminated when they reached this country. Novak, however, maintains that sodium sulphathiazole fills the bill. The section on the use of whole blood contains nothing fresh. Thalhimer's chapter on the preparation of high-titre specific antisera by concentrating the globulins is worth noting and so is the section on therapeutic experiences. The final "recapitulation and outlook" is not helpful. Several of the chapters have good bibliographies; and the book will be useful to workers in this field, but the newcomer will find it misleading because there is no critical estimate to guide him through the rather confusing maze of methods and opinions, often conflicting.

### Menstrual Disorders and Sterility

*Diagnosis and Treatment.* CHARLES MAZER, MD, FACS, assistant professor of gynecology and obstetrics at the graduate school of medicine in the University of Pennsylvania; S. LEON ISRAEL, MD, FACS, instructor in gynecology and obstetrics in the university. London: W. Heinemann. Pp. 485. 42s.

THIS valuable book, containing the accumulated knowledge and experience of its authors, illustrated by microphotographs and plates and reinforced by a well-chosen bibliography, is a comprehensive reference work for those specialising in the medical and endocrine aspects of gynecology as well as for the students and general practitioners to whom it is addressed. In England we lack works for the clinician summarising modern endocrinology in relation to menstruation and sterility. This is unfortunate, for a national interest in sterility is just beginning to waken and hitherto the medical profession as a whole has not been keenly interested in the treatment of the condition. The first part of the book is devoted to the physiology of the endocrines in relation to menstruation and reproduction. Abnormal manifestations associated with the menstrual cycle are considered in turn; taking cardinal symptoms one by one the authors build round each a complete picture of differential diagnosis and aetiology. Treatment is indicated but details of surgical procedures are not set out. Rather more than a third of the book discusses sterility, including the now well-recognised causes in the male partner. The authors describe techniques of investigation, many of which, such as tubal insufflation, endometrial biopsy, epididymal aspiration and testicular biopsy, can be carried out in the consulting-room without general anaesthesia and with little inconvenience to the patient. They advocate rather higher doses of endocrine preparations than those generally approved over here.

### Don't Be Afraid

EDWARD SPENSER COWLES, MD, director of Park Avenue Hospital, and of Body and Mind Foundation Clinic, New York. London: Jarrolds. Pp. 169. 8s. 6d.

Dr. Cowles is not a psychiatrist's psychiatrist. His naïveté is equal to his confidence, and his ideas belong to an earlier day. There is much theorising about "nerve-cell energy"; nervous fatigue is at the bottom of the "fear neurosis," he says, and "fatigue which reduces your nerve-cell energy below 80 units brings you into the neurasthenic field." He has apparently been successful in treating neurotic patients at a special clinic he has built up in New York; some of this success was evidently due to the social activities, and atmosphere of enthusiasm and hopefulness which were encouraged at the centre—a lesson not to be ignored by clinics of a more conventional sort.

# THE LANCET

LONDON: SATURDAY, FEBRUARY 20, 1943

## THE NURSE'S PAY

BELETED recognition of the shortage of suitable candidates for nursing has compelled a first step towards righting conditions of life in that profession. The Nurses Salaries Committee, under the chairmanship of Lord RUSHCLIFFE, and the corresponding Scottish committee under Prof. T. M. TAYLOR have published in their first and interim reports suggested scales of pay which, if not an advance on all previous proposals, at least outstrip common practice. Nursing suffers under many disabilities in comparison with other occupations open to women, and it is doubtful whether it is the cash that weighs heaviest with prospective candidates: long hours, restricted leisure and a conventual life are probably more serious deterrents. But reform must begin somewhere, and the Minister of Health and the Secretary of State for Scotland were probably wise in picking simple remediable anomalies of pay for the first attack. The National Advisory Council set up by the Minister of Labour (see p. 250) will doubtless tackle some of the other thorny points. It is encouraging that both the English and the Scottish committee asked that their terms of reference should be interpreted to include such conditions of service as hours of work, length of holidays, and interchangeability of pension rights; but disappointing that neither advocated optional non-residence for trained staff as an early reform. They recommend a 96-hour fortnight "as soon as conditions permit" (a somewhat feeble proposal), 28 days leave yearly, free uniform, and abolition of the fees paid, at some hospitals, by the student nurses on entry. Because of special difficulties in getting staff the salaries recommended for nurses in tuberculosis hospitals are somewhat higher than those to be offered elsewhere.

The main scales for nurses in training hospitals are set out on p. 248, beside the scale drawn up by the Royal College of Nursing in 1941. The Rushcliffe and Taylor scales differ from that of the college in two ways: the salaries ultimately attainable by trained staff are lower, and the salaries proposed for student nurses higher, than in the college scale. There are serious objections, often stated in these columns, to reform of nursing salaries along these lines. The student nurse already suffers under the disability, not experienced by any other student, of being paid by the institution from which she is receiving instruction; any increase in her salary increases her obligation to the hospital and gives greater excuse for the employing authorities to ignore her student status. The student may say (and often does), "But we do most of the work of the hospital. We *ought* to be paid, and paid well." This practice of running hospitals on student labour is at the root of much dissatisfaction in the profession. The aim should probably be to staff hospitals with qualified women and to admit only a limited number of picked students for training. But the Rushcliffe report states that "The number of trained nurses qualifying at the present time is inadequate to satisfy the large and

growing demands for their services or to make good the wastage that occurs when nurses leave the profession for personal reasons, such as marriage." This wastage is considerable; thus, in 1941, 6435 nurses qualified for the state register by examination, and 3411 left it; in addition a large proportion of student nurses (estimated by the Athlone committee at 20% during the first year of service) give up training without qualifying. It would be well to investigate the causes which lose to us such large numbers yearly. Marriage is not the only reason, and in any case it is not clear that marriage need form a bar to continued service. Nursing should not be restricted to celibates.

The Rushcliffe and Taylor scales for trained women, though falling short of the college standard, represent a substantial increase in pay for most of the nurses now serving in hospitals. It is interesting to compare them roughly with the corresponding rates of pay in teaching, an occupation into which many girls are attracted who might be suitable for nursing. Under the Burnham scale operating in one of the home counties the head certificated woman teacher of an elementary school of 200-350 children can achieve an ultimate salary of £342 p.a. This may be compared with the proposed salary of £450-£530 for a matron of a hospital of 200-399 beds. Here the reward is obviously much greater for the nurse, especially in view of the fact that the matron receives valuable emoluments. Most nurses, however, will not achieve matronship, but will work all their lives as ward sisters, and these are to receive a maximum of only £200 after 10 years' service in that office. A certificated assistant teacher in an elementary school rises to £258. The ward sister's emoluments (assessed by the committee at £100) must of course be taken into consideration, but it must also be borne in mind that a nurse's training is longer by a year or more than an elementary school teacher's, and that the teacher has advantages denied to the nurse—long holidays and the chance of a normal home life. Moreover if the ward sister chooses (and is allowed) to live out of hospital she is not to be granted the full £100 value of her emoluments in cash, but only £70; so that her resources will exceed those of the assistant teacher by only £12. Nevertheless the Rushcliffe scale does bring the prospects in nursing more into line with those in a parallel occupation.

Both committees recommend that their proposals should come into force on April 1. The cost of bringing the Rushcliffe scales into operation is estimated at £1½ to £2 million a year, of which the Government will pay half. The country will still be getting its nursing service cheaply, but it has made a move towards equity.

## HOME GUARD CASUALTIES IN INVASION

SCHEMES for the evacuation of injured Home Guards in an attempted invasion must have been further complicated by the manning of anti-aircraft and coastal defence guns by HG personnel, and by the slow evolution of the HG infantry from a purely static defensive force into one ready for offensive patrol action. Home Guard regulations, Army Council instructions, and the EMS circular (Gen. 353) of 1942 set out a basic scheme adapted to all areas,<sup>1</sup> but

1. For a much simplified summary see *Army med. Dept. Bull.* December, 1942, p. 8.

in those particularly liable to invasion the possibilities have to be considered in more detail. It is likely, for example, that ambulance traffic will be difficult or impossible for several days. Moreover, it would be reasonable to withdraw all ambulances from areas immediately threatened by the enemy, since an ambulance captured by some wandering parachutist might be used with devastating effect against our own strongpoints. The destruction of petrol supplies in threatened areas might also be a military necessity which would have to take precedence of the needs of the wounded. Enemy action might require the closure of roads or make them impassable by any but armoured vehicles, and few ambulances are adapted to cross-country work owing to their low clearance. In any case the number of ambulances has always been based on the requirements of blitz conditions and takes no account of what might occur during an invasion. It is useless to complain of this state of affairs, just as it is useless to bemoan that war inevitably produces casualties. But those responsible for HG wounded must face these facts and not assume that because there is in print the outline of a plan applicable to all parts of the country therefore this plan will work smoothly in their own district.

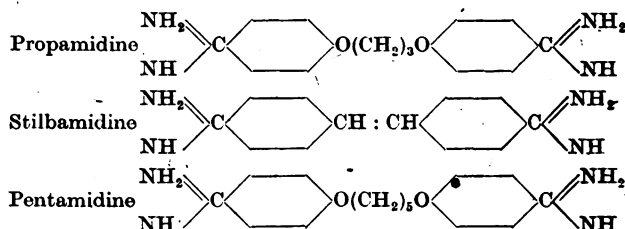
Except for those who are fighting alongside regular troops, the wounded are to be evacuated through civilian channels, and most local authorities are as anxious as the HG medical officers to evolve a combined plan which will work smoothly on the day of action. Any such plan must assume that no further equipment is to be expected from official sources. This means that local rates and local voluntary effort must be prepared to look after local people, and with the least possible call on ambulances. It seems essential that scattered casualties, both civilian and HG, shall not be carried into the nearest house without regard to the help and accommodation to be found there, but shall be collected into primary collecting posts. These may be, from the official point of view, HG casualty collecting posts, unofficial first-aid points, or such places as public assistance institutions, isolation hospitals or private first-aid posts in factories. Primary collecting posts must be prepared to retain their casualties for two or more days and to clear them on improvised transport to posts of the next grade. One small town has converted all its street-cleaners' barrows so that they can be used as wheeling ambulances; almost anything on wheels can be used. The primary post must also be ready to face a failure of the ordinary public services, and so must have independent means of water storage, lighting, cooking and sanitation sufficient, at least, to serve the needs of 6-8 wounded for two days. The primary collecting posts should be grouped as satellites around central collecting posts, into which they will move their casualties as occasion allows. These central posts can often be civil defence first-aid posts or points, especially where the latter have been upgraded or have been expanded into small hospitals by voluntary effort. From these posts civil defence ambulances, perhaps supplemented by military or improvised transport, would convey the wounded to EMS hospitals. Where this proved impossible a surgical team might be sent to smaller collecting units.

This two-point arrangement, comprising a central collecting post of fairly high standard surrounded by

such lesser posts as the Home Guard is accustomed to set up, would of course serve both civilian and Home Guard casualties. The distinction between the two is one of name rather than of kind: it must necessarily remain for administrative reasons, but the actual plans for dealing with casualties should give it as little weight as possible. This has always been realised by both the CD and HG organisations; nor is the Army unaware that its own posts may easily be crowded out by casualties which it cannot refuse. But none of the three parties, CD, HG, and Army, has ever been encouraged to plan its casualty services with an eye to casualties other than its own. Each has the equipment and posts considered suitable for its own needs, and since the combined equipment will probably prove reasonably satisfactory for the combined casualties there can be no good reason for any considerable administrative rearrangements at this stage. But it would be well if discussions could be held everywhere with a view to securing even closer coöperation than exists today. The two-point arrangement mentioned above, which provides against the sudden stopping of ambulance traffic, is an example of the practical schemes that further coöperation might bring forth.

#### DIAMIDINES IN PROTOZOAL INFECTIONS

APART from its topical use in wounds<sup>1</sup> propamidine is effective against protozoal infections. The three diamidines used for this purpose in human and veterinary medicine have the following formulæ:—



On initial trial they were found to be powerfully curative in *Trypanosoma rhodesiense* infections in mice and rabbits, and some had a strong effect on *Leishmania donovani* infections produced experimentally in hamsters; they also cured some of the piroplasm infections occurring naturally in animals. Early attempts to treat trypanosomiasis and kala-azar in man with stilbamidine were encouraging, and reports on large numbers treated have been published. In West Africa, in the treatment of *T. gambiense* infections the aromatic diamidines were shown to have advantages over the commonly employed synthetic compounds of the suramin type. In particular, pentamidine and propamidine were found as effective as suramin in the early stages, though inferior to the arsenical, tryparsamide, in late cases.<sup>2</sup> The relatively easily treated cases of kala-azar in India responded rapidly to the diamidines even when, as occasionally happens, they had proved resistant to antimony.<sup>3</sup> Better still, the Mediterranean and Sudan forms of this disease, notoriously refractory to antimonial drugs, were also cured by the diamidines, many patients being freed from infection even after long and heavy dosage with antimony in

1. *Lancet*, Jan. 30, four signed articles and a leader.

2. Lourie, E. M. *Ann. trop. Med. Parasitol.* 1942, **36**, 113.

3. Napier, L. E., Sen Gupta, P. C., Sen, G. N. *Ind. med. Gaz.* 1942, **77**, 321.

various forms had proved unavailing.<sup>4</sup> Further study however cast a shadow on the proceedings; sudden toxic sequelæ, some ending fatally in a few days, developed in a few of the cases treated with stilbamidine; and these manifestations were shown to be due solely to the use of the drug. The symptoms, which were largely due to liver changes, might not come on for a month or so, but then developed rapidly.

In the first selected cases of kala-azar in man treated successfully with stilbamidine, the small doses of drug were dissolved immediately before each injection, and the only toxic manifestations observed were immediate, trifling and ephemeral. In some of the later trials with larger numbers of cases however stilbamidine was used in much bigger doses and was dissolved in bulk some days and even weeks before administration; and it was in such trials that accidents occurred. It has now been shown that stilbamidine alters on being kept in solution, becoming toxic.<sup>5</sup> An obvious remedy is to dissolve the drug just before use. Solutions even a few hours old should be discarded and the dosage should be kept on the small side. The maximum safe dose has not yet been decided; daily doses of 1-2 mg. per kg. body-weight have proved safe and effective in man, and it seems inadvisable at present to exceed these amounts. So far there is no evidence that solutions of pentamidine and propamidine deteriorate like those of stilbamidine. Bearing this special danger in mind we should now be able to give the diamidine drugs their proper place in the treatment of protozoal diseases of man and stock.

### Annotations

#### OBSCURE FEVER IN THE CHILD

THIS is the time of year when the febrile child is at his most perplexing. The parents want to know the diagnosis: so does the doctor who has to admit, often for several days, that he does not know where the infection is lurking. Then the child gets well and everyone is pleased—everyone that is except the honest practitioner who, as such examples accumulate, wonders in his heart of hearts what exactly is the explanation.

To clear the air let us assume dogmatically that fever means infection. The dehydration fever of infants is not under discussion and in this climate (and at this season) heat stroke is unlikely. Fevers of metabolic origin possibly exist, but paediatricians are reluctant to accept them, and the facile label of "acidosis" has its risks, besides being scientifically inaccurate. The symptoms grouped under this title are the result of fever and not the cause of it—and the fever is due to infection somewhere. To find it, the doctor will have made a complete physical examination, but there are traps for the inexperienced. The painlessness of acute otitis media on occasion means that the drums must be examined whether the child has earache or not. Even acute tonsillitis may in children be associated with remarkably little pain. Fever, cough and loss of appetite may be mistakenly attributed to a lung infection unless the throat is inspected. The acute specific fevers do not always obey the rules: two days for the rash of scarlet fever, four days for measles and ten days for the enteric group are sometimes annoyingly extended and it is notorious that from time to time the rash of rubella appears after a week or more of

unexplained pyrexia. Of the common local infections often causing obscure fever, pyelitis, central pneumonia and (as seems to have been happening lately) infective hepatitis with delayed appearance of jaundice seem to be likely "spots" in a difficult case; slight hints are given by dysuria, a rise in the respiration-rate, and a tender upper right abdomen respectively. Meningococcal infection after infancy generally sets in acutely with early meningeal signs, but tuberculous meningitis can cause obscure fever for some days, and signs will only be detected by the experienced. Reluctance to bend the neck, a little fullness of the optic discs and a just palpable spleen may be grave warnings of systemic tuberculosis with meningeal involvement.

With upper respiratory tract infections even careful inspection of the nose and throat does not always convince the examiner that he has found the site of disease. Sometimes the evidence is circumstantial and retrospective. Enlarging cervical glands, and slightly stiff neck due possibly to adenitis in the retropharyngeal region and otitis media may follow a period of doubt, and thus incriminate the nasopharynx as the primary seat of trouble. Spread round members of a family may produce a mixture of clinical pictures: the same primary infection works itself out in one as otitis, in another as bronchitis and in another merely as high fever, perhaps with sickness and no other evidence of what the trouble has been due to. Faced with negative results of full examination in a case of obscure fever in a child the doctor can but announce the absence of localising signs and hold a watching brief; in the words of an ex-president of the Royal College of Physicians, he is dealing with a "clear case of deep-seated mischief." He must not give sulphonamides because he does not know what he is treating and he might dangerously dull the picture. Routine purgation is unwise. Abundant fluids and some help for the alkali reserve in the shape of citrate and bicarbonate are the best measures for the puzzling first few days. If the child is then well again such treatment will get the credit: if recovery is delayed the chances are that something will have turned up.

#### MOHS PLAN

FOR a full year 22 members of the Society of Medical Officers of Health deliberated on the lack of system for medical care revealed by the war and on the best way to reorganise provision for the health needs of the nation. The result was an interim report, printed in *Public Health* for September, 1942. This draft was discussed in detail by medical officers engaged in different kinds of work—administrative, public health and clinical—and the final report has now been issued as a brochure of 20 pages entitled *A National Health Service*.<sup>1</sup> Health is a national asset, says the foreword, and every member of the community should be entitled to the best possible health and its minimum disturbance by disease or any adverse condition. The plan to ensure this appears simple: let us try to put it in a few words. A new central department with health as its sole function, under a minister of cabinet rank with a central CMO responsible to him (Scotland separate and Wales with an administrative board of its own). New large local government areas devised on broad grounds of efficiency in which the extended health services would be run by the elected councils like any other public service (for rare or occasional conditions—e.g., smallpox, typhus, brain surgery—areas might combine). The areal CMO to be responsible for all health services, advised by committees appointed by the local doctors. General practitioners, mostly in groups, to act as first line of defence, working from health centres provided for them, with clerical and nursing help, regular visits by consultants, and conferences on latest medical developments. Within this organisation

4. Kirk, R., Sati, M. H. *Ann. trop. Med. Parasitol.* 1940, 34, 181.

5. Fulton, J. D., Yorke, W. *Ibid.*, 1942, 36, 134.

1. From the acting executive secretary of the society, at Tavistock House South, W.C.1.

patients to be free to choose who should be their "real family doctor." The hospital service to be complete—i.e., to deal with all forms and stages of invalidity—provided, for all members of the community on similar terms, by the area in coöperation with existing voluntary hospitals to meet the ascertained requirements of the people and their social circumstances; relieved by the health centres, and by a domiciliary nursing service, their outpatient work would be limited to emergencies, consultations, special treatments and follow-up. The laboratory service would be so arranged as to secure regular personal contact between its staff and those who see the patients as well as with the epidemiologists. Government would be asked to subsidise field research. Turning to ways and means, all and every service bearing on their health is to be available to every member of the community without any charge whatever. The poorer areas would receive Treasury grants so that standards would be equalised throughout the country. To employ the participating practitioners on a whole-time salaried basis would have the dual advantages of administrative efficiency and the elimination of undesirable competition for patients, although as between a capitation basis of payment and a part- or whole-time salaried basis no final decision is suggested. But to inculcate early the preventive outlook essential to the realisation of the plan there should be a postgraduate period of salaried training at both hospitals and health centres for every doctor before he chooses a career. Finally, as all this will take time to mature, a beginning should be made by establishing the new areas and giving their authorities discretion to plan and develop their own health services, and the major authorities power to set up whole-time salaried domiciliary service. It will now be evident, even from a cursory summary, that the simplicity is only in the manner of the report, not in its matter, and that the Society of MOHs have been planning comprehensively "for the advancement of public health" as has been their avowed aim ever since the society was founded 87 years ago.

#### HAND AND HANDINESS

In living beings variability in structure is found most commonly in those parts which are undergoing most rapid development of form or most extensive adaptation of function. In man such variability is chiefly evident in the cerebral cortex and in the hand. Highet's observations on the innervation and function of the thenar muscles, recorded on an earlier page, show that the usual anatomical account is inadequate and that there is a much greater degree of variation than is commonly recognised. In particular, he finds that the short flexor of the thumb is often supplied both by the median and by the ulnar nerves and that in some persons even the opponens and the abductor pollicis brevis are supplied by the ulnar and not by the median nerve. Man's hand has become capable of a wide variety of skilled movements and of precisely adjusted movement-sequences which can be "learned" or developed under the guidance of attention; many of these become by frequent practice almost involuntary in that they are produced in appropriate circumstances as automatisms which no longer require conscious attention and which are not even consciously intended. They vary from the simple processes involved in dressing and undressing to the most complicated fingering of the instrumental musician. Further, there are two special activities of the hand which associates it closely with the highest activities of the cerebral cortex. It is the instrument of one of the main ways we have of expressing our thoughts—of writing. Indeed, there are many persons who find that in writing they can express their thoughts with more precision and with greater fidelity than in the spoken word. The use of the hand to express emotion is less universal in more civilised communities, but it is still

very common and in many persons manual gesture does more than emphasise conversation; it greatly assists its fluency so that, deprived of this assistance, the most eloquent may falter and the man who cannot continue to fiddle with his hands is reduced to fumbling with his words.

The importance to man of these acquired movements of his hands is reflected in the comparatively large part of the excitable motor cortex which is covered by the hand area, and it is noteworthy that within this area the mechanisms controlling or initiating movements of the thumb are peculiarly sensitive. Not only does electrical stimulation within the area almost always lead to thumb movements, but when the area becomes irritated by disease processes (constitutional epilepsy or the local occurrence of a cerebral tumour) focal or Jacksonian fits so caused appear first as movements of the thumb and spread thence to involve the other digits and near segments of the arm. The thumb contributes maximally to nearly every complex movement of the hand. Loss of the thumb is the most disabling form of manual mutilation. To say of a man who lacks deftness with his hands that his fingers are all thumbs is an unthinking libel on this member and such lack of dexterity can be more properly described as having two left hands.

Despite this close association of manual activity and mental development, a high degree of refinement of the cortical responses is not always found linked with a correspondingly high degree of usefulness of the hands; witness the stupid man cunning with his fingers and the intelligent man who is a born fumbler. Nevertheless it is sound educational policy to strive for neatness as well as for accuracy of work, as assisting the development of clearness and precision of thought. It has been widely taught that to force a naturally left-handed child to use his right hand for writing may cause him to develop a stammer. Although this warning is probably misconceived, there lies behind it a truth which Hughlings Jackson has formulated and to which Highet's observations contribute—namely, that an organ such as the cerebral cortex which is in process of rapid biological development is one in which we can anticipate both conspicuous structural variations and conspicuous functional instability.

#### ABDOMINAL INJURY FROM BLAST

THE effects of an explosion in water differ from those of an explosion in air because in water the primary pressure wave is not followed by a wave of mass movement, nor is there a negative or suction wave. The shattering effects of blast are largely due to the component of mass movement, so that these are not produced when blast is transmitted through water. Otherwise the resulting injuries are in general similar, but whereas abdominal damage is rare on land, except in the fatal cases with multiple injuries, it has been fairly common after the tremendous explosions of depth charges, mines and torpedoes.

Surgeon Rear-Admiral C. P. G. Wakeley, in his John Burns lecture in Glasgow on Feb. 10, said he has seen over 80 such cases in this war, and operated on nearly 20; many cases are picked up dead and remain undiagnosed when no autopsy is done. The clinical manifestations vary greatly according to the distance from the explosion and its nature, and the man's position in the water. The effect is most severe if the man's abdominal wall is directed towards the explosion. Nearly always a sharp slap is felt on the abdomen—one man described the sensation to Wakeley as like a hand being placed around his waist and quickly tightened, together with a collapsed feeling as after a sudden diarrhoea evacuation. With this there may be paralysis and numbness of the legs due to spinal concussion. These usually pass off within an hour, sensation returning

with pins and needles, but many sailors have lost their lives because they gave up trying when they thought themselves permanently paralysed. In slight cases epigastric or umbilical pain may persist for some days after the blast injury, and there may be loose bloody motions; there are no signs of external injury and often none of an intra-abdominal lesion in such cases. In the more severe cases which Wakeley has operated on retroperitoneal and subserous hæmorrhage was always present, and lesions range from intramural hæmorrhages to actual laceration of the intestinal wall. The large intestine, because of the air it contains and its relative lack of muscle, suffers worse than the stomach or small bowel. The liver may be lacerated enough to cause dangerous hæmorrhage. Commonly the lacerations are multiple and extend upwards and inwards from the free border; they are difficult to suture and the diathermy cautery or packing with ribbon gauze may be the best way of stopping the bleeding. Wakeley used grafts from the rectus muscle to plug two rents in the liver in one patient. Like those produced by bullets, the openings in the bowel tend to close of their own accord by prolapse of the mucous membrane, and nearly always the omentum makes some attempt to seal the laceration. Cases may well have recovered without operation because of these protective mechanisms, but if there is any doubt it is better to look and see than to wait and see, for by waiting the patient may die of peritonitis.

Extensive laceration of the bowel wall may necessitate excision, with end-to-end union where possible or a lateral anastomosis reinforced by an omental graft. In the more usual slighter case the prolapsed mucous membrane is united, a few interrupted sutures being inserted over the area to reinforce the suture line and prevent leakage and adhesions. If there is any soiling of the peritoneal cavity sulphanilamide powder is dusted into it and over the suture line. Blood-transfusion may be advisable during the operation if there has been much hæmorrhage, and this may be preceded by a plasma-transfusion where extensive burns from burning oil have led to hæmoconcentration. In the common case where the cæcum is ruptured the laceration takes place on the outer side, as it does when cæcal rupture complicates annular carcinoma of the sigmoid colon; general peritonitis seldom develops in these cases. The after-treatment of blast injuries of the gut is along routine lines.

#### HOSPITALS AFTER THE WAR

A COMPREHENSIVE hospital service has already been foreshadowed by the Minister of Health. The *Hospitals Year Book*<sup>1</sup> for 1942, besides providing its usual feast of analysed facts considers how the voluntary hospitals can play their part and especially how they can work in partnership with the municipal hospitals. It seems that the voluntary hospitals look forward to steady rather than rapid developments along this line. They have a great contribution to make to the future service once they are assimilated into a regional scheme. They came through 1940 with a surplus of a million and three-quarters of income over expenditure. Under the Emergency Hospital Scheme they have reserved beds for casualties, and while this plan has relieved the hospitals of the cost of maintaining the beds it has also saved the Government much capital expenditure. As the report points out, the patient today can only receive thorough investigation in hospital, where the equipment and the skilled workers are grouped under one roof; there must be a great expansion to these facilities if they are to serve the whole community. Mr. S. Clayton Fryers, house governor of Leeds General Infirmary, discusses in the report the position of the hospital administrator in time to come. In voluntary

hospitals the senior administrator is usually a layman, in municipal hospitals a doctor. Both plans have advantages and drawbacks, as a recent discussion<sup>2</sup> at the Medical Superintendents Society showed. The voluntary hospitals are often highly successful in picking their lay administrators, the municipal hospitals sometimes less successful in picking their medical superintendents. It may not matter in fact whether an administrator is a doctor or a man with experience of the economic and efficient running of a hospital provided he has the gift of persuading a large number of people with different tastes, interests and types of education to live together in harmony and content, and to work synergically for a single end—the well-being of the patient.

#### LORD NUFFIELD'S TRUST

In a letter to the *Times* the president of the Royal College of Physicians has expressed the pleasure felt by the medical profession on hearing of the new Nuffield Foundation, described on p. 255. The precise use of the income accruing from this huge fund is for the trustees to decide; but, as Sir Charles Wilson says, it should enable men of promise to follow high adventure without the distraction of material cares. "Some will staff the units of social medicine which every teaching hospital will soon establish . . . others will plan to restore men and women to health and to work after illness or injury . . . others still will serve the needs of research in the wide fields of medicine and industry." The possible benefits from Lord Nuffield's action are immense, and so far as medicine is concerned he has chosen trustees who will bring knowledge and imagination to their task. Sir John Stopford is at once a distinguished anatomist and an experienced vice-chancellor; Dr. Janet Vaughan, daughter of the late W. W. Vaughan of Rugby school, is a hæmatologist whose experience has been enlarged during the war by charge of a large blood-transfusion depot.

#### SIR FARQUHAR BUZZARD'S RETIREMENT

IN April the regius professor of medicine at Oxford will retire from the chair he has occupied since 1928. During his years of office he has done much to renew the vital growth of the Oxford medical school. His vision and wise counsel will be remembered in connexion with the Nuffield Institute for Medical Research, the Nuffield Trust for Medicine and the war-time organisation of clinical teaching at the Radcliffe Infirmary. He has also helped in the work of coördinating the hospital and medical services of the country, while in the university he has been a notable member of council and of many committees, besides holding the office of curator of the chest. His friends and colleagues wish to commemorate his work, and a representative committee has suggested that his portrait should be painted and that a Buzzard scholarship or prize in medicine should be endowed. Donations may be sent to the Vice-Chancellor at Oriel College. The names of donors will be handed to Sir Farquhar.

Mr. LAMBERT LACK, consulting aural surgeon to the London Hospital, died on Feb. 14 in his seventy-sixth year.

Dr. ALASTAIR FRAZER, reader in pharmacology, has been appointed to the newly created chair of pharmacology in the University of Birmingham.

A special meeting of the BRITISH ORTHOPÆDIC ASSOCIATION will be held next Saturday (27th) at the RSM House, 1, Wimpole Street, when (at 10 AM) Brigadier W. R. Bristow, Brigadier Dudley Buxton and Colonel Rex Diveley (Kansas City) will discuss the organisation of orthopædic surgery in the British and American armies. The afternoon session (2-5 PM) will be given up to short papers on the management of various types of injury to the limbs.

1. Published by the Central Bureau of Hospital Information, 12, Grosvenor Crescent, London, S.W.1. 41 ls.

2. See *Lancet*, Jan. 30, p. 152.

## Special Articles

### REFORM OF LOCAL GOVERNMENT

LOCAL government in England is the result of piecemeal legislation, for Parliament has never considered it as a whole. The system, in consequence, is patchy, complex, illogical and unnecessarily expensive. True, it can be said to have met most of the demands made upon it, and it has responded wonderfully to the strains of war; but no-one could contend that it is perfectly fitted to cope with the heavier tasks that must develop from new conceptions of social welfare, town and country planning, housing, industry and education. A report from the National Association of Local Government Officers (NALGO) discusses its anomalies and defects and proposes remedies for them.<sup>1</sup>

The chief anomaly is that the local authorities with the largest populations and revenues are not necessarily those with the highest status. County boroughs and county councils possess far more comprehensive powers than any others, but there are rural districts containing more people than some of the smaller counties, and in one area an urban district with 190,000 inhabitants adjoins a county borough with only 28,000. More serious is the high proportion of authorities with populations and resources too small for the provision of services of the range and standard nowadays required: they cannot pay salaries that will attract an able and qualified staff; because of their low status and lack of executive powers they do not get the best type of councillor; for both these reasons they are more susceptible to pressure from vested interests; and they cannot take full advantage of technical and scientific developments. Inequalities in the standards attained in different parts of the country are all too apparent—witness the differences in death-rates from specific diseases. Coöperation between authorities is inadequate, and there is undesirable division of services; for example in the surveillance of milk-supplies three separate officials have to visit each farm. Because of the complexity of the system the public does not know where to turn for help and advice, and fails to take due interest in local affairs. Apathy is general, and in most areas local government, though theoretically democratic, is left to a few people of whose competence the ratepayers know little.

#### A BOUNDARY COMMISSION

The Nalگو report insists that the control of local government must remain democratic: in the long run bureaucratic or non-elective bodies would be less efficient. By simplification of the system and explanation of its work, the ordinary citizen should be induced to take more—not less—interest. To secure this simplification it is suggested that a permanent boundary commission should at once be established, whose first duty would be to divide England and Wales into a number of local government areas having populations generally between 100,000 and 500,000. Each of these areas would be served by a directly elected "all-purpose" authority having the full powers now enjoyed by county boroughs. Where such an area was mainly urban it would be administered from a single centre, but where it included a number of non-county boroughs or urban districts with populations over 20,000 these might retain or receive borough status and undertake services which the all-purpose authority would delegate to them: (It is thought important to preserve the smaller boroughs, many of which have ancient charters and a fine record of civic achievement, and the widest possible discretion would be granted them.) Elsewhere directly elected district councils would be constituted to administer local services, acting as district committees for the all-purpose authorities.

There remain the thorny questions of regional coöperation and central direction. With experience of civil defence regions during the war, the Nalگو committee is firmly against any proposal to create regional authorities which would supervise the local authorities of their region and link them to the central government. "Such a system would unduly restrict the democratic powers of

local authorities, would encourage public apathy and would lead to administrative delays. If local democracy is to be vigorous and effective, it must have the right to make representations direct to Parliament through the appropriate government departments." On the other hand, it is recognised that postwar conditions will probably require far closer coördination over wide areas, and swifter executive action, than was expected in the past, and to meet this need it is proposed that provincial councils should be formed for coördination and planning. Such councils, established by law, would be indirectly elected by the all-purpose authorities of their region, which would be bound by their recommendations. And it is here that medical planners will sit up and take notice, for the services over which these statutory provincial councils would exercise their planning and coöordinating function include "general hospitals, specialist hospitals, mental hospitals, and certain public assistance institutions." It seems to follow that regional hospital services or regional medical services, if such were devised, would have to be fitted precisely into the areas served by the provincial councils.

#### LOCAL CONTROL OR NATIONAL CONTROL?

The last few years have seen a great increase of "government by circular." The government departments making grants seek more and more to control the services for which these grants are provided, and today local authorities act largely as agents of the central government, fulfilling instructions on which they have not been consulted. The logical conclusion of this tendency is illustrated by the story of the fire service, which was eventually removed from local control and completely nationalised. The Nalگو committee dislikes the idea that health and social welfare services should be similarly taken out of the hands of the local authorities and placed under national control. It recognises, however, that local government is faced with two alternatives—"Either it must drastically amend its structure to enable it to achieve the degree of coördination, equality of standard and speedy decision and execution over wide areas required by modern conditions; or it must submit to a much greater degree of governmental control than has hitherto been imposed upon it, even to the cession of its most important services to the Central State machine, with the consequent dangers of remote control and responsibility and bureaucratic tendency."

### RADIOLOGY AFTER THE WAR

THE Faculty of Radiologists has issued reports on the planning of radiodiagnostic services and radiotherapy in Great Britain. Their common theme is the need for concentrating radiological work at places where accommodation, equipment and personnel are sufficient and efficient.

#### DIAGNOSIS

At present there are probably 800–900 X-ray diagnostic departments in hospitals in England and Wales, besides those in tuberculosis and other outpatient dispensaries, in nursing-homes and in consulting-rooms. The faculty believes that the service provided by many departments leaves much to be desired. Its adequacy usually depends on whether the neighbourhood offers enough private work to support a radiologist. "All will have sympathy with the general practitioner in a small town, many miles from the nearest radiologist, on whom falls the task of doing his best for his patients with an X-ray plant in a cottage hospital. Too often he is pressed to attempt work quite beyond his capacity and that of the apparatus." But experience shows that (exceptions notwithstanding) efficiency in a department is usually not achieved except under the direction and supervision of a radiologist of consultant status. An essential feature of this supervision is that every case examined in the department should be reported on by a member of the radiological staff. This rule should hold, it is felt, even in small departments visited by a radiologist only once or twice a week, where the clinician in charge of the case will often have interpreted the radiogram already for purposes of immediate treatment.

Every department should have at least one properly trained radiographer in charge of the radiographic work under the radiologist. A department with a turnover of

1. Interim Report on the Reform of Local Government Structure. National Association of Local Government Officers: 27, Abingdon Street, London, S.W.1. 6d.



2000 cases a year could utilise a whole-time radiographer, while smaller ones could be staffed by a part-time radiographer who was also working in a large department. But where the turnover is less than 1000 cases a year it may be difficult to justify the costs of maintaining the department at all.

A serious fault in many hospitals has been the lack of up-to-date equipment; some have been given apparatus unnecessarily elaborate for their work, while others much larger in the same district are poorly provided for. Using the terminology of the Medical Planning Commission, the faculty recommends that the key hospitals should be equipped completely, the intermediate hospitals should be able to handle all routine general radiological work, while in the cottage hospitals equipment should vary according to geographic situation. Unless some revolutionary change is introduced, the equipment of a department need not, on an average, be renewed for ten years.

Answers to a questionnaire show that nearly all members of the faculty prefer that their hospital work should be paid by salary. A majority of 2 to 1 believed their district would be best served by concentrating all radiology (including private work) at the hospital, where the radiologist would spend all his working hours. Only a small minority preferred whole-time salaried hospital appointment without the right to see private patients. In some hospitals the diagnostic X-ray department is closed to outside doctors—i.e., only patients referred from one of the clinical departments of the hospital may be examined. In future it seems best that the strict rule should be relaxed and the radiologist relied on to see that his department is properly used.

Future efficiency, the faculty declares, depends on a regional control and coördination of the hospital services generally.

"Only by the adoption of a planned scheme by a regional authority, armed with powers of persuasion sufficient to ensure its acceptance by the hospitals and commanding funds sufficient to meet the added expense, will the X-ray diagnostic services be raised to a satisfactory level of efficiency."

Perhaps the most important and radical change would be the appointment of the radiologists by the regional body, and that they should be appointed to the region.

"The basic principle of the staffing of the regional scheme should be to provide a medical staff at the divisional hospitals large enough to supply visiting radiologists to those hospitals in the division which are too small to support a radiologist of their own. These divisional hospitals would therefore require one or more senior radiologists according to their size, a number of assistant radiologists according to the requirements of the division, and one or two radiological registrars. The senior should be responsible for the radiological arrangements of the division, and the senior at the regional key hospital would be the regional radiological director, and would coördinate the services of the whole region. Most of the smaller hospitals would require a part-time radiologist only. He would normally be one of the juniors at the divisional hospital, working part-time at both. In this way the small hospitals would be served by competent radiologists, who would also have the advantage of the contacts and experience of a large key department."

#### TREATMENT

In the faculty's opinion treatment with radium and X rays should be kept separate from radiodiagnosis, and should be carried out in large departments with considerable staffs and a wide range of equipment. No department should treat less than 500 new cancer cases per annum, and the usual minimum should be 1000. To secure this latter number each would have to centralise the work of an area with about 2 million inhabitants. The appropriate staff is estimated at five radiotherapists, two physicists, eleven technicians, five clerks and an almoner, together with nurses to look after the beds (at least 85) under the radiotherapist's direct control.

London may be expected to provide radiotherapy for about 12½ million people. At present there are 30 hospitals in the London area offering a therapeutic service, and the faculty proposes their reduction to 6. Wherever possible radiotherapy departments should be part of a university medical centre, and in the provinces there should be one at each of the teaching schools—Birmingham, Bristol, Cambridge, Cardiff, Leeds, Liver-

pool, Manchester, Newcastle-on-Tyne, Oxford and Sheffield. "The radiotherapeutic unit would then become one of the members of that aggregate of specialist units which many people envisage as ultimately constituting the university medical teaching centre for a region." It is hoped that some form of amalgamation into a common organisation will be possible for the small number of excellent centres (e.g. Bradford and Wolverhampton) near but not associated with the main university centres.

Other areas where radiotherapy departments may be needed are Devon and Cornwall; "Wessex" (Southampton); the Leicester, Nottingham, Northampton, Derby area; the Lincoln area; and the Potteries. In Scotland the main centres should be single organisations, centred on Edinburgh, Glasgow, Aberdeen and Dundee. The north and north-west is regarded as primarily a transport problem. "Any attempt to establish, separately, centres for small numbers would be a mistake." It is recognised, however, that there may be parts of Great Britain where subsidiary centres must be set up to serve isolated populations of over 500,000. And though treatment departments should be few and centralised, diagnostic clinics should be numerous, one such clinic being required fortnightly or weekly for each separate population of 100,000 or more.

Skin cases could not be dealt with at the radiotherapy centres, but the other non-malignant conditions requiring radiotherapy are few and important enough to merit treatment there.

#### STERILISATION OF SULPHANILAMIDE POWDER

A FATAL case of tetanus,<sup>1</sup> possibly due to infection from the container of a sulphonamide powder applied locally, made it obvious that sulphonamides intended for topical application should be marketed ready sterilised, and in sterile containers. A conference, held last November, between representatives of the Medical Research Council and the Association of British Chemical Manufacturers discussed methods, and agreed on the procedure for large-scale sterilisation of sulphanilamide powder advocated by Hynson, Westcott and Dunning in America, and published in our columns with a covering letter from Lieut.-Colonel Perrin H. Long.<sup>2</sup>

Since this would take some time to put into general effect, and since the method could not in any case be applied to existing stocks of powder in hospitals and first-aid posts, methods of sterilising powder on a small scale were also considered and the following were recommended.

(a) *Dry heat maintained at 150° C. for an hour in a paraffin bath.*—Technique proposed by Berry.<sup>3</sup>

Use dry sterile cotton-wool plugged test tubes (5 in. by ½ in. or smaller diameter). Half fill them with the dry powdered substance, using a powder funnel. Flame the upper portion of the tubes and replug with the sterile plugs. Immerse to within 1 in. of the tops of the tubes in a liquid paraffin oil bath and maintain at 150° C. for 1 hour. If the tubes are to be stored the plugs should be covered with 'Cellophane' or paper.

(b) *Dry heat maintained at 150° C. for an hour in an electric oven,* with precautions to ensure even heating throughout.

(c) *Autoclaving in a dressings steriliser.*—Technique and precautions proposed by Buckland.<sup>4</sup>

An autoclave with vacuum drying attachment (dressing steriliser) is used and the container is a dry boiling-tube plugged with non-absorbent wool. The boiling-tube must be thoroughly dried, if possible in a hot-air oven. The jacket pressure of the steriliser should be ready at a pressure of 20–30 lb. Allow steam at 20 lb. into the empty closed chamber of the autoclave and leave for 5 min. Using the appropriate valves clear chamber of all steam and condensed water. This process has heated the chamber, and the boiling-tubes, loosely plugged with non-absorbent wool and containing the powder (in 5 g. or 10 g. batches), are now placed in it. They should be placed on their sides, with the powder spread over their full length, so that they give a thinner mass for the

1. See *Lancet*, 1942, i, 770.

2. *Lancet*, 1942, ii, 322.

3. Berry, H. *Pharmaceut. J.* 1942, 149, 139.

4. Buckland, W. J. *Brit. med. J.* 1942, ii, 264.

steam to penetrate. Leave the tubes for 15 min. in the hot chamber; this heats the tubes and their contents sufficiently to prevent condensation inside and on the powder. Autoclave at 15 lb. for half an hour. Clear the chamber of steam and any condensed water quickly, and allow a vacuum of 10-15 in. for 15 min. Remove tubes from autoclave, place a tight sterile plug of non-absorbent wool on the top of the one already in, and cap the tubes with a suitable paper—preferably cellophane. There will be no caking. If there seems to be caking, it is only present while the powder is still hot, and when cool a tap on the side of the tube will show that the sterile preparation is soft powder.

A sulphanilamide powder to be satisfactory for local application should not cake or be more than slightly discoloured with any of these techniques. The recommendations of the conference related only to sulphanilamide, that being the sulphonamide preparation most often applied locally. But Berry considers that the paraffin bath technique is also suitable for the sterilisation of sulphathiazole powder in hospital practice.

**NURSES' SALARIES**

THE first report of the Nurses Salaries Committee appointed by the Ministry of Health (the Rushcliffe Committee) and the interim report of the Scottish Nurses Salary Committee have now appeared. In the table the scales of salary proposed by the two committees are compared with those recommended by the Royal College of Nursing in 1941.<sup>1</sup>

Grade	Royal College of Nursing	Rushcliffe Committee	Scottish Committee
Student:			
1st year	£ 30	£ 40	£ 40
2nd "	35	45	45
3rd "	40	50	50
4th "	50	60	50
Staff nurse	100/5/150	90-100/5/140	60 unqualified 70 qualified. 100/10/120
Ward sister	150/10/250	130/10/180 plus an increment of £20 after 10 years	130/10/160
Departmental sister	.. ..	Ward sister's salary plus an allowance of £10-20	Scale not fixed
Housekeeping sister (certificated)	160/10/220	Ward sister's salary plus an allowance of £10-20	Scale not fixed
Home sister	.. ..	Ward sister's salary plus an allowance of £15-30	Scale not fixed
Senior sister tutor (qualified)	300/25/500	260/15/350	250/10/?
Assistant matron	Under 100 beds 175/25/250	Under 300 beds 205/15/250 300-499 beds 235-250/15/280-310	100-499 beds 200-240/15/245-285
	Over 500 beds 300/25/500	Over 500 beds 275-400	500-999 beds Between 275 and 375 Over 1000 beds Between 275 and 375 plus four annual increments of £15 (plus £25 p.a. responsibility pay for principal assist. matron)
Matron	Under 100 beds 250/25/400	Under 200 beds 250/25/375 200-499 beds 300-400/25-30/ 450-580	Under 100 beds 250/15/325 100-499 beds 280-350/20-25/ 380-?
	Over 500 beds 600/50/1000	Over 500 beds Between 450 and 700 plus six annual increments of £30	500-1000 beds Not yet agreed Over 1000 beds Responsibility payment of £50 p.a. over scale for 500-1000 beds (when agreed)

The salaries are those recommended by the Rushcliffe Committee for nurses in hospitals approved by the General Council of England and Wales for training in general nursing, sick children's nursing or fever nursing, and by the Scottish Committee for nurses in general hospitals (approved training schools).

1. See *Lancet*, 1941, i, 711.

**In England Now**

*A Running Commentary by Peripatetic Correspondents*

IN all that has been written and said about the Beveridge report I have yet to see anything on it as literature. I believe that in this account it can be put high. It has an even tenor of language that enables one to open it at any page and read on for some time about matters of which one knows nothing, and in this it resembles the *Origin of Species*. Compare, for instance: "there is, no need, in ending the present approved society system, to break or even weaken appreciably the close relation that has existed hitherto between the administration of state insurance for sickness and voluntary insurance for the same purpose" (sec. 72) with "natural selection can produce nothing in one species for the exclusive good or injury of another; though it may well produce parts, organs, and excretions highly useful or even indispensable, or again highly injurious to another species, but in all cases at the same time useful to the possessor." The married woman's charter (Change 6, secs. 107-111) might well be included in any anthology of English prose, not by the side of writers of fireworks like Carlyle and Macaulay, but with the more sober-worded historians who succeeded these, like the Trevellyans and John Morley. Comparison of the report with the *Origin* raises a word of warning from the older work; it is that the very ease of style may cause the reader to miss the substance. Huxley<sup>1</sup> tells of a "somewhat delusive simplicity of style, which tends to disguise the complexity and difficulty of the subject," and goes on to say that "long occupation with the work" had led him to believe that it was "one of the hardest books to master." In this he was supported by Hooker who wrote, "I have not yet got half through the book, not from want of will, but of time—for it is the very hardest book to read, to full profits, that I ever tried—it is so cram-full of matter and reasoning."<sup>2</sup> And so the report is also extremely clear but very hard to fully appreciate. May it have as great an influence upon the statecraft of this century as the *Origin* had upon the thought of the last.

I am afraid I was rather naughty. You see, it didn't say on the scruffy little demand-note who was to examine whom; so when I was ushered into a cell containing two officers in battle-dress, I thought of a new game that would include the best of everything. They were very nice youngsters. Called me "Sir" and laughed at all my little jokes; all, that is, except one about money, and I could see from that that they had been strictly brought up. Play was slow until they tested my eyesight. Without my glasses the two bottom lines were foggy, and I confessed as much. Nevertheless they made me read the letters aloud, covering the left eye and then covering the right eye, and I boggled dutifully at the last two lines each time; and then I said, "Shall I do it now covering both eyes?" And did so, reciting the whole lot perfectly; for I had lived with that particular test-card for some years. Love-fifteen. And then one of them got to work with the stethoscope. He didn't tell me whether to breathe through my nose or my mouth, so to be on the safe side I breathed through my nose while he was messing about on the right, and through my mouth for the left side. He spent a long time hopping from one side to another, making me goggle in front like a gold-fish. Then—"You don't seem to be getting much air into your right base," he said accusingly. "Oh, dear," I replied, "I got it working all right this morning at rehearsal. Do give it another chance." But he conferred anxiously in an undertone with his colleague—they both looked just like doctors at this point, and I wished I'd brought my camera—and the colleague borrowed the stethoscope and had a poke round. I reversed my breathing exercise. Then they conferred again in whispers. "You mean the LEFT side." "No, I don't. The RIGHT side. Practically no breath-sounds at all." "Well, I found less entry on the LEFT." "Does it make any difference which side of the nose I breathe through?" I chimed in. And they both said No it didn't; I mentally gave them full marks for this ready answer. Then they began filling up forms, so I asked if I could go home now? But no, a warder

1. *Essays*. Vol. II, p. 286.

2. *Life of Darwin*. Vol. II, p. 241.

led me to another cell where I smoked dreamily for a few minutes until he returned bearing my overcoat, scarf, and gloves, but no wrist-watch. We had a grand hunt for it, all three of them looking thoroughly guilty; but it was I who eventually found it when I got home.

The warder led me into yet another cell containing a nice elderly Colonel. I called him "Sir," and laughed at all his little jokes—every one of them, I'm afraid, regardless. He asked me some very easy questions and even wrote down my answers for me. Then I asked my question: How long would it be before I would be called-up? Would it be days, weeks, or months? Because I was thinking of taking up the clarinet. He said, "I can't say. You may never be called-up!" And there the matter rests. It's perfectly horrible being a secret weapon and not knowing when you're liable to go off.

\* \* \*

It is at times when things appear to be going a little better—if I may make so rash an observation without being accused of undue optimism and wishful thinking—that one begins to wonder whether we may not have been through the worst of it. Looking back over the past three years I am almost ashamed to admit that, through neither fault nor foresight of my own, I haven't suffered at all and wish only that there were more in the same boat. It is true that we had our one bomb which broke some of the church windows, blew Mr. Cram up the passage and sprained his wrist and, incidentally, jammed our backdoor; but somehow this seems a smallish drop in the ocean of armageddon and will furnish but a meagre feast of reminiscence with which to bore the grandchildren (if any). But the better news has deflated—at least for a time—my octogenarian patient Mr. Ranscombe who until recently has been inditing frequent rude letters all beginning, "Look here, my lad," to various members of the War Cabinet. Being himself a good deal of a blimp, Mr. Ranscombe has rather an anti-blimp complex.

\* \* \*

When I entered his room the great inventor was wrapped in thought. He came out of his reverie abruptly and started describing his inventions. "You know, this recent work on sulphonamide action is interesting," he began; "in the early days when all the sulphonamides were brightly coloured and were supposed to act like opsonins, I completed my theory of Phagocytic Vision." "What on earth," I mused. "The idea was that phagocytes could see and they preferred to eat bacteria when dyed a pleasant colour." "Like children eating brightly coloured cakes and jellies?" "Exactly," he nodded. "But I suppose the French workers spoiled that idea when they found colourless sulphanilamide?" "Yes," he said, "it was a bitter blow to me that the phagocytes were blind after all. I had just invented a new drug which stained streptococci in delicate shades of cerise and cream, which I believed would be irresistible to any artistic phagocyte." "How does the recent work affect you?" I ventured; "this business of essential metabolites and enzymes." "It seems to me a dirty way of fighting the enemy!" His face darkened, "deceiving them by giving a substance so nearly resembling the food they need that the poor beggars waste their precious enzymes on it." "No, I suppose it's not quite cricket," I agreed; "rather like killing an elephant by feeding it with fake currant buns which collar all its gastric juice so it cannot manage the real buns." The great inventor nodded. "That's the idea," he said. "Still it opens up a new line of thought. Could one exterminate rats by giving them ersatz cheese so that they couldn't manage the real cheese when they got it?" "I don't think that would work," I said; "cheese isn't an essential metabolite: they would manage with something else." He looked disappointed but continued: "Well what about Graves's disease? One could feed the patient on imitation iodine so that the thyroid would waste all its energies trying to make thyroid hormones out of the bogus material, and have no capacity to make active stuff." "There," I said, "I think you are on a more promising line; but what other work are you doing at present?" "I have here a scheme which I thought of in my bath yesterday," he pulled a sheaf of papers towards him. "You know that they use extract of bullock's heart as antigen in the Wassermann reaction?" "Yes," I murmured. "Well I thought that if one injected an extract of bullock's heart into all men in the

Navy it would immunise them against syphilis." "Possibly," I said, "but what about the danger of developing 'cor bovinum'?" His face fell. "I must warn the Admiralty," he muttered; "but be that as it may, can I interest you in a new disease I have just invented: 'Struve's Terrible Unilateral Anæmia'; different blood-counts from each side of the body (sometimes confused with 'Pseudo-Struve's' which is caused by different pathologists doing the count on each side). "No, I must be going," I said firmly. I started putting on my coat; my brain was already whirling round. "The treatment is simple," he went on dreamily, "transfuse the patient from one side to the other, or better still leave a permanent anastomosis, unless of course the condition is complicated by Struve's Terrible Unilateral Agglutinogens." "Have you ever seen a case?" I asked from near the door. "No," he replied, "but I shall never give up looking." As I stole out he was already hard at work on a scheme for treating insomnia with the blood of dormice. . . .

\* \* \*

I am getting more than a little tired of the censorious attitude of the press and others to alleged faulty medical certification. Personally for years I have signed panel certificates and put a date which is not the date of signing; but have always taken the precaution of drawing a horizontal line through "I hereby certify that I have examined you on the undermentioned date" and a vertical one through "Date of examination" and "Date of signing." It is crass negligence on the part of the societies to accept these mutilated bits of paper, but this is the first time I have written to the paper about it. When the local secretary of the Ancient Order of Heifers writes to us, "Will you please let me have two certificates for John Jones, dated March 1 and 8," if we had a really aggressive trade union they would prosecute him for inducing us to commit a felony—or perhaps it is a tort. Of course we only do these things to make it easy for patients and agents—pure good nature—but we don't get any thanks for it.

And it isn't only panel certificates. At this moment am doing a locum for Dr. Dose and an old woman has come into the surgery asking me to sign a pension paper saying that she is personally known to me. She has walked two miles and didn't know that Dr. Dose was away. He has known her for twenty years, but I have never seen her before. She stands by me old and frail and expectant. Am I entitled to sign my name "for Dr. Dose." You'd think not. Yet on the first page of the British Pharmacopœia I notice that it is published "for the General Medical Council." Now, Mr. President, perhaps you will tell me the dose of styrax? What, you don't know! Never heard of it! Disgraceful. Of oleum gossypii seminis, then? Good heavens, what woeful ignorance! Well, here's an easy one: urea? No no, you're guessing. Here's a last chance: what is the antimony trichloride test for cod-liver oil? Scandalous. Yet this book is published for you—in your name. You can't expect the poor publisher to know, he's only the printer. I'm afraid I'll have to direct the Registrar to erase . . . Or the Minister of Health, does he know all about the regulations that appear in his name? Of course he doesn't. There's one law for the politician and another for the poor practitioner. I join good company and sign.

\* \* \*

Week in, week out, they come to me.  
Here in my modest surgery  
I sit and grant certificates  
For spectacles, for dental plates,  
For clothing coupons, milk and eggs,  
For artificial arms and legs,  
For glucose, arch-supports and braces,  
For extra leave (in worthy cases).  
Certificates for this, for that . . .  
For sailor, soldier, airman, A.T.,  
For postmen, landgirls, coroners,  
For school-attendance officers,  
For Wrens and Waafs, Home Guards, Police . . .  
There is no prospect of release  
This side of Jordan. For my grave  
Here is the epitaph I crave:  
"The doctor fortunately died  
Ere he himself was certified."

## Parliament

## ON THE FLOOR OF THE HOUSE

MEDICUS M P

THE discussion on the Beveridge report is to take place on a somewhat colourless motion in which the report is welcomed as a valuable aid in determining the lines on which developments and legislation should be pursued but which does not demand immediate action. The motion has been put in this form to enable the Government to make statements on the four issues involved—the provision of a basic financial payment under practically all conditions for every citizen, and the three assumptions, allowances for children, full employment and a socialised medical service. The financial payments can be fixed and put into an Act of Parliament. So can allowances for children. A scheme of medical reorganisation can also be put into legal form, although it would probably need more than one act if it is to be complete and extend over the whole of curative and preventive medicine. But the maintenance of full employment for the working population cannot be dealt with by anything less than a new economic organisation whose ramifications will spread from the conditions of employment in the fields of Great Britain to the conditions of international trade and the determination of colonial and foreign policy.

On the next sitting day a resolution is to be moved in the name of Mr. Arthur Greenwood, leader of the Labour Party, headed by Conservatives, a Liberal, a National Liberal and Miss Rathbone, the Parliamentary mother of children's allowances, as an Independent, asking the Government to make a statement of policy on these allowances. There is so much general agreement behind the demand for them that action is to be hoped for.

A statement on the Government's plans for the medical service of the future is also wanted, but this may not yet be ready, for there is a lot of ground to cover. The Ministry of Health has on hand inquiries into hospital organisation, tuberculosis, and the immediate post-war medical relief in Europe. There is much material in the various reports on medical planning which have been produced during the war. Last week the Government put forward proposals for the appointment of a national council for the recruitment and distribution of nurses and midwives, and the report of the Rushcliffe Committee has also been published.

Nurses have been many things in their time, but not until lately have they become a bottle-neck in the treatment of tuberculosis. It is to be hoped that the Government can now make a comprehensive statement, for the medical and hospital situation needs clarification.

The Catering Bill has been put forward as a Government measure, but this does not necessarily mean that a Beveridge Bill will be introduced with equal Government backing unless the support in the House is general. The importance of such bills is great, but with the war moving to a climax, as revealed by the Prime Minister's survey on his return from Casablanca, even these important matters must take second rank if they throw strain on the coalition structure of the Government. The need to avoid this strain and to get general agreement on the Beveridge report is seen in the words of Mr. Greenwood's innocent motion. But behind the scenes strong pressure is being exerted to get the Beveridge report implemented before the end of the war. Considerable changes in medical organisation are in train now, and more changes are certainly coming.

## QUESTION TIME

## Rushcliffe Report

In reply to a question the Minister of Health stated: I have received from Lord Rushcliffe the first report of the committee which I appointed under his chairmanship on the salaries, emoluments and other conditions of service of nurses. This report deals with female nurses in hospitals and will thus cover the majority of the nursing profession. It is estimated that the total additional cost of bringing the committee's recommendations into operation will be between £1,500,000 and £2,000,000 per annum. I am today communicating with local authorities and voluntary hospitals commending to them

the recommendations and, with the agreement of the Chancellor of the Exchequer, am informing them that the Government are prepared to pay both to local authorities and to voluntary hospitals 50% of any increased expenditure in which they are involved in giving effect to the recommendations. The committee are already considering the salaries and conditions of service of other groups of nurses, and have stated their intention of recommending that the proposals they formulate for them shall operate from the same date as the recommendations made in the present report. I am informed also that the Midwives Salaries Committee will recommend that their proposals about midwives shall operate from the same date.

The Secretary of State for Scotland also announced that he had received an interim report from the Taylor Committee on the salaries, emoluments and other conditions of nurses in Scotland, and had sent a similar message to local authorities and voluntary hospitals. The main part of the Taylor report deals with nurses in general hospitals. It also makes recommendations regarding the salaries of midwives, health visitors and district nurses. The committee has not yet concluded its negotiations on the salaries of nurses in certain other hospitals, for example, fever, sick children's and tuberculosis hospitals, but hopes to make recommendations for these at an early date.

## Distribution of Nurses and Midwives

MISS I. WARD asked the Minister of Labour whether he was yet in a position to announce the results of his consultations with the Minister of Health and the Secretary of State for Scotland, and the nursing and midwifery organisations concerned, on the subject of securing a better supply and distribution of nurses and midwives.—Mr. E. BEVIN replied: The present shortage and uneven distribution of nurses and midwives for civilian work demand special measures. After consultation I have decided to appoint a national advisory council for the recruitment and distribution of nurses and midwives to advise me on all questions relating to the recruitment and distribution of male and female nurses and of midwives on civilian work. The council, which will be presided over by a parliamentary secretary to my ministry and with which officers of the departments concerned will be associated, will consist of the following representatives nominated by the various organisations concerned.

Chairman: Parliamentary Secretary to the Ministry of Labour and National Service (Mr. McCorquodale).

Joint War Organisation of the Red Cross and St. John of Jerusalem	1
Queen's Institute of District Nursing	1
London County Council	1
Association of Municipal Corporations	1
County Councils Association	1
Association of Councils of Counties of Cities in Scotland	1
Association of County Councils in Scotland	1
Mental Hospitals Association	1
British Hospitals Association	3*

\* Including 1 from Scotland.

I am asking the council to meet at an early date and to give immediate consideration to measures for increasing recruitment, to arrangements for a special registration of nurses and midwives and to the priority to be accorded to the different demands for the different types of nurses and midwives, as well as to make suggestions for easing the situation in respect of certain types of hospitals with large immediate demands, such as tuberculosis and mental institutions. There is, of course, no intention of changing existing arrangements where those are working satisfactorily. The administration of such measures as are decided upon will be entrusted to the appointments department of my ministry acting where necessary through the local appointments offices, each of which will be assisted in its work by a local advisory committee.

Mr. BEVIN in reply to further questions said that his statement did not mean that the nursing services of the Ministry of Health would be transferred to the Ministry of Labour. Anyone discharged from the three Fighting Services possessing nursing experience would be passed on to the appointments department, with a view to their services being utilised.

## Prevention of Venereal Disease

Dr. E. SUMMERSKILL asked the Minister of Health what sum was paid to the Central Council for Health Education for education in the prevention of venereal disease.—Mr.

BROWN replied: The Central Council's receipts in the current financial year by way of grants from the Exchequer and from local authorities are estimated at £19,000, made up of exchequer grants not exceeding £5000 and £6000 for general and venereal disease work respectively, and local authorities' grants of about £1000 and £7000 respectively. The Central Council's function is to provide facilities for the use of local authorities and other local bodies. Its grant income of £13,000 for venereal disease educational work represents working capital for local efforts in support of the ministry's central propaganda and is only part of the total expenditure from public funds on education in the prevention of venereal disease.

#### Antisyphilitic Drugs

Dr. H. B. MORGAN asked the Minister of Health why the less poisonous and more efficient drug used for antisyphilitic treatment 'Mapharside' which was much cheaper than less stable arsenical preparations still on the market, in spite of an imposed 25% purchase tax, was not being used sufficiently in Great Britain; was it recommended by his department; and, if not, for what reasons.—Mr. E. BROWN replied: The choice of antisyphilitic drugs for the treatment of civilians is in the discretion of individual medical officers in charge of treatment centres. It is not the practice of my department to recommend particular preparations for use in such centres, but I am advised that the claim that this preparation is less poisonous and more efficient is not substantiated by the evidence.

Dr. MORGAN: Is the Minister aware that mapharside, the drug known in the United States as mapharsen, has been recommended in the United States for the armed forces and that this recommendation has been accepted by the United States Government? Has every facility for the treatment of United States Forces in Great Britain been given; and is this drug now manufactured in Great Britain and available in sufficient quantities?—Mr. BROWN: I am aware that the drug referred to is used for the treatment of syphilis in the United States Army. No suggestion has reached me that there is any lack of facilities for treatment of United States Forces in Great Britain. The drug in question is manufactured in this country, but I have no information about the extent to which it is produced.

#### Jaundice following Arsenicals

In reply to a further question the minister said that arsenical preparations certainly played a part, not fully understood, in the occurrence of jaundice following such treatment. There was no clear evidence that virus infection during injection was a factor. During the ten years 1932-41, there were 86 cases severe enough to require hospital treatment; in the same period 131,000 cases of syphilis were dealt with at the centres, where some 2½ million injections were given.

#### Infant Mortality in Scotland

Major S. F. MARKHAM asked the Secretary of State for Scotland whether the departmental committee on infantile mortality was nearing the completion of its work; and whether their report would be presented to the House.—Mr. JOHNSTON replied: The subcommittee of the scientific advisory committee to the Department of Health for Scotland that is considering the question of infant mortality hope to submit an interim report in the near future. When I receive the report I shall consider whether it should be laid before the House.

#### Development of School-children

Mr. REYS DAVIES asked the President of the Board of Education whether periodical records had been taken of the average height, weight and other physical measurements of any school-children since the outbreak of war; and how these compared with those of prewar days.—Mr. R. A. BUTLER replied: A few local education authorities have continued periodical weighing and measuring of children during the war and a scientific investigation into growth-rates in certain neutral and evacuation areas is being undertaken on behalf of my department. This investigation, as far as it goes, shows that growth-rates measured by height and weight since the beginning of the war are being well maintained.

#### Shortage of X-ray Tubes

In reply to a question Mr. CHARLES PEAT said he was aware of a shortage of therapy and diagnostic tubes for X-ray apparatus and steps had been taken both in this country and

in the United States of America to remedy the position as far as the exigencies of the war permit.

#### Pulmonary Tuberculosis in Lancashire

The monthly average of pulmonary tuberculosis cases awaiting admission to institutions in Lancashire was 57 in 1941 and 89 in 1942. The average waiting period for ordinary cases is estimated to have been about 14 days in 1941 and about 21 days in 1942. Steps are being taken to relieve the demand for beds for tuberculous cases in various parts of the country by recourse to suitable beds in the Emergency Hospital scheme. (Mr. BROWN replying to Dr. MORGAN.)

#### Compulsory Medical Examinations

Mr. V. BARTLETT asked the Minister of Health whether, in order to improve the nation's health by the prevention rather than the cure of disease, he would consider the introduction of an order making it compulsory for every individual to undergo a medical examination twice a year.—Mr. BROWN replied: I sympathise with the object, but apart from all other considerations, including the addition to the already very heavy burden on the medical profession, I should certainly not be prepared to take the action suggested except with the express approval of Parliament.

Sir F. SANDERSON: Is the minister aware that it would take no fewer than 8500 doctors working eight hours a day, six days a week, assuming that only half of the population were medically examined, to carry out this suggestion? No further reply was given.

#### Pensions Appeal Tribunals

Mr. D. L. LIPSON asked the Minister of Pensions if he had drawn the attention of the committee, which he had appointed to consider the possibility of setting up pensions appeal tribunals, to the fact that 207 applications were received recently from doctors for nine posts under the mines department of the Ministry of Fuel and Power.—Sir W. WOMERSLEY replied: I will inform the committee, although a careful review of many factors, including the present duties of the doctors in question, would be necessary before any reliable deduction could be drawn. We are doing our best to get the right medical personnel for these tribunals.

#### Health of British Prisoners in Far East

In answer to a question Sir JAMES GRIGG stated: Representatives of the Protecting Power and of the International Red Cross Committee have now visited four camps in Japan, two camps in Korea, and two camps and a hospital in Hong-Kong. These camps all contain prisoners of war from the United Kingdom and the Dominions. Telegraphic reports on these camps are arriving and disclose that prisoners of war are benefiting in health by their transfer to Japan and Korea from less healthy latitudes, and the detaining Power will not, I think, refuse to consider suggestions which are being made to secure improvement in conditions. We are continuing to make representations through the Protecting Power in the hope that Japan will be willing to admit the representatives of the Protecting Power and International Red Cross Committee to camps in Burma, Malaya and the Netherland East Indies in which the majority of British prisoners of war are confined.

#### TUBERCULOSIS PREVENTION IN ARGENTINA

INVESTIGATIONS in various units of the Argentine Army have shown positive reactions to tuberculosis skin tests in 34 to 87 per cent. of conscripts. The highest incidence of positive reactions was found in men from urban areas, the lowest in men from rural areas; the only group in which it was below 50% was the (34%) group from Tierra del Fuego. The age of the recruits—about 20—corresponds to the age of highest mortality from tuberculosis in Argentina. On mass radiographic examination of 2112 conscripts L. Sayé discovered 2.03% with active lesions (*Rev. Sanid. milit.* 1942, 41, 388). Among prophylactic measures that he recommends are institutional treatment for all "open" cases of phthisis, regular radiographic examination of all contacts and suspected cases, and active immunisation with Calmette's vaccine of all healthy non-reactors to skin-testing. He particularly recommends the last-named measure for war-time use in the army: recruits should be skin-tested on entry, and again in 6-8 weeks, and if reactions are negative on both occasions immunisation should be undertaken.

## Letters to the Editor

### A NURSING PROBLEM

SIR,—We have 180 beds in our fever hospital and the same number in the sanatorium. At present there is a deficiency of 36 domestic staff. We have put up our wages to compare quite favourably with those—at any rate of the younger people—in the factories but still we do not seem able to get enough. It seems to me that the Ministry of Labour and National Service should exercise more effective powers of direction and that there should be a standstill order to prevent domestic staff unreasonably leaving their employment. I believe there is some such order but it is certainly not effective. I do not suggest, of course, that the ministry is not assisting us but I think a firmer line could be taken. As regards the question of nursing staff, we have a net deficiency of 41 student nurses, 12 general trained staff nurses and 2 sisters. These figures are to allow the hospital to be operated at full strength. The hospital is, of course, a training school and the salaries paid are quite up to standard. The difficulties appear to be in a general shortage of female personnel of the right age—so many are going into the Services and industry—a dislike of working in an infectious diseases hospital and particularly in a sanatorium. These difficulties have been frankly recognised by the Rushcliffe Committee which makes some suggestions for getting round them. We have to face the fact that girls prefer to go into a general hospital. Then I feel that the general hospitals are to a certain extent taking candidates from that section of the population that would normally have come to the isolation hospitals. They are taking them younger; and whereas previously it was quite customary for the girls to go first to the isolation hospital, then on to the general hospital, they are now going direct to the general hospital.

I feel myself that one way of getting over the difficulty is to make the training of the nurses a comprehensive one as is that of the medical student, requiring attendance at the isolation hospital (and other special hospitals) during the course for state registration. At present, registration being quite distinct for general training, fever training and so on, only those who wish to take up a specialty go into the special hospitals. Surely it would be better if the nurse had a complete training in all branches of nursing.

Health Department, Leicester.

E. K. MACDONALD.

### INGUINAL HERNIA

SIR,—Mr. Shorter distrusts operations which distort the normal anatomy and also fascial grafts, preferring an inlay of floss silk to repair defects. Other operations distort the anatomy, but experience has proved them to cure patients—e.g., Lotheisen's procedure for femoral hernia, Mayo's radical cure of an umbilical hernia, that for hallux valgus and rigidus, partial gastrectomy, and others. The proof of this pudding is in the digestion rather than in the eating and I have found that Bassini's repair of an inguinal hernia (performed after Bassini's superb detail) has met the need of most of my patients. In those where there was actual atrophy of the abdominal muscles, the Bassini procedure would not close the gap and this was darned with a fascial graft, and the edges of the strips sutured together with fine (120) interrupted thread, thus converting it into a membrane. No recurrence has been seen after this.

Mr. Shorter has only to use enough floss silk to be confronted with suppuration, persistent sinuses, and ultimately the tiresome task of removing the silk. This ground has been gone over before with silk, kangaroo tendon, and wire filigree; it is a pity to relearn these lessons. I too regarded transversalis fascia as a "flimsy" structure until I excised cremaster as routine, thus exposing it fully—when I found it a real barrier and worthy of respect as a factor for repair. It seems to me the successful cure of an inguinal hernia depends on many factors, not one. These are: avoidance of common cold infections around the time of operation; spinal or local anaesthetic (never a general, which in ordinary hands is too variable and often causes vomiting and postoperative chests); asepsis; wide exposure;

complete removal of the sac; excision of cremaster (to fully expose transversalis fascia and to lessen the size of the cord); accurate suturing with the finest suture material; hæmostasis; a secure pressure dressing; 16–20 days in bed; support for 3–6 months to the lower abdomen while the abdominal muscles recover tone. Finally, I agree with Mr. Shorter that it is a procedure worthy of a senior's full attention, and that there should be resolute rejection of that destructive element, operating against the clock.

Harley Street, W.1.

HAROLD DODD.

### CHRONIC PARKINSONISM

SIR,—In my paper there is the following statement in reference to the treatment of "dribbling" by means of deep X-ray therapy: "One man, even after six exposures spread over 6 months, says it has not become less." This case was particularly mentioned because it seemed only right to record failures as well as successes. However, on Feb. 8, 1943, after the paper had gone to press, this man walked into my clinic at the Royal Hospital, looking much better in every way than he had been for many months. There was no moisture about his lips and no handkerchief in his hand. Inquiry showed that he had had a further dose of X rays about a fortnight before, since when the dribbling had ceased completely, and (as usually happens when this troublesome annoyance is removed) there was a general all-round improvement.

Dr. Frank Ellis, medical director of the radium centre under whose care all my cases have been, kindly gives me the following technical details:

Aug. 28, Sept. 2 and 4, 1941: 500 R over left parotid. Slight temporary improvement.

Nov. 13, 15 and 18, 1941: the same treatment over right parotid.

April 16 and 23, 1942: 600 R over right and left submaxillaries.

Jan. 27, 1943: 600 R over each parotid.

It is only since the last exposure that real improvement has occurred.

Perhaps this information may be of value to others who find some cases apparently refractory to this form of treatment.

Sheffield.

ARTHUR J. HALL.

### PERFORATED PEPTIC ULCER DURING AIR-RAID

SIR—In the course of 1942 several investigators commented in the *Lancet* on the greatly increased incidence of perforated peptic ulcers in those parts of England which had been subjected to severe air-raids. The fact itself is evident and has been confirmed in several areas (London, Bristol, Liverpool), but there is a good deal of disagreement between authors concerning the aetiology of these ulcers.

In animal experiments conducted some years ago, I succeeded in producing similar acute gastric ulcers by a variety of non-specific damaging agents—for instance, emotional excitement, toxic drugs, trauma, and exhausting forced muscular exercise. These ulcers usually appeared conjointly with a set of other symptoms, such as accidental thymus involution, enlargement of the adrenal cortex, discharge of adrenaline from the adrenal medulla, appendicitis and others. They have been regarded as part of a syndrome which represents the somatic expression of a general alarm of the organism when suddenly confronted with a critical situation (Selye, *H. Canad. med. Ass. J.* 1936, 34, 706; *Nature, Lond.*, 1936, 138, 32; *Brit. J. exp. Path.* 1936, 17, 234. The earlier relevant literature will be found in the chapter on the alarm reaction in the *Cyclopedia of Medicine*, (1940, xv, 15). Since the publication of this monograph a good many additional papers have appeared, indicating that the alarm reaction is essentially a useful defence reaction against non-specific damage as such, though some of the accompanying symptoms (e.g., the gastric ulcers) are, of course, purely detrimental. The main benefit which the organism appears to derive from this reaction is an increase in the production of adrenal cortical hormones, which raise resistance in general. It may be of interest in connexion with the gastric ulcers seen during air-raids that starvation and cold greatly increase the ease with which such lesions are produced in animals by exposure to stress.

McGill University.

HANS SELYE.

## THE NEUROTIC EX-SOLDIER

SIR,—Your leader of Feb. 6 together with Dr. Aubrey Lewis's timely paper in the same issue deal with a problem the urgency of which is self-evident to the overworked general practitioner. Less attention is paid to the borderland case with a bias toward psychosis than to those which have well-defined symptoms and are unlikely to involve extensive investigation and clinical inquiry. Let me give an example from my own experience.

An agricultural labourer, aged 20, of admitted mentally defective stock, absorbed after conscription into the RAF, survived twelve months training. On his own (subsequent) admission he determined to "get his ticket" and, by dint of cunning and deception (well known to me as a dominant characteristic of his civilian life), he succeeded apparently by feigning sheer mental defect and inability to understand even the simplest commands. On arrival at the local country station, he inveigled the leader of the escort into hiring a conveyance to take him six miles that proved a short tow.

Now this man is not only sane but also a particularly fine physical specimen whose case calls not for follow-up investigation with a view to rehabilitation, but for drafting to Dartmoor for the duration. Not only has he successfully duped the Service doctors, boasted his achievement to all and sundry, but also deceived the psychiatrists in such a manner as to cast a serious shadow on their methods. He has had no sickness since his discharge and earns a salary each week equivalent to a captain in the RAMC. This man is one of ten I have known who have gained their discharge from active service, with no subsequent sickness, and who are apparently immune from inquiry as to restoration of fitness for military service.

DEVON DOCTOR.

## TOTAL versus SUBTOTAL HYSTERECTOMY

SIR,—I agree with Major Berkson about bias in medical statistics, but he should not attribute to me the statement that "this is a formidable array of material, large enough to reduce the statistical error to a minimum." It was against these words in your leading article of July 11 that the first half of my letter of July 25 was directed. They referred to the records of 2684 operations performed at the Mayo Clinic, and suggested that, as the number of cases studied increased, so all errors tended more and more to cancel out. Though still widely held, this view is quite wrong. Accidental errors tend to cancel out: systematic ones do not.

To compare subtotal and total hysterectomy by a subdivision of cases into two grades—i.e., good and bad operative risks, on a basis of the absence or presence of physical hazards—does not eliminate the bias of at least one important systematic error. Even though a patient is a good operative risk, unexpected technical, anaesthetic or other difficulties occurring during the course of the operation may materially alter the procedure and prognosis. Under such conditions the surgeon is hardly likely to perform the total operation having previously decided on the lesser procedure; he might however decide that the lesser, easier and quicker operation should be performed where the intention had previously been to remove the whole uterus. Such a trend would swell the group of subtotal hysterectomies with cases of greater risk and so weight the scales in favour of the total operation.

I acknowledge my error in stating that "the criteria for including cases in one or the other grade are not given"; I should have said "incompletely given." But when Major Berkson takes me to task for calculating the statistical significance of a table other than that used by the original authors he is doing me an injustice. I clearly stated that "the differences in the mortality-rates after total and subtotal hysterectomy in all three tables" (including the one prepared by myself, though derived from the authors' own tables) "are not statistically significant." I chose the table of the entire series to illustrate this fact, as I considered, that the authors had overstated their case, that they had not made it clear that it was only on the results of the group of lesser-risk cases that their conclusions were based, and that they had ignored the group of greater-risk cases

in which the mortality after the total operation was if anything higher than after the subtotal operation.

Major Berkson writes: "If the appropriate statistical calculation is made for the difference between the mortalities, in this group with least risk, one obtains 0.03\*"—that is, a 3% probability. I should be glad to know by what calculation he has arrived at this figure. Table I is in question, and by none of the accepted methods is such a value obtained.

TABLE I—CASES OF LESSER RISK

	Cases	Deaths
Subtotal hysterectomy ..	463	4
Total hysterectomy ..	1034	2

Pearson's  $\chi^2$  with one degree of freedom gives a value of 3.60 corresponding to a probability (P) of 5.8%; Yates's adjustment for continuity reduces  $\chi^2$  to 2.12 which corresponds to a probability of 14.5%; this latter value agrees closely with the 15.5% probability as calculated by the exact method (R. A. Fisher, *Statistical Methods for Research Workers*). Taking  $P = 0.05$  (5%) as the conventional level of significance, the observed difference in mortality is not statistically significant. Therefore in so far as McKinnon and Counsellor's conclusion is based on this table it is without sure foundation and my kindly intentioned reproof was not out of place.

I hold no brief for the subtotal operation, nor do I dislike or condemn the total procedure which in my opinion is the abdominal hysterectomy of choice in women whose cervix is parous or diseased. The immediate mortality from either operation, in good hands, has been reduced to the region of 1%. To improve results still further, attention must now be focused on morbidity. Much of the paper under consideration, concerned with this aspect of the case, is of interest and value, but unfortunately this has been obscured by conclusions largely based on mortality differences of questionable value.

Nuffield Department of Obstetrics  
and Gynaecology, Oxford.

C. SCOTT RUSSELL.

## THE MACINTOSH LARYNGOSCOPE

SIR,—The principle involved in the laryngoscope described by Air-Commodore Macintosh is new, and it is surprising that anaesthetists have not discovered before that the glottis can more easily be exposed by raising the tissues at the base of the tongue to which the epiglottis is attached, and so carrying it with them, than by actually retracting the epiglottis itself. I have been using the Macintosh laryngoscope for two months and the ease with which this curved instrument exposes the whole glottis, even with the patient under the lightest anaesthesia, is remarkable when one recalls how deep anaesthesia must be in order to avoid spasm when the sensitive epiglottis is lifted with a straight laryngoscope.

New ideas in anaesthesia have not been as fully tried out in Great Britain as in America because hitherto we have had so few facilities for organised research. It should be widely known that at Oxford there is now a department of anaesthesia equal in every respect to any abroad, well organised and equipped, where such work has been quietly proceeding for six years; and that it is ready to help anaesthetists in any branch of their subject. In the Macintosh laryngoscope the far-sighted benevolence of the founder of the Nuffield Department of Anaesthesia has again borne fruit for which anaesthetists will be grateful.

STANLEY ROWBOTHAM.

## MEDICAL ANONYMITY AND THE RADIO

SIR,—Friday, Feb. 5, saw a startling departure from tradition when a discussion was announced in the wireless programme and previously advertised in the *Radio Times* to the effect that those taking part were the radio doctor, a GP from the Midlands and a gentleman described as the well-known surgeon "Mr. A . . . B . . ." In the past doctors broadcasting on medical and allied subjects have been nameless and recognisable only to those who knew their voices. Even the Distinguished Doctor was incognito in the Brains Trust till his identity became an open secret. There seems to be no particular

\* We regret that this figure was misprinted 0.3 in Major Berkson's letter.—Ed.

reason why broadcasting medical practitioners should not be named, as are members of other professions in which overt advertising is barred. Perhaps it is in the public interest that the origin of widely disseminated statements, opinion and advice shall be known so as to be better appraised. But hitherto medical practitioners have had the reputation of shunning general publicity as far as they are able to do so.

London, W.1.

ENQUIRER.

## Obituary

### ISAK NAHUM BLUSGER

B A CAPE TOWN, F R C S

Mr. Blusger, a resident surgeon under the EMS, had worked in this country since he qualified from Bart's in 1934 till last year when he decided to give up a promising career here and return to South Africa to join the army. He sailed at the end of November, and his ship was torpedoed with no survivors. Blusger had held house-appointments at St. Bartholomew's Hospital, the Royal National Orthopaedic Hospital and the Connaught Hospital, Walthamstow, where he later became acting honorary surgeon. He took his fellowship in 1938 and he had published a paper on osteomyelitis of the spine and one on local anaesthesia in cystoscopy, which appeared in our columns after his



Elliot & Fry

death. J. H. D., his collaborator in this work, writes: "Blusger was ambitious in the right sense—ready always to improve his methods—and he gave the greatest consideration to his assistants. Thoroughness was the keynote of his work, he would never finish a job until it was as perfect as could be. As a teacher he was interesting and an inspiring instructor who delighted in answering questions. His cheerful directness was everywhere appreciated, he was the life and soul of any party. His main pastime was riding, but he played a good game of tennis, and as a student was in Bart's first rugby XV."

### FRANCIS HENRY EDGEWORTH

M D CAMB., D SC LOND

Dr. F. H. Edgeworth, emeritus professor of medicine in the University of Bristol, died in Bath on Jan. 14 at the age of 78. He was the son of Dr. T. F. Edgeworth, a retired RN surgeon who practised for many years in Bristol.

From Clifton College he won an entrance scholarship to Gonville and Caius College, Cambridge, where he gained a first-class in both parts of the natural science tripos (and was awarded the Shuttleworth scholarship. Edgeworth continued his medical studies at the Bristol Royal Infirmary, where his father had been a student before him. After taking his MB Camb. in 1889 he visited the Universities of Paris and Tübingen, and soon after his return became lecturer in physiology at University College, Bristol, and assistant physician at the Royal Infirmary.

Edgeworth never held a resident hospital appointment, and often expressed his regret at having missed this essential part of a physician's education. He once remarked to a colleague: "I have to think about things you appear to do automatically; I suppose it is having been a resident makes the difference."

He had a long spell of outpatient work without beds at the Infirmary, from 1893 to 1900, and in those days this work was almost unrelieved drudgery without help from clinical assistants, house-physicians or pathologists.

But Edgeworth had other resources upon which he could employ his fine scientific abilities.

A clinical interest in neurology and his Cambridge training in zoology and anatomy led him to study the comparative anatomy of motor nerves and cranial muscles in the vertebrates for evidence of the genetic relationships and the phylogenetic history of man in the remote past. *The Cranial Muscles of Vertebrates*, published in 1935, is a valuable contribution to the central

problem of biology—evolution. He obtained many rare vertebrates and showed extraordinary care in the preparation of dissections and sections as well as in their interpretation, and though his conclusions were not always accepted all comparative anatomists must draw upon the vast storehouse of material he brought together.

In medicine, besides his appointment at the Royal Infirmary, Edgeworth had also been for some years physician to the Bristol Children's Hospital and consulting physician to Almondsbury Cottage Hospital. During the 1914-18 war he was an à la suite officer of the Second Southern General Hospital (Territorial) in Bristol with the rank of major. In 1905 he was elected to the chair of medicine at University College, later the University, of Bristol. As a lecturer he was slow but clear, and students never forgot the aphoristic obiter dicta with which he illuminated his accounts of systematic medicine, and they were quick to recognise the kind heart behind his gruff speech. Though he did not contribute a great deal to medical literature he saw things accurately, and he was one of the first to describe meningism as a symptom of pneumonia in infants. Edgeworth belonged to the generation of hospital physicians who engaged in general practice, and he was a sound and appreciated family doctor.

In 1896 he married Miss Ethel Maud Usher, who died in 1931, and he leaves a son now living in America.

## Appointments

BATEMAN, LAURA L., MB BELF., DPH: assist. MOH for Harrow.  
CAMERON, F. P., MD, FRCS: deputy medical superintendent, Birkenhead Municipal Hospital.  
MARINKOVITCH, RADOYE, MD LEEDS: venereal diseases MO for Nottingham.

## Births, Marriages and Deaths

### BIRTHS

BENNETT-JONES.—On Jan. 31, at Liverpool, the wife of Mr. M. J. Bennett-Jones, FRCS—a daughter.  
BRANDER.—On Feb. 11, at Leeds, the wife of Major W. G. Brander, RAMC, of Kighley, York—a son and daughter.  
CROOKES.—On Feb. 2, the wife of Captain F. R. Crookes, RAMC, of Eckington—a daughter.  
HUDSON.—On Feb. 1, at Cambridge, to Dr. Jessie Marian Hudson (née McKenzie), lately captain RAMC, wife of Wing-Commander E. H. Hudson, FRCP, RAFVR—a son.  
MAURICE.—On Feb. 11, at Savernake, the wife of Dr. Timothy Maurice, of Marlborough—a son.  
MAY.—On Feb. 8, at Ware, Herts, the wife of Dr. G. William May—a son.  
NEWMAN.—On Feb. 4, at East Grinstead, the wife of Dr. R. E. Newman—a son.  
O'ROURKE.—On Feb. 4, the wife of Dr. H. C. O'Rourke, of Greenford—a daughter.  
SIMKINS.—On Jan. 30, in London, the wife of Surgeon Lieutenant Commander W. W. Simkins, RN—a daughter.  
SMYTH.—On Jan. 29, at Brandis Corner, Devon, the wife of Captain Patrick Smyth, RAMC—a son.  
STEDMAN.—On Feb. 8, at Dundee, the wife of Dr. R. E. Stedman—a son.

### MARRIAGES

GOSSE—KEOWN.—On Feb. 2, at Cambridge, Phillip Gosse, MD, to Anna Gordon Keown.  
SCORER—KEMSLEY.—On Feb. 10, at Cairo, Charles Gordon Scorer, FRCS, RNVr, to Jean Scott Kemsley.

### DEATHS

ANDERSON.—On Feb. 7, in London, John Buckle Anderson, MRCS, colonel late AMS, aged 76.  
BUCHANAN.—On Feb. 12, at St. Albans, George Burnside Buchanan, MB GLASG., FRFPs.  
HAVILAND.—On Feb. 7, in London, Henry Alfred Haviland, MB CAMB., aged 85.  
HOWARD-JONES.—On Feb. 10, in Edinburgh, Morgan Howard Howard-Jones, LRCP.  
MANNING.—On Feb. 6, at Wells, Somerset, Richard Beattie Manning, MRCS, aged 77.

MEDICAL CASUALTIES.—Recent casualty lists include the names of the following RAMC officers:

Wounded—Captain W. K. Badgett, MRCS; Captain J. O. Bishop, MB BIRM.; Captain G. M. Calder, MB EPIN.; Captain M. S. Chayen, MRCS; Captain R. W. Davidson, MB GLASG.; Captain E. P. Johnson, MB MANC.; WS/Captain J. S. Martin, MB BELG.; WS/Captain R. C. Meek, MB GLASG.; Captain B. E. Miles, MRCS; Lieutenant D. T. Milnes, MRCS; WS/Captain S. D. V. Weller, MB LOND.; and WS/Captain G. R. Wightman, MB EDIN.

Prisoner of War—Captain J. R. Gibbs, FRCS; Captain J. H. Gibson, MRCS; and T/Major Rudolph Stuppel, FRCS.



## Notes and News

## THE NUFFIELD FOUNDATION

Lord Nuffield has decided to form forthwith a charitable trust to be known as the Nuffield Foundation. As a capital fund he is handing over to trustees his shareholdings in the Nuffield organisation to the value of \$10 million. The seven trustees appointed to administer the income from this fund are:—

Sir William Goodenough, Bt. ( <i>chairman</i> ).	The Hon. Geoffrey Gibbs.
Sir John Stopford, MD, FRCS ( <i>vice-chairman</i> ).	Sir Hector Hetherington.
Prof. F. L. Engledow.	Sir Henry Tizard, FRCS. Miss Janet Vaughan, FRCP.

The objects which the trustees will endeavour to assist are (1) medical research and teaching; (2) the organisation and development of medical and health services; (3) scientific research and teaching in the interests of trade and industry; (4) the pursuit of social studies; and (5) the care and comfort of aged persons. The normal scope of the trust's activities will be Great Britain and Northern Ireland, but attention may be given to projects particularly affecting the Empire, and the provision of scholarships and other assistance for Empire students is included. Lord Nuffield's trusts which are already in being may benefit from the income of the new trust.

The trustees are enjoined to consult the appropriate ministers or departments of State in connexion with any matters of major importance in which they may become interested; but in carrying out the work of the trust they are not to be in any way bound by the views expressed by these ministers or departments. Lord Nuffield makes the donation from resources built up by private enterprise, in the essential importance of which he is a firm believer. He wishes in so doing to record his view that the spontaneous contributions which come from such sources to the service of the community are, and must always remain, a vital factor in the life of the nation. His own previous benefactions amount to more than £15 million.

## HOSPITAL APPOINTMENTS

SINCE last May, to meet the heavy demands of the Forces, holders of junior hospital appointments (officially called A or B2 posts) have been called up at the end of six months, and have not been eligible for promotion either from an A post to a B2 post or from a B2 post to the more senior B1 appointment. Now, on the recommendation of the Medical Personnel (Priority) Committee, the Minister of Health announces a return to the old system (circ. 2763). This will make no difference to the arrangements for A posts, which will continue to be filled by doctors who have been qualified for less than three months. But B2 posts and B1 posts may once again be filled by A or B2 officers respectively, provided that the Central Medical War Committee are notified at least a month before the original appointment expires. The CMWC have issued a circular (D. 21/1942-43) to hospital authorities explaining the procedure and giving model advertisements and a draft intimation of a change of appointment. Medical men who are liable to be called up may only hold one B1 post, but medical women who are liable for service may move from one B1 to another once the "freezing" of holders of these posts comes to an end. The restriction on transfer from one B1 post to another is being kept in force till April 30, when the effect of the resumed promotion between A, B1 and B2 posts will be felt. Recruitment to the Forces from B1 posts will also begin again on April 30. The new arrangement will help hospital authorities to plan ahead.

## OSLER versus TUBERCLE

William Osler's interest in tuberculosis became manifest early in his professional life. Dr. Charles Parfitt, who delivered the fifth Osler oration of the Canadian Medical Association in Alberta last year, was himself selected by Osler to undertake a special investigation of tuberculosis. He quoted Dr. James Bovell's account of Osler, in 1870, as "trying to confirm some of Villemin's

findings by the inoculation of guineapigs with tubercle"; in after years Osler wrote "I got my first-hand introduction to Laennec, to Graves and to Stokes and became familiar with their works" as the result of researches in the Montreal General Hospital post-mortem room. "He did most of the autopsies" we are told, "and early in 1875 volunteered to take the service of the smallpox ward." From this service came the autopsy which led to his classic paper on the pathology of miner's lung. Starting from the work of Pearson in London in 1813 he went on to record original observations which promised a new pathological approach to lung diseases in general besides being among the earliest accounts of the autopsy findings in anthracosis. His report on the first 100 cases of autopsy at the Montreal General Hospital in 1877 was dedicated to his teacher James Bovell, whom he admired greatly. Throughout Osler's life at Montreal, Philadelphia, Baltimore and finally at Oxford, he encouraged the study of tuberculosis—witness the foundation of the Laennec Society in 1900, the Phipps Dispensary in 1903 (both in Baltimore) and the organisation with Trudeau and many others of the American National Association for the Study and Prevention of Tuberculosis. He helped to attack the disease in Ireland in 1907, and he was president of the Oxford branch of the National Association for the Prevention of Tuberculosis in 1910. His classification of pulmonary tuberculosis in the 1892 volume of his *System of Medicine* is itself a masterpiece.

## THE GROWTH OF SCHOOL CANTEENS

BEFORE the war something over 3% of children were being supplied with school meals, most of them free. The war has turned the school canteen into something more than a means of feeding necessitous children: it has offered ways of supplementing rations during the growing years and of releasing the mother from the duty of providing the mid-day dinner. The Children's Nutrition Council<sup>1</sup> have lately shown what use is being made of this double opportunity. During the early months of the war evacuation of children led to some disorganisation of existing schemes, and by June, 1940, only 2.4% of children were getting meals. The figure has risen steadily, however, to 4.6% in May, 1941, 11.5% in May, 1942, and 16.6% (the latest available figure) in October, 1942. Even as late as February, 1941, of the 315 education authorities 97 had made no schemes; by May, 1942, the number putting off the task had fallen to 45 and there has been progress since. Nevertheless 80-85% of children are still unprovided with the chance of a balanced diet which school feeding offers; and the school canteen is not yet playing its full part in our war economy.

## CHARITY ON SECURITY

In their statement<sup>2</sup> on the Beveridge report the Charity Organisation Society declare that the scheme has little hope of success unless fully trained social and family case workers are employed in its administrative machinery, and they suggest that the advice bureaux, which it is proposed to run in connexion with every local security office, should be manned by voluntary social service agencies. They also hold that an organisation of medico-social workers, comparable to the hospital almoner services, is an essential part of any comprehensive health and rehabilitation service. The society think that family allowances should begin only with the second child, should be paid by postal draft to the mother, and should be associated with a rigid state control of rents and with intensive education of the housewife in wise spending.

## Royal Faculty of Physicians and Surgeons of Glasgow

Dr. George Graham will deliver the Finlayson lecture in the hall of the faculty, 242, St. Vincent Street, Glasgow, on Wednesday, Feb. 24, at 4 P.M. He will speak on various hypotheses on the causes of diabetes mellitus.

## Ex-Services Welfare Society

Lord Horder will open the annual medical conference of this society at the Waldorf Hotel, Aldwych, London, W.C.2, on March 11 at 10.30 A.M. The meeting will discuss war and the neurotic and psychotic.

1. *War-Time Nutrition Bulletin*, January, 1943, No. 23.

2. Obtainable from the Society, 296, Vauxhall Bridge Road, London, S.W.1.

### Royal College of Surgeons of England

To a meeting of the council of the college, held on Feb. 11, Dr. J. Newman Morris, FRACS, brought a message of greetings from the Royal Australasian College of Surgeons. He received from Sir Alfred Webb-Johnson, the president, as a token of friendship to the sister college, a first edition (1664) of Willis's *Anatomy* illustrated by Sir Christopher Wren.

Mr. W. H. Bowen and Mr. P. J. Moir were re-elected members and Mr. N. F. Sinclair, Mr. W. D. Doherty, Colonel A. H. Whyte, Surgeon Commander J. B. Oldham, Brigadier H. C. Edwards, Mr. B. H. Burns and Surgeon Captain L. C. Rogers were elected members of the court of examiners for one year, and Miss Alice Bloomfield was elected an examiner in midwifery under the Examining Board in England for the remainder of the year 1942-43. It was decided to recognise the post of resident surgical officer at the Chelmsford and Essex Hospital for the six months' surgical practice required of candidates for the final fellowship examination. It was reported that the new bye-laws had been approved giving the college power to make the primary fellowship examination solely postgraduate and to add pathology as an additional subject. Revised regulations will be published at a later date and the new regulations are likely to come into force in 1944.

Mr. H. S. Souttar was appointed Bradshaw lecturer, and Mr. J. Johnston Abraham was appointed Thomas Vicary lecturer for 1943, and Mr. H. E. Griffiths a Hunterian professor for 1943.

Diplomas of membership were granted to J. M. Titcombe and Mary W. P. Huddart and (with the exception of J. M. Childs, G. H. V. Clarke, R. H. Maudsley and A. N. Whiteside) to the candidates named in the report of the committee of the Royal College of Physicians in our issue of Feb. 6 (p. 190). Diplomas in public health were also granted jointly with the Royal College of Physicians to the candidates named in the same report.

### Chadwick Lectures

At 2.30 PM on Tuesday, Feb. 23, Prof. M. Greenwood, FRs, will give the first lecture of the spring programme of the Chadwick trust at the London School of Hygiene, Keppel Street, W.C.1. He will speak on social and industrial environment and disease. Other lectures will be: (March 16, at 2.30 PM, 26, Portland Place, W.1) Dr. Robert Cruickshank, post-war problems in the control of infectious diseases; (April 6, 2.30 PM, 90, Buckingham Palace Road, S.W.1) Mr. Thomas Sharp, M.T.P.I., town planning and public health; (May 11, 2.30 PM, 26, Portland Place, W.1); Dr. C. F. White, health problems in rebuilt London; (June 17, 4 PM, Chelsea Physic Garden, Swan Walk, S.W.3) Mr. F. J. Chittenden, FLS, plants causing irritation. Further particulars of the lectures may be had from the offices of the trust, 204, Abbey House, Westminster, S.W.

### London School of Hygiene and Tropical Medicine

Since the war began no courses have been held for the DPH, and the normal course for the DTM & H has also been suspended. The annual report shows, however, that short courses in tropical medicine and parasitology have been given to many hundreds of service medical officers, while instruction has also been provided for nurses and factory medical officers. Many members of the staff remain in the Services or in Government departments, but valuable research is in progress. The report mentions, among other items, inquiries into the incidence of trichiniasis, the control of mosquitoes and lice, the biochemistry of antibiotics such as penicillin, and the ventilation of factories.

### University of Birmingham

The council has converted the lectureship in pharmacology into a chair to which they have appointed Dr. Alastair Frazer.

Dr. Frazer qualified from St. Mary's Hospital in 1931 and took his London degree the following year. After holding a house-appointment in the surgical unit at St. Mary's and junior appointments in the department of experimental physiology he became assistant director of the department and assistant lecturer in physiology and pharmacology. In 1937 he was appointed to a Halley Stuart research fellowship and took up his present post of reader in pharmacology at Birmingham some eighteen months ago. Dr. Frazer is a major in the RAMC (TA) and commandant of the Birmingham University Service Training Corps medical unit. He has published papers on the inactivation of cobra venom by finely dispersed emulsion and on the structure and properties of fat particles in human serum.

### University of Sheffield

Dr. Helen Uprichard has been appointed an assistant tutor in medicine.

### Royal Institution Prize

The Actonian prize for 1942 has been awarded by the managers of the institution to Mr. A. W. G. Ewing, PhD, and Mrs. Ewing for their investigation into deafness and hearing-aids.

### Medical Society for the Study of Venereal Diseases

A meeting of this society will be held at 2.30 PM on Saturday, Feb. 27, at 11, Chandos Street, W.1, when Dr. A. H. Harkness will speak on drug resistance in gonorrhoea, with special reference to aetiology and treatment.

### Royal Society of Tropical Medicine and Hygiene

A meeting of this society will be held at 26, Portland Place, London, W.1, on Wednesday, Feb. 24, at 4.30 PM, when Dr. A. G. H. Smart will open a discussion on medical problems in the colonies in war-time.

### Royal Society of Medicine

The section of odontology will meet at 4.30 PM on Monday, Feb. 22, when Mr. E. B. Manley will read a paper on pulp reactions to dental cements. At 4.30 PM, on Feb. 25, Mr. H. L. Attwater will deliver his presidential address to the section of urology. His subject will be the history of urethral stricture. The section of disease in children is holding a clinico-pathological meeting at the Hospital for Sick Children, Great Ormond Street, W.C.1, on Feb. 26, at 2.30 PM. At the same hour at the section of epidemiology and state medicine Major-General J. P. Helliwell, MRCS, LDS, will open a discussion on the dental aspects of post-war planning.

### Nutrition in Scotland

Speaking at Edinburgh on Feb. 11 Dr. Andrew Davidson, chief medical officer of the Department of Health for Scotland, said that the nutritional surveys so far undertaken showed that families of workers in heavy industries in Scotland were receiving adequate supplies of the essential foods: in fact a survey last year showed a significant increase in supplies compared with 1941. Any deficiency was in vitamins A and C. Infant mortality last year was the second lowest on record and maternal mortality was 0.5 per 1000 below the average for the five preceding years. But infant mortality was 40 per cent. higher than in England, whereas thirty years ago the Scottish rate was lower than the English. In South-East Scotland last month only 21.6 per cent. and 16.8 per cent. of those entitled to orange juice and cod-liver oil under the Food Ministry scheme made use of it. "We must make mothers realise," said Dr. Davidson, "that these things are not medicine but food—necessary additions to diets."

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

### Infectious Disease in England and Wales

WEEK ENDED FEB. 6

**Notifications.**—The following cases of infectious disease were notified during the week; smallpox, 0; scarlet fever, 2119; whooping-cough, 1695; diphtheria, 897; paratyphoid, 8; typhoid, 9; measles (excluding rubella), 15,363; pneumonia (primary or influenzal), 1530; puerperal pyrexia, 183; cerebrospinal fever, 110; poliomyelitis, 3; polio-encephalitis, 2; encephalitis lethargica, 0; dysentery, 89; ophthalmia neonatorum, 85. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Feb. 3 was 2328, including scarlet fever, 617; diphtheria, 267; measles, 633; whooping-cough, 250; enteritis, 92; chickenpox, 89; erysipelas, 35; mumps, 38; poliomyelitis, 2; dysentery, 32; cerebrospinal fever, 21; puerperal sepsis, 23; enteric fevers, 16; encephalitis lethargica, 1; german measles, 9; osteomyelitis, 1; glandular fever, 1.

**Deaths.**—In 126 great towns there were 2 (1) deaths from enteric fevers, 3 (0) from scarlet fever, 20 (2) from measles, 14 (2) from whooping-cough, 35 (3) from diphtheria, 54 (10) from diarrhoea and enteritis under two years, and 109 (15) from influenza. The figures in parentheses are those for London itself.

Exeter reported the fatal case of an enteric fever. Birmingham had 13 deaths from influenza, no other great town more than 4.

The number of stillbirths notified during the week was 224 (corresponding to a rate of 33 per thousand total births), including 9 in London.

## PATHOLOGICAL FINDINGS IN A SERIES OF BLAST INJURIES\*

J. V. WILSON, MD BELF  
MAJOR RAMC; DEPUTY ASSISTANT  
DIRECTOR OF PATHOLOGY,  
MALTA COMMAND

R. E. TUNBRIDGE  
MD, M SC LEEDS, M B C P  
MAJOR RAMC; MEDICAL  
SPECIALIST

SEVERAL pathological studies (Falla 1940, Osborn 1940, Hadfield et al. 1940, Zuckerman 1940, Hadfield and Christie 1941) have been made of the pulmonary lesions in cases where death had been attributed to blast injuries. The present series is reported because of the uniqueness of the incident, the number of cases involved and the strong evidence that blast was the primary cause of death.

During a heavy dive-bombing attack directed against a target in Malta a bomb fell near the entrance of a crowded deep rock shelter. Several people were killed instantaneously and many suffered from clinical symptoms of blast or pulmonary concussion and burns of minor degree. Those who survived told the following story:—

Some bombs had fallen in the vicinity and considerable vibration had been felt in the shelter together with much noise. Suddenly a loud explosion was heard, which seemed to come from a bomb right on top of them, and tongues of flame accompanied by a gust of wind of tremendous force went right through the shelter. The electric lighting failed, the shelter was plunged into darkness and the inmates were thrown against each other.

The shelter was in deep rock and was entered by a stairway at either end leading down into the main tunnel. Before reaching the latter, three right-angled bends had to be negotiated. From the side of the tunnel cubicles were hewn out of the rock; bunks had been fitted in these cubicles and people were using them as sleeping compartments at the time of the incident. The bomb which did the damage burst within 5 yards, and almost directly in front, of entrance 1 of the shelter, on hard rock making a small crater. A portion of the flame from the explosion passed straight down the entrance and through the shelter blackening with a deposit the normal white rock sides of both the staircases and shelter itself. On the raid in question most of the enemy aircraft were dropping 500 kg. bombs, and it is probable that the bomb that caused the damage to the shelter was one of these. Entrance 1 was completely demolished and persons standing on the steps were dismembered. The structure of the shelter itself was intact, the only damage being the blackened walls and the fact that entrance 2 had its concrete roof thrown back; the steel reinforcement bars supporting the concrete were not seriously distorted, however, and so experts agreed that the damage to this entrance was due to the blast passing out and not to a second bomb.

The first person to enter the shelter after the incident stated that when he got down to the main tunnel no-one moved or answered him and even those who later were able to return home seemed at the time to be confused and dazed. There was no evidence of burning, the naked light he carried burned perfectly and there were no obvious noxious fumes even though his entry was made within 5 minutes of the bomb explosion. Medical aid soon arrived and it was found that a number of patients in the tunnel, in the bunks and on the stairway nearest entrance 1 were already dead.

Some of the casualties were removed to hospital suffering from superficial burns and blast injuries. In most cases the burns were of minor degree involving the forehead and scalp. Some, however, were more serious—second degree—and involved the face, the forearms and the chest anteriorly. The patients complained of pain and tightness across the chest and cough; many of them brought up a bloodstained sputum. They all had indefinite physical signs in the chest. There was no evidence on spectroscopic examination of carboxyhaemoglobin in the blood samples taken from fatal and non-fatal cases.

The cadavers were divisible into two main groups; those with multiple external injuries and those with no external injury except the burns described above. Of the latter group we were able to carry out autopsy

on 11 cases where death had been more or less immediate and on 1 case that died 8 hours after the injury. Owing to the intensity of the bombing and the tragedy surrounding the incident it was impossible to get facilities to carry out autopsy examination until 36 hours after the incident and it was not possible to examine either the brain or spinal cord in any of the cases. This report therefore is confined to the effects of blast on the abdominal and thoracic cavities.

### PATHOLOGICAL FINDINGS

**CASE 1.**—A boy aged 8 years. No external injury; thoracic cage intact. The body was covered with dust and the skin of the face was pitted with dust particles; mouth and nose covered with bloodstained froth. Both pleural spaces contained about 50–75 c.cm. of bloodstained serous fluid. The parietal layer of pleura showed small patchy areas of ecchymosis, not exceeding 30 mm. in diameter, but was otherwise normal; no injury to ribs and no pneumothorax. Heart and mediastinum normal. The lungs showed the subpleural hæmorrhages illustrated in fig. 1. The linear hæmorrhagic areas on the anterior surface of the left lung corresponded with the ribs. The upper and posterior two-thirds of the left lower lobe was one hæmorrhagic mass which felt rubbery, but crepitus was still obtainable; the right lung emphysematous. The trachea and bronchi were filled with frothy bloodstained mucus. Cut surface of lungs showed extensive hæmorrhage throughout the substance; the hæmorrhagic areas had not the feel of pneumonic consolidation and floated on water. Abdominal cavity: no injury to any organ. A small amount of bloodstained fluid in the peritoneal cavity was apparently derived from the mesenteric vessels which were extremely congested and showed evidence of perivascular hæmorrhage. Microscopic examination: widespread capillary congestion in all parts of lung tissue; in some areas the alveoli were packed with red cells and in others with œdema fluid; in other areas the alveolar epithelium was filled with red cells but the alveolar spaces contained only a few cells. In some fields there was evidence of rupture of the alveolar epithelium with the formation of bullæ.

**CASE 2.**—A girl aged 10. The only external injuries were slight first-degree burns of scalp and forehead. Ribs intact; mouth and nares were covered with a bloodstained froth. About 75 c.cm. of hæmorrhagic exudate in each pleural space; no injury to the pleura itself; heart and mediastinum normal. The lung hæmorrhages are shown in fig. 2. Superimposed on the areas of hæmorrhage in the left lung were dark linear markings running parallel with the ribs, and in the right lung the hæmorrhagic areas in the upper lobe were determined by the rib positions. Transverse sections showed hæmorrhagic areas deep in the lung tissue and these communicated with the subpleural hæmorrhages. The trachea and bronchi contained bloodstained frothy mucus. The only abnormal pathological findings in the abdominal or pelvic cavity were small hæmorrhages into the peritoneum in the upper abdomen. Microscopic examination of the lungs showed extreme congestion of all the blood-vessels. Many alveoli were packed with red cells but none contained œdema fluid and there was no evidence of any special concentration of these choked alveoli in the peribronchial regions.

**CASE 3.**—Male infant aged 1½ years. This child was being held in the mother's arms (case 9). There was no evidence of external injury and all the bones were intact. On opening the thorax there were hæmorrhagic areas in the mediastinum but the heart and the pericardium were normal. There was a small hæmorrhagic effusion in both pleural cavities. The hæmorrhages are shown in fig. 3. Section of lung showed deep-seated hæmorrhages. The trachea and bronchi were filled with bloodstained frothy mucus. All over the peritoneal cavity there were small areas of ecchymosis due to rupture of the mesenteric vessels; none of the abdominal or pelvic organs was injured. Microscopic examination of the lungs revealed widespread congestion of all the alveolar capillaries. The alveolar epithelium in the hæmorrhagic areas contained numerous red cells, as did the alveolar spaces. One of the larger bronchioles showed evidence of hæmorrhage into the subepithelial layer with actual rupture and exudation of red cells in one small area.

**CASE 4.**—A woman aged 54. Extensive second-degree burns over the face and upper thoracic region; the mouth and nose exuded a bloodstained froth. The bony skeleton

\* This paper is an abridged version of a longer report, and is published without awaiting possible corrections from the authors.

was intact and no wounds were present. The mediastinum was normal; a small hæmorrhagic exudate was present in each pleural cavity. Hæmorrhages are shown in fig. 4. The trachea and bronchi contained bloodstained mucus. Section of the lung revealed evidence of widespread hæmorrhage into the lung substance, the whole of the central portion of the lung being involved. There were no abnormal pathological findings in the abdomen. Microscopic examination of the lung tissue showed widespread congestion of alveolar capillaries; the alveolar spaces were packed with red cells.

CASE 5.—A boy aged 7. The mouth and nose were covered with bloodstained froth; no burns or external injuries. The thoracic cage was intact and the mediastinum was normal; little if any excess fluid in the pleural spaces. Hæmorrhages are shown in fig. 5; superimposed upon the hæmorrhagic areas were darker linear markings corresponding to the position of the ribs. In the right lung there were emphysematous bullæ. The trachea and bronchi were filled with bloodstained froth. On section the whole of both lungs with the exception of a few subpleural areas were found to be the seat of hæmorrhage. There was slight hæmorrhage into the peritoneum, but no injury to any of the abdominal or pelvic organs. Microscopic examination of the lung showed gross congestion of all the vessels especially the alveolar capillaries. The alveolar spaces were packed with red cells. There was no evidence of hæmorrhage into the lining epithelium of the bronchus.

CASE 6.—A man aged 24. The mouth and nose exuded bloodstained fluid; severe second-degree burns of the face, and the hair over the scalp was singed; no other evidence of injury to any part of the body. On opening the thorax the chest wall was found to be intact and there were slight mediastinal hæmorrhages present with emphysema of the

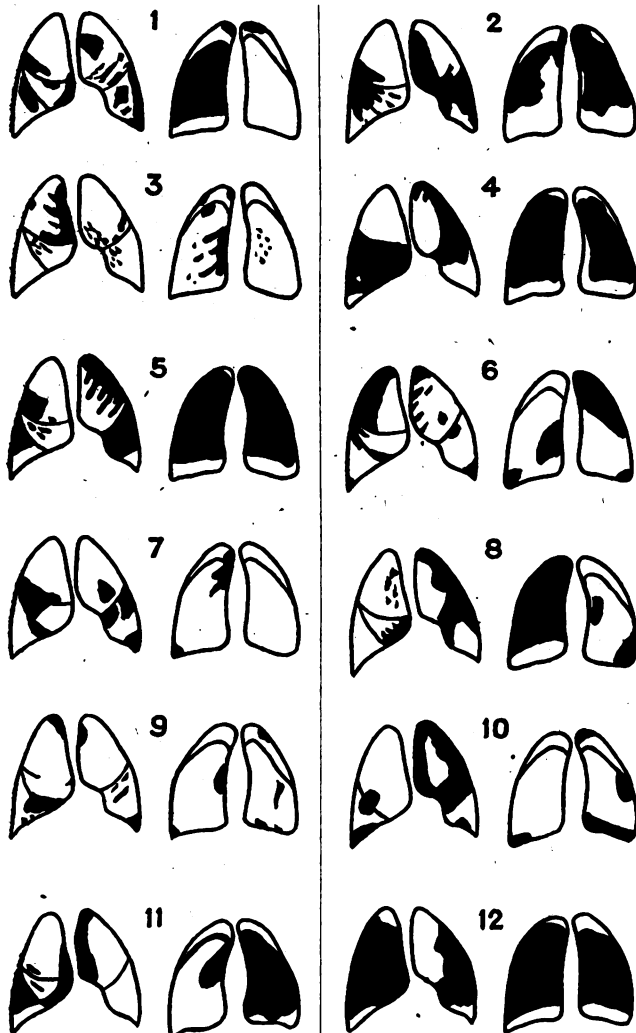
mediastinal structures. The cardiac muscle of the left ventricle appeared to be contused but there was no definite subpericardial hæmorrhage. Each pleural space contained about 100 c.cm. of bloodstained fluid. Hæmorrhages are shown in fig. 6. In the left lung there was emphysema in the upper lobe. The middle 2 in. of the inferior border of the lower lobe was the seat of a costophrenic angle pneumonia. The trachea and bronchi contained bloodstained mucus. On section the lung substance showed widespread hæmorrhage more particularly in the posterior half of the right lung. There were no pathological changes in the abdominal or pelvic cavities. Microscopic examination of the lung tissue showed congestion of the capillaries; the alveoli were filled with red cells and a few contained œdema fluid.

CASE 7.—A boy aged 5. There was no burning or evidence of external injury; mouth and nose covered with bloodstained froth. There was some evidence to suggest that he was seated during the incident. His face was pitted with dust. The chest wall was intact. Nothing abnormal was noted in the mediastinum. The pleural cavity on each side contained about 30-35 c.cm. of bloodstained fluid. Lung hæmorrhages are shown in fig. 7. The trachea and bronchi contained bloodstained frothy mucus. Section of the lung showed deep hæmorrhages throughout the lung communicating with the subpleural areas. There was nothing abnormal noted in either abdominal or pelvic cavities. Microscopic examination of the lung tissue showed widespread congestion of the vessels and many of the alveolar spaces were filled with red cells.

CASE 8.—A man aged 25. The mouth and nose were covered with bloodstained froth. There were slight first-degree burns of the face and upper part of thorax. The face was also severely pitted with dust particles. No obstruction to any of the vital respiratory passages and no evidence of external injury. The thorax was intact and nothing abnormal was noted in the mediastinum, heart or great vessels. Subpleural hæmorrhages are shown in fig. 8. There were also hæmorrhages into the pericardium and the mediastinal structures. The trachea and bronchi were filled with bloodstained fluid. Section of the lung revealed considerable areas of deep-seated hæmorrhage. Nothing abnormal was observed in either the abdominal or pelvic cavities. On microscopic examination of the lungs there was widespread vascular congestion particularly of the alveolar capillaries (fig. 13); red cells seen in the alveolar spaces.

CASE 9.—A woman aged 29. This woman was seated holding a child (case 3) in her arms. The mouth and ears were covered with bloodstained mucus. There were slight first-degree burns of the face and upper chest anteriorly but no other evidence of injury. On opening the thorax the ribs were found to be intact but there were slight but definite hæmorrhages into the mediastinal structures and a slight degree of emphysema. Both pleural spaces contained at least 50 c.cm. of bloodstained exudate. Subpleural hæmorrhages are shown in fig. 9. The trachea and bronchi were filled with bloodstained fluid. On section it was found that the costophrenic areas of hæmorrhage did not communicate with those situated in the deeper parts of the lung substance; and these deeper hæmorrhages were not so extensive or severe as in other cases. There were slight hæmorrhages into the peritoneal coverings in the upper and central abdomen but the great organs were intact. The chief feature in sections from this lung, apart from the congestion of the blood-vessels, was the large number of alveoli filled with œdema fluid. In quite a number of fields adjacent alveoli were seen, one filled with œdema fluid and the other with red cells.

CASE 10.—A man aged 32. The mouth and nose were covered with bloodstained froth; slight first-degree burns of the face and scalp but no other evidence of external injury. The thorax was intact and there were no changes in the mediastinal structures. The pleural spaces contained no excess serous fluid. Fig. 10 shows the subpleural hæmorrhages. The left upper lobe felt rubbery along the whole of the anterior margin and the lateral surface, and along the interlobar septum. The lower lobe showed similar infiltration along the whole of the interlobar septum and the outer half of the inferior margin. The right lung had two lobes only. The trachea and bronchi contained bloodstained frothy mucus. On section there was hæmorrhage in the deeper portion of the lung but this was not excessive; its distribution did not conform to any particular pattern. No abnormal



Figs. 1-12—Subpleural areas of hæmorrhage in 12 cases.



Fig. 14—Heart with ruptured aorta (case 11).

pathological findings in the abdomen. Microscopic examination of the lung tissue showed congestion of the alveolar capillaries. A notable feature of the sections was the widespread filling of the alveoli with red cells, some of which merely existed as ghosts.

**CASE 11.**—A woman aged 25. The mouth and nose were covered with bloodstained froth; slight first-degree burns of the forehead and scalp, otherwise no evidence of external injury; chest wall intact. The pericardial sac was enlarged and there was evidence of hæmorrhage into the mediastinal tissues around the roots of the great vessels. On opening the pericardium a large blood clot was found at the base of the heart and the sac contained in addition some 50 c.cm. of bloodstained fluid. The myocardium was intact and showed no evidence of hæmorrhage. The blood appeared to come from the first part of the aorta, in which a large tear (fig. 14) was seen extending transversely for about 1 in. and situated  $\frac{1}{2}$  in. distal to the aortic ring; the left coronary cusp of the aortic valve was also ruptured, but the free edge was intact. The wall of the ascending aorta was infiltrated with blood and inferiorly the infiltration extended into the pericardial sac. The mediastinal structures showed in addition small areas of hæmorrhage and emphysema. Both pleural spaces contained about 30 c.cm. of bloodstained fluid. Lung hæmorrhages are shown in fig. 11. In the left lung there was a small area of costophrenic angle pneumonia. The inferior margin of the right lower lobe was singularly free from hæmorrhage. The trachea and bronchi were filled with bloodstained fluid. In the abdominal cavity were large patches of ecchymosis and intraperitoneal hæmorrhage, especially in the omentum and mesentery. None of the great organs showed any evidence to the naked eye of abnormal pathology. Microscopic examination of the lungs showed that the alveolar capillaries were congested while the alveoli themselves contained blood-cells. A few alveoli were ruptured. A section taken from the aortic wall showed normal structure.

**CASE 12.**—A man aged 24, who was admitted to hospital and died 8 hours later as a result of blast injuries complicated by extensive burns of face and upper thorax. Lung hæmorrhages are shown in fig. 12. Section of the lung showed evidence of widespread hæmorrhage. On microscopic examination of the lung tissue the principal finding was one of extreme congestion of the blood-vessels in all portions of the lung. The epithelium of many of the alveoli was full of red cells and many of the alveoli also contained blood-cells but very few could be described as being packed. There was no evidence of rupture of the alveoli.

#### DISCUSSION

The autopsy records of 12 cases, 7 adults (4 men and 3 women) and 5 children (4 boys and 1 girl) are described. The principal pathological findings were: extensive bilateral pulmonary hæmorrhages in all cases; hæmoperitoneum and congestion of the abdominal vessels in 6 cases; mediastinal hæmorrhage in 3 cases; and rupture of the aorta in 1 case. All cases had frothy bloodstained fluid in the trachea, larynx, mouth and nose.

The pulmonary hæmorrhages involved primarily the deeper portions of the lung tissues, the subpleural areas of hæmorrhage communicating with those situated more centrally. The hæmorrhagic areas had not the feel of a true pneumonic consolidation, and in all sections tested the lung tissues floated on water. In some

areas, particularly where the hæmorrhage involved the inferior margin, the lung tissue had a leathery feel. The area of subpleural hæmorrhage had no constant pattern. Rib markings were a feature of all the cases, although they were more definite in the case of the children. In some instances the markings corresponded with darker linear shadows superimposed upon a more widespread area of hæmorrhage. The sites of election for the subpleural hæmorrhages were the anterior margin, the costal surface, particularly along the middle portion of the interlobar septum, and the posterior surface. The inferior margin was never extensively involved in the present series, although there was occasional involvement of this margin in the mid-axillary region corresponding to the costophrenic angle pneumonia described by Osborn (1940). In a few instances subpleural emphysematous bullæ were noted and also evidence of emphysema of the mediastinal tissues. In no case was there a large effusion into the thoracic or peritoneal cavities, and there was no case of pneumothorax. The vessels of the mesentery, omentum and peritoneal walls were in 6 cases congested and surrounded by numerous small hæmorrhagic areas not exceeding 10 mm. in diameter. Of the cases with mediastinal hæmorrhages, 2 were not severe, while the third—case 11—had an associated rupture of the aorta and of one semilunar valve and hæmopericardium. There was no evidence of hæmorrhage into the cardiac muscle.

The most characteristic feature of the microscopic anatomy of the lungs was the congestion of the alveolar capillaries, even in areas comparatively free from gross hæmorrhage (fig. 13 b). Many of the alveoli were distended with red cells and in a few instances with oedema fluid. The alveolar epithelium was often found

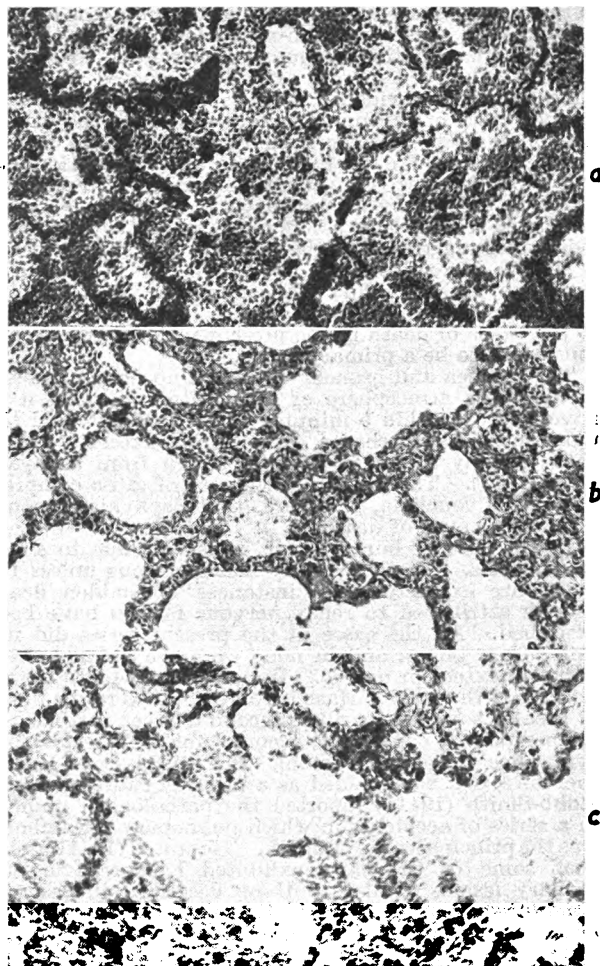


Fig. 13—(a) Section from centre of lung (case 8) showing extensive hæmorrhage into the alveolar spaces; (b) vascular congestion with only slight hæmorrhage; (c) hæmorrhage and rupture of the alveolar walls.

packed with red cells, even when the alveolar spaces contained but few cells. In a few instances there was evidence of rupture of the alveolar epithelium (fig. 13 c) and the formation of bullae, but this was not a prominent feature—a finding confirming the view expressed by Hadfield (1941). The presence of alveoli filled with oedema fluid alongside others containing red cells is difficult to explain. Oedema of the lungs has been described as an accompaniment of cranial injury, and while the possibility of such a factor cannot be excluded we prefer to consider that it is merely the result of the general vascular congestion. There was no evidence to suggest that the alveoli surrounding the larger bronchi were more seriously affected than those elsewhere. The general picture was the same in all sections and we could detect no essential difference in tissue taken from the peripheral or from the central areas of hæmorrhage, from the young or from the old, from cases dying immediately or from the case dying 8 hours after the incident.

Hadfield has drawn attention to the fact that bilateral pulmonary hæmorrhages were a prominent feature although not pathognomonic of blast injury. The findings reported above correspond closely with those described by Zuckerman (1940) in animals exposed to blast, and with those in previously reported human casualties.

What evidence have we that blast was the primary cause of death in the present incident? Many factors—such as poisoning by gaseous fumes (more especially carbon monoxide), asphyxia, burns, fat embolism, trauma or blast injury—might have been the primary cause of death. No evidence of carboxy-hæmoglobin was obtained from simple spectroscopic examination of the blood of the reported cases or of the survivors. The possibility of death from poisonous fumes cannot be so readily eliminated. There were no symptoms among survivors to suggest carbon-monoxide poisoning; nor was there lacrimation or mucous membrane irritation, which we observed among casualties exposed to bomb fumes in another incident; further, we have not observed in civil cases of carbon-monoxide poisoning the extensive bilateral pulmonary hæmorrhage described in the present series. We are inclined to agree with Hadfield and his colleagues (1940) that the finding of extensive bilateral pulmonary hæmorrhage in 3 of their cases, associated with at least a 50% blood saturation of carbon monoxide, suggests that the patients had suffered from a severe degree of blast injury before inhaling the explosive gases. While we cannot therefore exclude the possibility of poisonous fumes having contributed to the cause of death in the present incident, we do not consider it to be a primary cause.

The trachea and bronchi contained no undue amount of dust, the atmosphere of the shelter was known to have cleared within 5 minutes of the incident, and the pulmonary hæmorrhages were more extensive than those usually found in cases of death from asphyxia (Ross 1941). There was no evidence of gross compression. We conclude, therefore, that asphyxia was not a primary cause of death.

In the case of burns, death is usually due to shock or to sepsis. Death is rarely instantaneous unless the burns are extensive, but instances of sudden death usually attributed to reflex nervous factors have been described. All the cases in the present series did not suffer from burns, and in none were the lesions severe either in extent or degree. In no case was more than a quarter of the body surface involved, nor were the burns of greater severity than the second degree; further, the lesions per se could not account for the respiratory symptoms observed among the survivors. Burns, therefore, can be excluded as a primary cause of death. Robb-Smith (1941a) reported the pathological findings in a series of accidents in which pulmonary fat embolus was the principal cause of death. He stated (1941b and c) that some of the cases exhibited hæmorrhagic pulmonary lesions similar to those described in cases of blast injury. Sections of the lung tissue taken from our cases were examined by the Robb-Smith technique, but no evidence of fat embolism was obtained.

Fallon (1940) and Osborn (1940) have published evidence that trauma to the thoracic wall can give rise to pulmonary hæmorrhage. Bright and Beck (1935),

Barber (1938, 1940) and Anderson (1940) have reported cases of injury to the heart and pericardium as a result of non-penetrating trauma to the thoracic wall. Direct injury to the thoracic wall cannot be readily excluded in the present incident. Some of the casualties in the shelter had fractured limbs, and at the entrance to one of the cubicles there was a portion of brain tissue from the skull of a man who had been thrown against the corner. The cases selected for autopsy, however, were those showing no evidence of external injury save burns, and were found lying huddled together in the centre of the tunnel or in the cubicles. That the bodies knocked against each other or against the floors or walls in falling is almost a certainty. In the case of direct trauma to the chest wall, the area of hæmorrhage is confined to the lung tissue immediately beneath the site of trauma and does not extend throughout the lung substance, although contrecoup effects have been described. In the present series the pulmonary hæmorrhages were bilateral and extended throughout the whole of the lungs, the central portions being those most involved. Although no detailed information of the mode of falling is available, it is difficult to conceive that all the casualties fell with equal force and that the trauma was equally distributed over all parts of the body. Further, case 3 was found dead in his mother's arms, and the mother was sitting on the edge of the bed in one of the cubicles. Case 7 was also found dead in a sitting position. In all 3 cases the possibility of trauma other than that due to blast was remote, yet the pathological findings were identical with those of cases found lying dead in the main tunnel. We conclude, therefore, that the primary lethal factor in the present series of cases was blast.

Three views have been put forward to explain the method of production of the pulmonary lesions in blast injury:

1. The suction wave following blast leads to rupture of the alveolar capillaries (Logan 1939).
2. The sudden distension of the lungs with air causes rupture of the lung tissues (Barcroft 1939).
3. It is the traumatic effect of the blast wave upon the chest wall (Zuckerman 1940).

Zuckerman devised a series of animal experiments which provide conclusive evidence in favour of the last theory. Animals placed laterally so that one side of the chest received the main force of the blast wave had more extensive hæmorrhage in the proximal than in the distal lung. Further animals exposed after protection by means of a sponge rubber jacket showed only slight hæmorrhage compared with animals placed in a similar position but unprotected. The information available as to the position of the bodies in the present series is insufficient to permit of any discussion as to the significance of minor differences in the distribution of the hæmorrhagic areas. Such minor differences as were observed might well have been due to individual differences—weight, height, clothing—as has been suggested by Hadfield in another series of cases.

The presence of emphysematous bullae might be taken as evidence in favour of the distension theory, but neither that theory nor the suction theory could account for the hæmorrhages in the abdominal cavity. Zuckerman observed abdominal hæmorrhages in 40% of his cases; we observed them in 50% of cases. Breden and his colleagues (1942) described abdominal hæmorrhages following exposure of men in the sea to depth charges. Further, it would be difficult to explain the presence of the ruptured aorta in case 12 by means of the distension or suction theories. Kahn and Kahn (1928) state that it is possible to rupture an aortic valve by striking the chest wall after death, and whilst such a factor could account for the rupture of the semilunar valve in case 11, there are no reports of rupture of the aorta, hæmopericardium and bilateral pulmonary hæmorrhages attributable to such a factor. We consider, therefore, that the extent and nature of the lesions described in the present series of cases support the view that it is the traumatic effect of the blast wave upon the body surface which is responsible for the pathological changes.

In the present series the pulmonary hæmorrhages were so extensive that it is conceivable that they may have caused death. Further experience (Wilson and

Tunbridge 1943) has led us to agree with Hadfield and his colleagues (1940) that the pulmonary lesions are not always extensive enough to account for death, and that "it seems more likely that blast produces death by interfering with some vital tissue or centre in which, from the extreme rapidity of action, structural changes are unlikely to be found." No examination of the brain or spinal cord was possible in the present series. Death from reflex causes, without gross pathological changes, is known; ventricular fibrillation after direct trauma to the heart has been produced in animals (Moritz and Atkins 1938); sudden deaths after pulmonary infarction, puncture of the pleura during the inducement of an artificial pneumothorax and blows upon the abdomen are described, so that the possibility of death in cases of blast injury being due to direct or reflex action upon the vital centres is not unreasonable, though as yet unproven.

In our opinion, then, the lesions produced as a result of exposure of man to blast are in no way unusual or specific, but are those one might expect to find if the body were struck by a violent force—namely, the percussion wave of a high explosive.

#### SUMMARY

The autopsy findings in the organs from the thoracic and abdominal cavities of 12 cases, 7 adults and 5 children, dying primarily as a result of blast injury, are described. Of these cases 11 died immediately and 1—an adult—after 8 hours.

The principal macroscopic findings were extensive bilateral pulmonary hæmorrhages in all cases; hæmorrhage into the peritoneal cavity in 6 cases, into the mediastinum in 3 cases and in 1 case rupture of an aortic semilunar valve and hæmopericardium. The lung hæmorrhages extended throughout the lung substance and the subpleural hæmorrhages showed no constant distribution.

The principal microscopic findings were widespread congestion of the alveolar capillaries—with red cells in the alveoli and alveolar epithelium—and occasional areas of emphysema with rupture of alveoli.

There was no striking difference in the pathological findings of the case dying 8 hours after the incident and of the cases dying immediately.

We consider that the findings support Zuckerman's experimental evidence that it is the traumatic effect of the percussion element of the blast wave upon the body surface that causes the lesions.

No evidence is submitted as to the mechanism of death.

We wish to thank Prof. A. V. Bernard, CBE, director of public health, and the authorities of the Central Civil Hospital, especially Prof. Walter Ganado, for permission to examine cases 1-11 post mortem; Prof. P. P. Debono, for his help and coöperation; Captain R. Rankin, RAMC, and Sgt. Samson and Sgt. Marsden, RAMC, for their technical assistance. We are grateful to Colonel A. S. Heale, MC, DDMS Malta Command, for permission to publish this paper.

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## ELECTROENCEPHALOGRAPHY IN CHRONIC POST-TRAUMATIC SYNDROMES

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CONSIDERING the numerous advances in knowledge made in other fields by electroencephalography, the attention given to the conditions following cerebral trauma has been limited. Jasper, Kerschman and Elvidge (1940), and Williams (1941a), have demonstrated that the course of recovery from head injury may be followed by observing the progressive changes in the EEG, which is a more sensitive indicator of abnormality than clinical observation. The finding that the more severe and acute injuries are associated with a greater amount of slow frequency potentials parallels Walter's work (1937) on cerebral tumours, in which the most acute and malignant produced the greatest slowing of the rhythm.

In an investigation of 600 Services personnel who had suffered head injury, Williams (1941b) correlated the EEG findings of 325 patients with the clinical state, the type of injury and the personal and family history. He found that of his total group 50% had abnormal EEGs irrespective of the time which had elapsed since the injury, that there was positive correlation between the duration of post-traumatic amnesia, dural penetration and abnormal EEG, but none with abnormal personal or family history. In 50 patients who were constitutionally inferior the EEG was abnormal in 37%, and in 58 whose symptoms were regarded as due to an exogenous neurosis 20% were abnormal. These figures agree with those obtained later (1941c) of 26% abnormal for mixed psychoneurotics and 32% abnormal (Hill and Watterson 1942) for inadequate psychopaths (constitutionally inferior persons).

In examining the EEG abnormalities in his series Williams (1941b) notes the generalised rather than localised quality of the abnormal discharge. The non-specific nature of the EEG in many neuropsychiatric conditions is now becoming recognised, and the importance of the need to elicit differences between what may be inherent tendency to psychiatric illness and what is certainly acquired as the result of trauma has led to this investigation. This preliminary report has been made on patients, largely Services personnel, suffering from chronic post-traumatic syndromes. It is interesting to note that 40% were admitted to hospital with a diagnosis of predominantly functional as opposed to predominantly organic cerebral conditions (table 1).

The diagnosis of postconcussive syndrome rather than of a functional reactive state was made in most cases whose presenting and predominant symptoms were headaches, irritability, postural giddiness, emotional lability and impaired memory retention. The EEG results have been considered in connexion with duration of post-traumatic amnesia, time since head injury, age at the time of injury, and abnormal personal and family history. In the different groups attention has been paid to the EEG abnormalities in so far as these could be divided into generalised and focal. The high proportion of traumatic epilepsy in this series is no indication of the incidence of this condition in post-traumatic states since the presence of the EEG apparatus at this unit was the reason why many such patients were seen.

*Method.*—The technique employed is that advocated by Gibbs and Gibbs (1941) and used by Williams (1941a) and Hill and Watterson (1942). A three-channel Grass ink-writing oscillograph was used, and each record, which lasted some 20-25 minutes, including 3 minutes' voluntary hyperventilation, was divided into four parts for the four electrode positions, two on each hemisphere. The criteria of abnormality used were the same as those previously described (Hill and Watterson 1942) with the additional interpretation of what has been called "focal" abnormality. With the technique originally elaborated by Adrian and Mathews (1934) for the localisation of Berger rhythm, and later used by Walter (1936) in cases of cerebral tumour, an EEG focus may be described as a point on the skull from which, if an electrode common to two channels connected in series is placed on it, electrical oscillations of opposite phase are produced.

\* Receiving a Rockefeller research grant.

RESULTS

The investigation was carried out on 150 patients, of whom 78 (52%) had abnormalities in the EEG. Of these 78, 45% had an abnormal response to hyperventilation and in 5 this was the only abnormality. The EEG abnormalities have been divided into diffuse and focal, the latter including 10 cases in which a chief focus was found in a diffusely abnormal brain; 32 patients (41%) showed focal and 41 (53%) diffuse abnormalities.

Table I shows the incidence of these abnormalities in the different diagnostic groups. The figures in italics show that traumatic syndromes are more usually associated with a positive EEG than functional ones ( $\chi^2 = 10.5$ ;  $P < 0.01$ ), and that this preponderance is almost exclusively in the focal type of abnormality, 54% of the traumatic and only 16% of the functional being focal ( $\chi^2 = 8.2$ ;  $P < 0.01$ ). These differences are significant.

TABLE I—INCIDENCE OF ABNORMAL EEG FINDINGS (totals in italics)

Diagnosis	Total cases	Total abnormal (and %)	Abnormal EEG		
			Diffuse	Focal	Hyp. only
Postconcussive syndrome ..	58	33 (57)	16	16	1
Post-traumatic epilepsy ..	29	22 (76)	9	13	0
Anxiety state ..	21	10 (48)	7	1	2
Depressive state ..	19	8 (42)	5	2	1
Schizophrenic state	2	0	0	0	0
Hysteria ..	14	3 (21)	2	0	1
Psychopathy ..	7	2 (29)	2	0	0
<i>Organic states</i> ..	<i>87</i>	<i>55 (63)</i>	<i>25</i>	<i>29</i>	<i>1</i>
<i>Functional states</i> ..	<i>63</i>	<i>23 (37)</i>	<i>16</i>	<i>3</i>	<i>4</i>

In agreement with Williams (1941b) the time since the head injury has been found to bear no relationship to the EEG result. The age at which the head injury occurred is, however, found to be important, and comparing those whose head injury occurred before the age of twenty with those in which it occurred after that age it is seen that 65% were abnormal in the first group and 46% in the second. The hyperventilation response in these two groups is also interesting, 39% of the first and 16% of the second being abnormal.

Age at time of head injury	EEG +	EEG -	Hyp. +	Hyp. -
Under 20 years ..	30	16	18	28
Over 20 years ..	48	56	17	87

$\chi^2 = 4.6$ ;  $P = 0.035$        $\chi^2 = 9.7$ ;  $P < 0.01$

These two results are significant and indicate that a head injury suffered before the age of twenty is more likely to result in a permanently abnormal EEG, particularly in hyperventilation response, than one suffered later.

An association has been found between length of post-traumatic amnesia and abnormality of the EEG (see Williams 1941b). If patients are divided into those whose amnesia was less than an hour, less than a day and more than a day, in the first group 43%, in the second 52% and in the third 58% are abnormal.

Amnesia	EEG +	EEG -	Abnormal * EEG	
			Diffuse	Focal
< 1 hour ..	16	21	13	2
< 1 day ..	33	30	15	14
> 1 day ..	29	21	13	16

$\chi^2 = 1.9$ ;  $P = 0.4$        $\chi^2 = 7.4$ ;  $P = 0.03$

\* Those abnormal on hyperventilation only have been omitted.

While these findings are not significant statistically, it is interesting to note that if the abnormalities are divided into diffuse and focal, of the focal there are 13% in the first, 48% in the second and 55% in the third group, showing significant differences.

In the organic group, 18 of 87 patients had abnormal personal histories, and in the constitutional and reactive

TABLE II—RELATION OF PERSONAL AND FAMILY HISTORY TO EEG FINDINGS

Personal history	Abnormal * EEG		EEG normal	Family history	Abnormal * EEG		EEG normal
	Diffuse	Focal			Diffuse	Focal	
Neurotic	12	6	32	Neurotic	20	7	26
Normal	29	26	40	Normal	21	25	46

$\chi^2 = 7.2$ ;  $P = 0.03$

$\chi^2 = 5.6$ ;  $P = 0.06$

\* Those abnormal on hyperventilation only have been omitted.

states 33 of 63 patients. This result, which is significant, is expected, for when constitutional factors play a predominant rôle one would expect to find evidence of neurosis in the previous personality. Of the patients with abnormal personal history, 37% had abnormal EEGs, and of those with a normal history, 60%. Dividing again into diffuse and focal abnormalities it is seen that the first group had 33% and the second 47% focally abnormal records (table II). These results are significant.

In assessing the incidence of abnormal family history, disorders of the first-degree relatives have alone been considered. The assessment has been wide and has included epilepsy, psychosis, severe neurosis, mental defect and psychopathic personality. Of the 53 patients with an abnormal family history, 27 (51%) had abnormal EEGs; and of the 97 with a normal family history, 48% had abnormal EEGs, showing no difference in the two groups. But division into diffuse and focal abnormalities shows a strong tendency towards significant results (table II). In the first group—those with a positive family history—26% had focal and 74% diffuse abnormalities, while in the second group 54% had focal and 46% diffuse abnormalities. Thus in the post-traumatic syndromes a positive personal or family history does not increase the probability of a positive EEG, but where diffuse as opposed to focal abnormalities occur it is more likely that an abnormal personal or family history will be found.

DISCUSSION

Little attention has been paid in previous work to the localisation of abnormalities in the EEG in chronic post-traumatic states, and no attempt to divide these abnormalities into diffuse and focal has been made. Such a division, however, has proved of significant value and thrown some light on the question of what is inherent and what has been acquired in the EEG.

Evidence of EEG differences between individuals of different constitutional type is now accumulating. Jasper, Solomon and Bradley (1938) and Lindsley and Cutts (1940) have shown significant differences between the EEGs of normal and behaviour problem children. Williams (1941c), in a survey of different groups, found ascending degrees of abnormality from the super-normals to the psychoneurotics. Hill and Watterson (1942) found significant differences between different types of psychopathic personality and normal controls and also found abnormal personality traits in those of the controls whose EEGs were abnormal. In this series the EEG showed diffuse abnormalities, and there has been no suggestion, nor have the published records shown, that the abnormalities of other workers have been anything but diffuse. Both Williams (1941c) and Hill and Watterson (1942) agree that the EEG abnormality in such cases indicates an inborn constitutional defect "which may find expression as epilepsy or a behaviour disorder such as a constitutional psycho-neurosis or psychopathy."

In his study of the EEG in post-traumatic states, Williams (1941b) found a higher percentage of abnormal records in cases thought to be primarily due to organic damage (55%) than in those thought to have a functional origin (31%). The comparable figures from this series are 63% and 37%, the higher value of the former probably being due to the greater proportion of traumatic epileptics in this series. But the significant differences between focal and diffuse abnormalities in these cases suggest that a focal abnormality in the EEG indicates an acquired lesion of the brain, and a diffuse abnormality indicates a constitutional defect.



Further evidence for this hypothesis is found on examination of the personal and family histories. In agreement with Williams (1941b), it is shown that abnormal personal and family histories are not likely to influence the possibility of the EEG being abnormal, but, when the type of abnormality is considered, the focal are found significantly more often in individuals with a negative personal history and the diffuse in those with a positive personal history. The relationship between a diffusely abnormal EEG and a positive family history is almost statistically significant. This is not surprising, for Lennox, Gibbs and Gibbs (1940) have demonstrated the presence of dysrhythmia in 80% of the total relatives of epileptics and Hill and Watterson (1942) found abnormal family histories very frequently in cases of aggressive psychopaths, 65% of whom had abnormal EEGs.

Agreement with previous work (Williams 1941b) has been shown in that approximately 50% of all post-traumatic states have abnormal EEGs, irrespective of the time that has lapsed since the head injury. Also, there is an association with the severity of the injury, but not, it has been found, one of statistical significance. The comparison of post-traumatic amnesia with focal and diffuse abnormalities has shown that the more severe the head injury the more likely is the EEG to be focally abnormal and the diagnosis to be post-traumatic syndrome or traumatic epilepsy. Conversely, the less severe the injury the more likely is the EEG to be diffusely abnormal and the diagnosis to be a functional syndrome.

Taking all these findings into consideration, it is seen that the presence of diffuse abnormalities in the EEG in post-traumatic states does not necessarily indicate the presence of cerebral damage. Further work may indicate the significance of a chief focus of abnormality in a diffusely abnormal brain, but in the present series the number is insufficient to draw any conclusions.

#### SUMMARY

Abnormal EEGs were found in 78 (52%) of 150 patients with post-traumatic syndromes; 5 patients were abnormal on hyperventilation only.

An abnormal EEG and an abnormal hyperventilation response occur with significantly greater frequency in patients suffering head injury before the age of 20, but the time since the head injury does not influence the result.

Focal abnormalities are found significantly more often in true postconcussive syndromes and traumatic epileptics, in patients with long post-traumatic amnesia and in those with a negative personal history.

Diffuse abnormalities were found significantly more often in depressive, anxiety, schizophrenic and hysterical syndromes, in cases of short post-traumatic amnesia and in patients with a positive personal history.

The presence of a positive family history does not increase the probability of a positive EEG in post-traumatic syndromes. When the EEG is abnormal there is a strong tendency for diffuse as opposed to focal abnormalities to be found associated with a positive family history.

The findings suggest that focal abnormalities in the EEG are associated with acquired cerebral trauma and diffuse abnormalities with constitutional deficiencies.

We are indebted to Mr. J. Theobalds, electroencephalographic technical assistant, who took many of the records; to Dr. Eliot Slater, clinical director at the unit, for his advice and criticism; to Dr. Louis Minski for permission to use the case material; and to the Rockefeller Foundation for the means which have made this work possible.

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## NIGHT VISUAL CAPACITY OF PSYCHOLOGICAL CASES

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THE processes concerned in dark-adaptation, or more broadly night visual capacity, are known to vary from time to time in the healthy individual, though the nature and degree of this variation is uncertain. There is little doubt that some of the responses elicited during research into nutritional conditions, as they concern the visual threshold, can be explained as individual variations, especially if the subject is tested on many occasions. There is no likelihood of establishing a near relationship between results that come from a test simplified and guarded from extraneous influences, and from one which presents complications that can only be unravelled through the medium of higher cortical analysis. Nevertheless, even between these two extremes a link does exist, feeble though it may be.

It is important to emphasise the difference between night visual capacity and dark adaptation. In dark adaptation considered as a physiological process, much emphasis has been laid upon the so-called cone adaptation curve, which constitutes the first part of the curve resulting from a technique which incorporates severe bleaching of the visual purple as an initial procedure. After this cone adaptation curve, the rod curve commences at about the end of 5 minutes. It is felt however that the cone adaptation phase is not really an adaptation as understood in terms of darkness, but only a recovery after an intense stimulus which is a different thing. There is every indication that the cones, in order to function at all, must be favoured by an adequate though minimal amount of illumination, and that this illumination is, in actual fact, higher than what can be regarded as clinical darkness.

The term "night blindness" is unsatisfactory. Outside the field of ophthalmic pathology it is unusual to find anything more pronounced than varying grades of night visual defect. It is important to differentiate between those who at low levels of illumination can only reach the stage of awareness of an object and those who can analyse its character.

A study of the night visual capacity of inpatients of an EMS hospital confirms these views and suggests that the apparent incompatibility of some of the results obtained from the examination of the visual threshold in dietetically deficient subjects may in part be due to varying attitudes of mind. The results obtained in cases of mental illness may, it seems, be regarded as a gross exaggeration of the variables found in normality.

#### APPARATUS EMPLOYED

In brief, the apparatus used for testing night vision<sup>1</sup> presents 32 letters and objects for analysis in the proportion of 24 letters to 8 objects (fig. 1). The scores therefore are recorded as fractions of 32. The letters are selected capital letters of the alphabet which in several instances are placed in abnormal positions, such as an "E" facing backwards, upwards or downwards, or an "L" or a "T" on its side. The objects shown are in the



Fig. 1.—Rotating hexagon. Note the large letters above the routine test panels, which are employed in cases where the attitude of the subject under test is in doubt.

1. See Livingston, P. O. *Brit. J. Surg.* 1942, 29, 339.

form of aircraft, ships, arrows, crosses and parallel lines.

Preparation for the test consists of half an hour's dark-adaptation behind dark goggles transmitting 3% of light. This is followed by a further 10 minutes in the dark room during which the details of the test are carefully described. The subject then writes down his interpretation of the letters or objects seen, on special

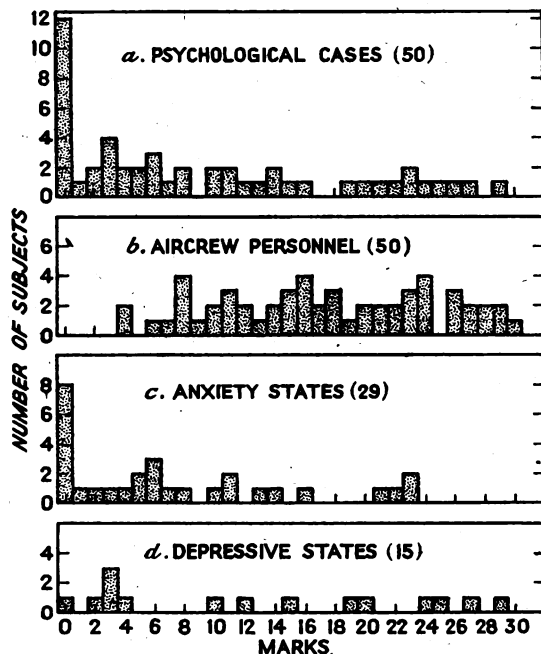


Fig. 2.—Night visual capacity scores recorded on the rotating hexagon: (a) by 50 psychological cases from an emergency hospital; (b) by 50 normal aircrew personnel; (c) by 29 anxiety patients; (d) by 15 depressive patients.

braille cards, the points of reference being easily detectable by means of metal buttons clamped to the supporting board. Four routine tests are undertaken at different levels of illumination, each concerned with 2 objects and 6 letters. In each test a minute is allowed in which to record the answers, with due warning after 45 seconds (Livingston 1941 and 1942). In this investigation a fifth test was employed, to detect any possible malingerers and hysterics; three large capital letters were exposed against a background sufficiently illuminated to ensure that they were easily discernible except by those suffering from advanced pathological conditions.

The hexagon test examines a mixture of rod and cone vision. At one end of the scale the test is designed to elicit a cone response, at a brightness level of 0.0012 equivalent foot candles, while at the other end rod vision is demanded at 0.00025 equivalent foot candles. A total of 30–32 marks may be considered exceptional, while anything over 20 is good and anything under 4 is poor.

#### RESULTS

Fifty psychological patients volunteered for the test. Care was taken not to suggest to them that an abnormal result was anticipated, but rather that they were being selected as representative of the non-flying population of the country, for comparison with flying personnel. Thirty patients were suffering from anxiety states. Of these, ten were sent for testing because they complained of poor night vision, though they had not been questioned directly regarding this. Among the other patients, who were selected at random, fifteen were grouped as depressives, with an allied anxiety state in five; two were cases of hysteria, one of epilepsy, one of psychopathic migraine, and one was obsessional in character. The night visual capacity scores of these fifty cases grouped together are shown in fig. 2a. These can be compared with fifty normals taken at random from a group of 40,000 cards recording scores during routine testing in the Royal Air Force (fig. 2b). It will be seen that psychological cases as a whole produce a far greater number of poor results. The average score in 6051 RAF

personnel was 19 marks, while that of the 50 cases under review is 9.8.

Anxiety states (fig. 2c) provided poorer results than did depressives (fig. 2d). The ten patients with anxiety states who complained of night blindness gave an average score of 4. Of these, one man aged 40 whose peace-time work was that of forge hand scored 22, five scored 1–7 marks, while four returned no score. In this group was one malingerer. It is interesting that a subject may complain of night blindness and yet the condition may not be confirmed by test. The anxiety states uncomplicated by complaints of night blindness produce an average score of 8; five subjects returned no score, five returned 10–20 marks, and three exceeded 20.

The fifteen depressives averaged 13 marks. Five who suffered from an added anxiety state included one case with no marks and two exceeding 20. One of these was a man who had been a tweed designer. He interpreted all the figures in the form of animals such as bison and buffaloes, although no suggestion was made that animal forms could be expected in the test. He scored 23 marks, as a result of accurate interpretation of the letters where his imagination was kept within bounds. Among the ten depressives without an anxiety state none scored less than 2 marks, and three scored over 20, the highest being 29, a figure only exceeded by 5% of the normal population of aircrew age. The two hysterics scored no marks, the obsessional 26, the epileptic 14 and the case of psychopathic migraine 8 marks.

The attitude of these psychological patients towards games was interesting. It was found that few played any team game such as football or cricket, or joined in any form of athletics such as cross-country running. Only those who had actually served for some time in the Army had played games with any regularity. It seemed that the team instinct, probably one of the most valuable possessions of man, was practically non-existent in these people. Nor did it appear that they possessed any hobbies. It is debatable whether this lack of interest in group games existed because of their psychological state, or whether the psychological state itself had in some way created a form of isolation from competitive sport or hobbies which had persisted throughout their lives. Nevertheless, the negative

Psychological states	Total no. of cases	Average NV score
Anxiety .. .. .	20	8
Anxiety with complaints of night blindness .. . . .	10	4
Depressives .. . . .	10	13
Depressives with anxiety state .. . . .	5	13
Hysteria .. . . .	2	0
Obsessional .. . . .	1	26
Psychopathic migraine .. . . .	1	8
Epileptic .. . . .	1	14

history of the sporting instinct in these 50 cases was striking.

#### CONCLUSIONS

From the result of tests of night visual capacity in 50 psychological inpatients at an EMS hospital it seems that patients with an anxiety state are on the whole incapable of concentration and record a low score for that reason (average 8 out of a possible 32). Depressives, even where some anxiety background has been revealed, seem capable of making a reasonable effort when aroused by an interesting problem; scores of 20, 24, 25, 27, and 29 were recorded in this group. The hysterics failed to score any marks, while the obsessional by virtue of his very condition did well in obtaining 26. The cases of epilepsy and psychopathic migraine presented no special features.

Some of the variations in night visual capacity recorded in healthy people may depend on lesser degrees of the same differences in mental make up.

We wish to thank Dr. W. S. Maclay, superintendent of the Emergency Hospital, for allowing us to undertake this study, and Dr. Aubrey Lewis, the clinical director, for his help in selecting the cases.

## SLOWLY ACTING PITUITARY PREPARATIONS IN DIABETES INSIPIDUS

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DIABETES insipidus was first discovered by Willis in 1674. No rational treatment was achieved until the introduction of posterior pituitary extracts in 1913. Since then several attempts have been made to gain more effective control of the symptoms by modifying either the preparation or the administration of the hormone. Among these may be mentioned subcutaneous injection of the liquid extract (Farini and Ceccaroni 1913, von den Velden 1913), intranasal application of liquid extract (Blumgart 1922) and of powdered whole gland (Choay and Choay 1924), and the use of suppositories. With the separation of the pressor and oxytocic factors, and the demonstration that the antidiuretic principle was associated if not identical with the former (Kamm et al. 1927), a more refined preparation became available and subcutaneous injections of this material—'Pitressin'—or of the official liquid extract are now the standard method of treatment.

Unfortunately all the methods described have two great disadvantages: the period of control is short (usually not more than 6 hours for each dose); and disagreeable side-effects occur. Confronted with these difficulties in relation to a child of three we began in 1938 to consider the possibility of a more slowly-acting preparation.

The only previous attempt in this direction appeared to be that of Strauch (1929) who incorporated the drug in the aqueous phase of a water-in-oil emulsion. His formula was:

Concentrated and sterile solution of drug	10 c.cm.
Sterile olive oil	2.5 c.cm.
Sterile metacholesterolin	0.2 g.
Sterile myricin	0.3 g.

The final product, having the consistency of an ointment, was administered in a modified syringe. The pituitary extract used was 15 times the normal strength and doses containing 8 times the standard amount were given without ill effect; 8 cases of diabetes insipidus were treated by this method, the control after a single dose lasting 3-6 days. No detailed case-records were given.

We failed, using Strauch's formula, to produce a stable preparation, fluid at body temperature, and therefore tried a simple preparation using woolfat and beeswax as emulgents. The formula was:

Concentrated pituitary extract	4 c.cm.
Woolfat	0.5 g.
Beeswax	0.2 g.
Parachlormetaxylenol	0.1%
Olive oil to	10 c.cm.

Details of its preparation have been given elsewhere (Court and Taylor 1939). Later by concentrating the aqueous pituitary extract to a tenth of its volume, a double strength emulsion was produced. This is solid at room temperature and must be warmed to body heat before injection. Overheating is dangerous as it may produce a separation of the two phases. The clinical effects in 3 patients are given below.

Concurrently Naterman (1939) in America and Wankmüller (1939) in Germany were studying the effects of similar emulsions and claiming favourable results. Wankmüller, with a single dose containing 24-36 units produced control for a period varying from 3 to 5 days. A different approach was made by Dodds and Noble (1937) and later by Stephen (1940). They showed that the antidiuretic effect of posterior pituitary preparations was prolonged by the addition of zinc and other metals. The effect was obvious when as little as 0.1% of zinc acetate was used and became increasingly evident with higher concentrations. Stephen, using the dog, found that the control exercised by a single dose of pitressin could be extended from 12 hours to 24 by the addition of 0.1% zinc acetate. As far as we know this effect has not been applied to the treatment of the disease in man. The subcutaneous implantation of pellets of dried

posterior pituitary gland has also been tried (Greene and January 1940a). The encouraging animal results were vitiated in man by local inflammation—a complication which was intensified when the pellets were impregnated with lanolin and beeswax.

The latest phase is represented by suspensions. Good results were first obtained with a suspension of pitressin powder in peanut oil. A single injection containing 20 pressor units gave adequate control for fully 48 hours while some effect was still evident on the 4th day. A more satisfactory preparation was obtained by precipitating the pitressin with tannic acid. The resulting insoluble "tannate" is suspended in sterile peanut oil, so that 1 c.cm. of the final product contains 5 pressor units. It is given by intramuscular injection. The control period effected by this dosage varies between 30 and 120 hours (Greene and January 1940b, Caddy 1942). Sharpe (1942) has shown that this is not due to variation in the product. He points out that in diseases of this kind the effect of a fixed dose will vary with a number of factors such as the rate of absorption and the degree of control still exercised by the damaged but not necessarily defunct hypothalamic pituitary mechanism. It is important to shake the suspension thoroughly before use. The clinical effects of this preparation are shown in the table and charts and discussed in a subsequent paragraph.

### CASE-RECORDS

Only data considered essential to prove the existence of diabetes insipidus has been presented (fluid balances are shown in the figure).

CASE 1.—A boy of 6. Born by instrumental delivery. Polyuria and polydipsia from the age of 12 months. When first seen in November, 1938, he would drink at least 5 pints in 24 hours and if restricted would take any fluid available. This included a bottle of disinfectant and the water from a vase of flowers. An intelligent, wasted child with a coarse dry skin. Daily fluid intake about 100 oz. Urine: specific gravity 1003, with no abnormal constituents. Blood-urea 16 mg. per 100 c.cm. Urinary chlorides 0.99 g. rising to 1.29 g. per litre on a restricted salt intake. Wassermann reaction, Kahn and complete Mantoux tests negative. Radiograms of the entire skeleton normal. He was treated first with liquid pituitary extract (BP) and then with pituitary emulsion. Unfortunately evacuation made supervision intermittent from the middle of 1939 to September, 1941, when he was admitted to hospital. He was now 6, weighed 45 pounds and seemed in good general health. He had been having 0.5 c.cm. pituitary emulsion twice a week. Treatment was stopped and the daily fluid intake soon reached 200 oz. A thorough examination still revealed no known aetiological factor. Several small nodules were found at the injection sites. As the child had received over 300 injections of emulsion and no deposits were found in the first 3 months they probably represented the effect of repeated injections into the same subcutaneous area. Biopsy showed that they were paraffinmata. While in hospital he was given 'Pitressin Tannate' in oil with satisfactory results and is now receiving 1 c.cm. twice a week.

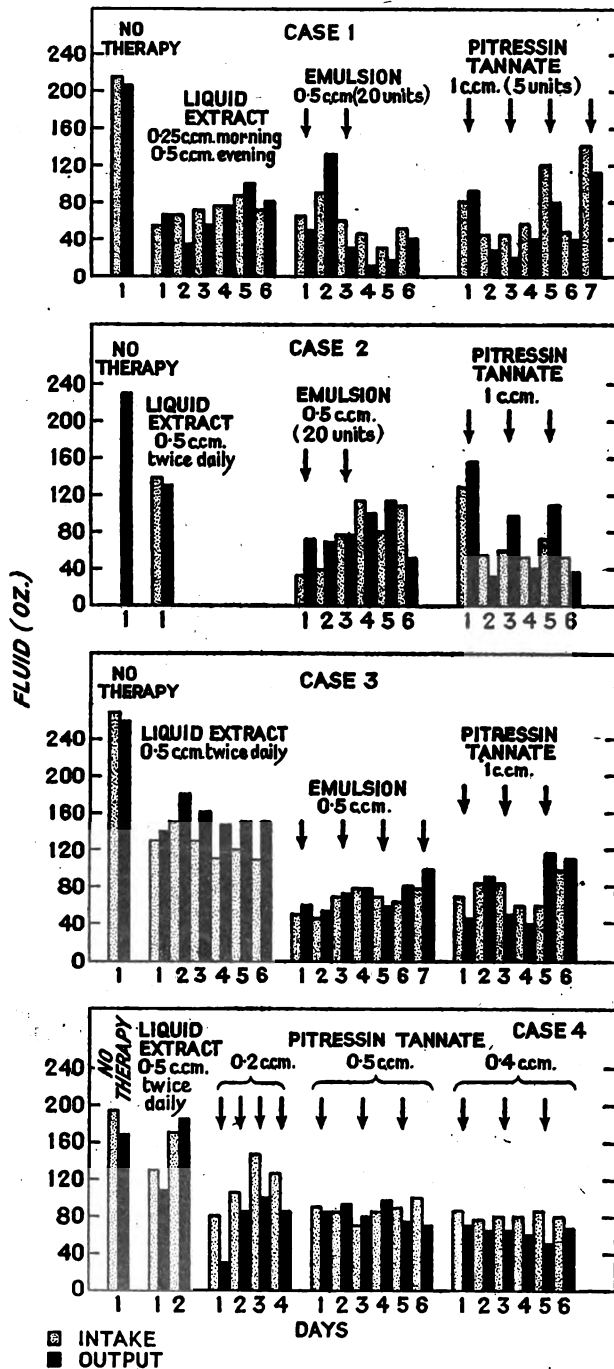
CASE 2.—A nurse, aged 40, had pain in the left hip after a motor-cycle accident in 1930. Sudden onset of polyuria and polydipsia with anorexia and restlessness in March, 1933. Liquid pituitary extract 0.5 c.cm. given intermittently with symptomatic benefit. In 1934 an accident to the head led to further investigations, which suggested the presence of xanthomatosis. An operation on the left ilium at the London Hospital provided histological confirmation for this diagnosis. Deep irradiation was given to all affected areas, including the head, without effect on the diabetes insipidus. In 1940 she was given pituitary emulsion intramuscularly, 0.5 c.cm. every 48 hours, though from time to time the effect lasted 3-4 days. Later pitressin tannate, 1 c.cm. every 2 or 3 days, was substituted with rather better effect. Examination in 1941 revealed a well-nourished woman with no abnormalities apart from small translucent areas in the left ilium and the right parietal bone consistent with the existence of the Hand-Schüller-Christian syndrome; and well-defined atrophic areas in the subcutaneous tissue of both arms and thighs where liquid pituitary extract had been given. There was no evidence of nodules like those in case 1. The scars of two abscesses, one after the liquid extract and one after the emulsion, were present.

CASE 3.—Housewife of 70 had had intermittent headaches for many years. Attacks of abdominal pain with vomiting

for the past 5 years. A car accident 4 years ago was not associated with head injury or unconsciousness. In January, 1941, she had an influenza-like illness with excessive drowsiness, followed quite suddenly by great thirst and frequency. When seen on March 27, 1941, she was a well-nourished, sensible, rather plethoric patient in a good state of preservation. The fluid intake varied between 12 and 15 pints in 24 hours. No other abnormality was found except the presence of a duodenal diverticulum. Blood-pressure 140/80 mm. Hg. Blood-urea 23 mg. per 100 c.cm. WR and Kahn negative. Cerebrospinal fluid normal. Urine normal. In July, 1941, Dr. Russell Brain felt there was no evidence of cerebral tumour and considered the case one of postencephalitic diabetes insipidus. The symptoms have been well controlled with pituitary emulsion and pitressin tannate. She has

produced one or two nodules at the injection site, presumably where the emulsion was given subcutaneously.

CASE 4.—A housewife, aged 36, admitted December, 1941, with a 5 months history of progressive pallor, fatigue, giddiness and transient bruising. A well-nourished, composed, extremely pale woman. No petechia. A few small glands felt in the neck and axillae. No obvious enlargement of spleen or liver. Initial blood-picture: red cells 595,000 per c.mm.; Hb. 13%; colour-index 1.05; white cells 29,200 per c.mm. (polymorphs 9%, myelocytes 13%, lymphocytes 17%, monocytes 1%, myeloblasts 8%, promyelocytes 9%, premonocytes 8%, 75% of the cells were peroxidase positive). Further blood and sternal marrow examinations confirmed the diagnosis of myelogenous leukaemia. For family reasons repeated blood-transfusion was carried out and she was discharged on Feb. 7, 1942. Readmitted on March 23 with a return of weakness and in addition polyuria and polydipsia, which had been present for 3 weeks. Urine normal, apart from low specific gravity. Blood-urea 15 mg. per 100 c.cm. Radiograms of the skull and axial skeleton showed no abnormality. As the symptoms persisted treatment with pitressin tannate was instituted, the controlling dose being 0.4 c.cm. every 48 hours



Effects of different preparations in 4 cases. The periods charted were as nearly as possible in the middle of periods of treatment, when the effect of a particular preparation and dosage was fully established. The fluid intake and output shown was in each case about the same as the average for the whole period. The black and shaded columns represent the output and intake respectively over a 24 hour period.

DISCUSSION

Slowly acting pituitary preparations with powerful antidiuretic properties are now available. From their historical development it is evident that the delaying effect has been achieved in two main ways: by emulsifying an aqueous solution of the hormone or suspending an insoluble derivative in a suitable oily medium. A study of the charts and table presented in this paper show that preparations of both types can give excellent control. A fluid intake and output not greatly above the average follows an injection once in 48 or 72 hours. Pituitary emulsion however has some serious disadvantages; the standard dose contains as much as 20 oxytocic units; as the emulsion is solid at room temperature and the hormone thermostable, preparation of the injection requires considerable care; and finally paraffinomata may develop at the site of injection, probably owing to the hydrocarbons present in beeswax. This view is supported by January and Greene's experiments with beeswax-impregnated pellets and our own experiments with various emulgents where beeswax also gave rise to inflammation and abscess formation. This unfortunate sequel deserves to be noted since a similar vehicle has recently been used for adrenaline. Pitressin tannate in oil is free from these drawbacks; 1 c.cm. contains only 5 pressor units; administration is simple and painless; and after 6 months careful observation no local deposits have been seen. There is no rise in blood-pressure during the 90 minutes after injection, or at subsequent periods. Pallor intestinal cramps, nausea or vomiting commonly associated with injections of the liquid extract have not been present in our series or in those of other observers. The results of treatment are summarised in the table.

The only complication we noted was the development of minor symptoms of water retention in case 3 when receiving 1 c.cm. every 48 hours for 3 weeks. A similar dosage in case 1 however did not produce this effect. A more serious degree of water intoxication with rapid increase in weight, oliguria, drowsiness and headache is reported by Thorn and Stein (1941), after three daily injections of 0.6 c.cm. which lasted 48 hours after the last injection. They also noted increased menstrual flow in 2 cases, which in one was so severe that therapy was stopped during the menses. This has not so far been reported by others. The amount of tannic acid in 1 c.cm. of the final preparation is only 1 mg. and animal experiments show no tissue injury from such minute quantities.

Dosage is closely related to the definition of the word control, which should be conceived in functional rather than mathematical terms. If the patient is able to lead a normal life to undertake long journeys in comfort and is free from the distressing nocturia and restlessness of the untreated state, then control is satisfactory, even if the daily output of urine is somewhat greater than the expected average. We first used a 1 c.cm. dose of pitressin tannate every 48 hours; larger doses—1.5-2 c.cm.—did not prolong the effect and only slightly improved the control. Our attention was then drawn

to the paper by Thorn and Stein (1941) advocating a smaller dosage. They favour a daily dose of 0.15-0.2 c.cm. (0.75-1 pressor unit) though admitting that satisfactory control can be achieved with a correspondingly large dose every 48 hours. We have since confirmed their observations including the fact that the maximum effect is not reached on any daily dose level until 2-4 days after the beginning of therapy.

We suggest that any case of diabetes insipidus treated with pitressin tannate in oil should receive daily injections of 0.2 c.cm. (1 pressor unit) for 14 days. If the effect is satisfactory 0.4 c.cm. can be given every 48 hours for 3 weeks. If control is still adequate the same dose may be given at 3-day intervals or a smaller dose every 48 hours. If 0.4 c.cm. is not enough the dose should be progressively increased to 1 c.cm. (5 pressor units). The essential points to remember are the time interval before the full effect of any given dose is established and the variable intensity of the disease in different patients and in the same patient at different times. With the smaller initial doses advocated here, water retention—the most serious potential complication—is unlikely.

EFFECTS OF DIFFERENT PREPARATIONS OF THE POSTERIOR LOBE OF THE PITUITARY IN 4 CASES

Case	Length of treatment (days)	Preparation	Total injections	Av. relief per injection (hours)	Av. daily fluid intake (oz.)	Av. daily fluid output (oz.)
1	14	Ext. pituit. liq. 0.25 c.cm. mane	28	12	64	65
	32	0.5 c.cm. nocte	11	68	58	46
	44	Pituit. emulsion 0.5 c.cm. (= 20 units) Pitressin tannate 1 c.cm. (= 5 units)	21	50	82.5	70.5
2	6	Pituit. emulsion 0.5 c.cm. (= 20 units)	2	72	74	79
	17	Pitressin tannate 1 c.cm. (= 5 units)	8	51	65	74
3	13	Ext. pituit. liq. 0.5 c.cm. b.d. or t.d.s.	30	10.5	125	152.5
	25	Pituitary emulsion 0.5 c.cm. (= 20 units)	12	50	61	70
	57	Pitressin tannate 1 c.cm. (= 5 units)	27	52	81	74.5
	8	Pitressin tannate 2 c.cm. (= 10 units)	4	48	65.5	64
4	5	Ext. pituit. liq. 0.5 c.cm. bd.	10	12	143	147
	6	Pitressin tannate 0.2 c.cm. daily	6	24	100	75.5
	10	Pitressin tannate 0.5 c.cm. alternate days	5	48	86	81
	26	Pitressin tannate 0.4 c.cm. alternate days	13	48	76	73.5

The very small amount of hormone required to give control is striking as already noted by Verney, who found that in cats minute doses were sufficient to control artificial polyuria.

In a disease needing repeated injections for an indefinite period the use of oil as a vehicle is undesirable. Moreover, the fact that the main delaying action in pitressin tannate is due to the insoluble nature of the tannate is surely significant. The production of stable aqueous suspensions may well prove the next stage in the development of slowly acting pituitary preparations.

SUMMARY

Pitressin tannate in oil seems to be the safest and most effective slowly acting preparation of the posterior pituitary lobe so far available for the treatment of diabetes insipidus.

Pituitary emulsion, though giving excellent control, has several drawbacks, notably the delayed formation of paraffinoma at the injection sites.

Four cases of diabetes insipidus showing the effects of these two preparations are reported.

We wish to thank Dr. A. G. Signy and Dr. H. W. C. Vines for help with pathology, and Dr. Hugh Gainsborough for his critical encouragement; also Messrs. Parke Davis for liberal supplies of pitressin tannate in oil.

References at foot of next column

GANGRENE AFTER ARTERIAL CONTUSION

K. H. PRIDIE, M.B. LOND, F.R.C.S.

A CARPENTER of 32 was knocked down by a truck and then crushed against a wall on Nov. 26, 1941. On admission to hospital he was in great pain and appeared much worse than his blood-pressure of 120/80 mm. Hg and pulse-rate of 120 per min. indicated.

He was found to be suffering from: (1) A laceration of the left hand with fractured head and base of 5th metacarpal; tendons and nerves were intact; a debridement was performed, sulphanilamide powder was applied and the wound loosely sutured. (2) A crack in the lower end of left ulna; both hand and forearm were functionally healed in a month. (3) A spiral fracture in the subtrochanteric region of the left femur with avulsion of the lesser trochanter. There was much bruising of the upper half of both thighs and tenderness and guarding in the lower part of the abdomen. X rays showed no evidence of any fracture of the pelvis. The external iliac artery was pulsating but the femoral, popliteal, and dorsalis pedis arteries could not be felt. On account of the great swelling round the fracture site the absence of femoral pulsation was thought to be due to a large hæmatoma extending from the site of the fracture.

The patient's general condition improved after the left femur had been put on skin traction with extension strapping, Russell traction being the routine method we use for fractures of the shaft of the femur. The foot of the bed was raised on blocks. On Nov. 27 the pulse-rate was 140; temperature normal. He was still complaining of pain in the left ankle and so the extension strapping was changed. Pulsation in the external iliac artery over the head of the femur was still palpable but no pulsation could be felt in the other arteries. He vomited and continued to have pain in the lower abdomen. There was bruising in both inguinal regions but nothing abnormal was found on abdominal palpation except tenderness in both iliac fossæ. The respiration-rate was raised. On Nov. 30 the patient still complained of pain in the foot and the strapping was again removed. The foot was cold and pale and the condition was thought to be due to arterial thrombosis. He was given brandy by mouth and hot soaks to the right leg in order to improve the circulation of the left leg. He could move his foot and toes but some discoloration of the toes began to appear. On Dec. 2 a Kirschner wire was inserted into the lower end of the left femur for extension and the limb was placed on a Braun's frame. The foot was very cold and there was loss of sensation over the distal half of the foot but he was still able to move his toes. On Dec. 4 the femoral, popliteal, tibial and dorsalis pedis arterial pulsations were not palpable. The toes showed signs of becoming black and there was discoloration of the foot to just above the ankle.

*Operation for exposure of the femoral artery.*—Local anaesthesia and a little gas and oxygen were used. The external iliac artery was beating and of normal size. About 3 in. of the femoral artery was found to be in spasm but it was normal above and below. The outer thin coat was found to be infiltrated with blood; it was split and dissected from the main artery. The artery was then freed from its bed. Procaine was injected along the artery and sprayed on to it. When the artery had been freed it began to beat and pulsation was seen and felt throughout the whole length exposed, though it was feeble; before the artery was cleared there was no pulsation. The constriction was 3 in. long and extended from the origin of the common femoral to below its branches. The vein seemed to be empty and dilated and was not easily visible.

On Dec. 5 the leg was warmer. In the meantime the foot

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underwent mummification and was kept dry and cool with ice packs. All the toes were shrivelled and mummified up to the toe clefts, and the skin on the dorsum of the foot was discoloured to just above the ankle. During the whole of this time although the toes were completely dead and mummified the patient had full power of movement in them at the metacarpophalangeal joints.

On Dec. 17 a below-knee amputation was performed. The muscles were found to be very ischæmic and light brown in colour; the usual healthy red was not seen. There was little bleeding and it was not necessary to tie more than two vessels. The wound was stitched up without drainage, and the dressing was undisturbed for 10 days.

On Jan. 7, 1942, the sutures were removed; sulphanilamide powder dressings were applied to keep the wound dry, and it was exposed to the air. On the 17th the stump skin-flaps were almost healed. The Kirschner wire was removed from the femur and skin traction was again applied. By the 27th he started using crutches. He complained of dragging pain in the stump which was relieved by a crêpe bandage. He was discharged home on Feb. 13 with everything satisfactory, to await his artificial limb. When seen on May 9 he had full movements in the stump and did not complain of any pain. The stump, however, was colder than the opposite leg.

This case demonstrates that arterial contusion of a large artery, such as the common femoral, may lead to gangrene of a limb. All severe fractures, whether of the upper or lower limb, should be repeatedly examined for pulsation in the arteries below the site of the injury. Early exploration within 6-10 hours is the safest measure if there is any anxiety about vascularity of the limb. This case shows that late exploration, though it may not save a limb, yet releases the spasm and may make a more distal amputation possible. Heparin drip was not used in this case, but it might prove valuable in the prevention of thrombosis in cases of this type.

## TRANSFUSION OF FILTERED LIQUID SERUM

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WHILE most of the regional transfusion services store filtered citrated plasma and but little serum, this region has stored filtered liquid serum only since October, 1940; an account of our experience may therefore be of interest.

The reason why plasma is widely used and serum comparatively neglected is largely historical. Processing citrated plasma began as an attempt to reduce wastage inherent in the maintenance of stores of citrated blood. In spite of the difficulties encountered in clarifying and sterilising plasma by filtration through asbestos pads (Bushby and Whitby 1941, 1942), the processing of plasma continued; citrated blood was held to be the transfusion medium of choice for the emergency treatment of hæmorrhage and circulatory shock, and large stores of citrated blood were maintained.

It is not necessarily true, however, because blood has been lost, that blood must be transfused. Granted that both volume and composition of the circulating fluid must ultimately be restored to normal, experience has yet shown that lasting restoration of the plasma volume is the first necessity in resuscitation, while restoration of the red cell number is rarely of immediate importance. The prime function of the transfusion services is to provide a transfusion medium for the emergency treatment of circulatory shock in previously healthy subjects (Vaughan 1942); provision of blood for the treatment of anæmia, whether secondary or primary, while undoubtedly within the province of the regional services, need not, and in our opinion should not, determine the orientation of their entire economy. This should rather be decided by the answer to the question which of the possible and equally useful blood substitutes can be most economically prepared and stored. The considerations which led us to filter serum at a time when it was natural—in view of the precedent of the sector blood depots—to

filter plasma, are in our opinion still valid. Furthermore, now that serum has been shown to be a safe and valuable medium for emergency transfusion, these considerations merit attention, if only in the interests of economy of labour and materials. They may be summarised as follows:—

1. About 80% of all citrated blood collected by the regional services is ultimately processed for plasma and stored as such; about 80% of the blood collected may, therefore, be processed immediately. The interval between collection and filtration in which bacterial growth can occur is thus reduced. That this interval should be as short as possible is suggested by the observation of MacFarlane and his colleagues (1942) that at least 5% of all bottles of blood are contaminated.

2. If 80% of the blood is processed at once, citration (and hence the filtration of plasma) is both unnecessary and extravagant; it is simpler and more economical to collect clotted blood and filter serum. This saves labour in preparing standard sodium citrate solution in pyrogen-free distilled water, simplifies filtration, and has the advantage that the contents of all bottles collected can be utilised; whereas partly filled bottles of citrated blood, containing an excess of citrate, have to be discarded. In addition it is more economical of storage space to bottle a product of high protein content (7% protein in serum) than one of low protein content (4.5% and often less in citrated plasma). If the filtered product is to be dried, serum is again more economical than citrated plasma: there is no added water to be removed, and 400 c.c.m. of serum yield about 28 g. of dried protein, as compared with about 18 g. from the same volume of citrated plasma.

3. Contaminating organisms multiply less rapidly in clotted blood and serum than in citrated blood and plasma.

4. No filter is required in the giving set supplied for the transfusion of serum.

When it was decided to filter and store serum, wastage of dissolved protein in unused citrated blood at first sight appeared inevitable. It may be argued that such wastage is preferable to the risk of filtering grossly contaminated material, or to introducing the labour and expense of the bacteriological control necessary to exclude contaminated bottles. Wastage can however be reduced by defibrinating, instead of citrating, blood for storage (Harrison and Picken 1941a) and incorporating serum from defibrinated blood with that from clotted blood. If on the other hand citrated blood is stored, the plasma separated can be converted into serum before Seitz-filtration (Picken 1941, Maizels 1941).

### COMMENTS ON TRANSFUSIONS OF SERUM

Up to Dec. 31, 1942, 2012 bottles of serum had been transfused in this region. The conditions for which 1532 of these were administered to 838 patients are classified in the following table; concerning the remaining 480 bottles we have no information.

	WAR-TIME GROUP		PEACE-TIME GROUP	
	Patients	Bottles	Patients	Bottles
Burns .. ..	40	113	Peace-time surgical ..	188 .. 301
Injuries, including fractures	325	627	Medical ..	33 .. 69
Amputations ..	23	82	Obstetric and gynecological	155 .. 233
			Children's diseases ..	63 .. 84
	388	827	Miscellaneous ..	11 .. 18
				450 705

The division into categories of war-time and peace-time patients is of course only approximately correct. It may legitimately be concluded, however, that fully 40% of the serum used was transfused for conditions not attributable to enemy action. This is important support for the view that facilities for preparing and storing blood substitutes should be maintained after the war. While a detailed analysis of the subgroups in the table would be of little value, the following comments may be of interest.

Our experience conforms with that of others, that results obtained in the treatment of severe burns by transfusing serum have been disappointing. On the other hand replacement by serum of blood lost during operation has been most successful. The subgroup of peace-time surgical conditions included operations for enlarged prostate, gastric and duodenal ulcers, malignant growths and civilian accidents. The medical cases included nephroses, colitis and diabetes. Most of the

obstetric and gynaecological patients were cases of hæmorrhage postpartum or antepartum, and included difficult labour, cæsarean section, placenta prævia, ruptured ectopic gestation and abortion—indeed some of the most gratifying results from transfusions of serum were reported in the complications of childbirth. Most of the children transfused suffered from gastro-enteritis.

On an average each patient received slightly less than 2 bottles of serum. In the great majority of cases the quantity was either 1 or 2 pints. Most of the subjects receiving serum from 4 or more bottles died—not as a result of, but in spite of, the transfusion. The experience of our colleagues in this region coincides, therefore, with that of Grant and Reeve (1941): if the condition of a patient is not improved after 1500 c.cm. of serum have been administered, it is seldom that a greater volume will have any good effect. Experience has thus borne out the conclusions previously reached on theoretical grounds (Harrison and Picken 1941b). The number of instances in this series of cases in which continued or repeated loss of blood or plasma from the circulation has necessitated further replacement has been too small to influence our figure for the average volume transfused.

There have been a few examples of overloading the heart, or of pulmonary œdema, when 4 or more bottles of serum were transfused within a few hours, but the information available is not sufficiently detailed to justify comment. Most of our colleagues seem to have been aware of the danger, and have seldom transfused volumes greatly in excess of those lost from the circulation. A small number of patients received the contents of many bottles: several, 5 or 6 bottles; a few, 7–11 bottles; and one patient with nephrosis received 22 bottles of serum over a period of 2 months; in none of these cases was there any evidence of serum-toxicity. In the experience of medical officers in this region, therefore, serum separated from the clot soon after collection (within 48 hours) and sterilised by Seitz-filtration is a non-toxic safe medium for transfusion. This is further borne out by the small incidence of reactions. Our records indicate a reaction rate of 4% in a total of 838 patients; 5 patients showed rigor and rise in body temperature; 5 slight rigor without rise in body temperature; 18 rise in body temperature without rigor. Such records are, of course, of limited value only.

We are greatly indebted to those who have completed and returned the detachable, franked postcards from which the data summarised here have been obtained.

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## SUPERFICIAL ATRESIA OF THE VULVA

## REPORT OF TWO CASES

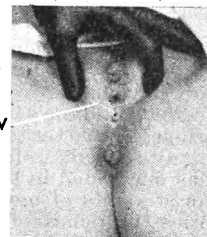
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SINCE atresia vulvæ superficialis is rare the following two cases seem worth recording.

CASE 1.—An unmarried woman of 49 had noticed gradual closure of the vaginal orifice since the menopause 2 years before. The constriction at last reached a degree at which micturition was hindered. She was obliged to strain to pass any urine, and it continued to dribble away for several hours afterwards (though the bladder felt empty), so that she had to wear a towel constantly; she complained of moderate frequency (diurnal 8–9, nocturnal 1), with no pain or hæmaturia. The external genital organs showed entire absence of hair; the labia majora were absent; the clitoris was greatly hypertrophied; the labia minora were represented by two small wrinkled masses lying immediately behind the clitoris, from them a median raphe extended towards the anus, and about 1 cm. from the anterior end of this line there was an opening just large enough to admit the point of a fine probe (*v* in figure). The patient was advised to have an operation, and it was arranged to admit her to hospital. During the few days she had to wait for a bed the obstruction became

complete, and it was necessary to admit her as an emergency. Under general anaesthesia a probe was with difficulty made to enter the opening, which was now of pin-head size. Once the probe had entered there was no difficulty in using it to slit up the light adhesions joining the edges of the labia minora. To prevent recurrence an ellipse of skin with a wedge of subcutaneous tissue, including the narrow line of adhesion, was then excised. The incisions were planned to evert the vaginal ostium and to bring the suture-lines well away from one another. A large vaginal dilator was passed at intervals during convalescence, and the patient was advised to continue to pass it occasionally to guard against cicatricial contraction of the orifice. So far (15 months) there has been no such tendency.



Case 1 at first examination; v = vaginal orifice. The apparent orifice between the vaginal opening and the anus is an artefact.

CASE 2.—An unmarried woman of 91 complained of acute retention of urine for 12 hours, with painful distension of the bladder and constant dribbling of urine. For many years she had had difficulty in passing urine and frequency of micturition (every 2 hours, day and night). There had been no hæmaturia. Examination revealed a bladder reaching to the umbilicus. The clitoris was large, labia majora and hair were absent, and the labia minora were fused in the midline except for an opening in front, just behind the clitoris, about 3 mm. in diameter. The old lady was so frail that it seemed best to avoid an anaesthetic and to do as little as possible. A glass catheter was persuaded to enter the opening, and with a sudden, quick movement the adherent edges of the labia minora were torn apart. There was a small amount of bleeding. The patient at once passed 40 ounces of urine without difficulty. No plastic operation has been advised in this case, in the hope that if the condition should recur it will do so slowly and will not trouble the patient during the brief remainder of her life.

In both these patients urinary infection was present. Case 1 was treated with sulphamylamide; case 2 was given merely an alkaline mixture with hyoscyamus. Masturbation was denied by case 1, and unlikely as a cause in case 2 on account of the patient's age. Neither had had previous medical or surgical treatment for any gynaecological condition. The clitoris usually becomes atrophic after the menopause and the enlargement in these cases cannot be explained.

Salmond<sup>1</sup> in 1930 described the condition, including one new case and a bibliography of cases previously reported. I have not discovered any later work on the subject. The cause is unknown; microscopic examination of the excised area of skin has yielded no evidence of inflammation. In most cases progressive difficulty with micturition has been the symptom which brought the patient to seek advice. In both the cases here described the lightness of the adhesions was striking; the edges of the labia minora appeared as though gummed rather than fused together.

1. Salmond, M. J. *Obstel. Gynec.* 1930, 37, 824.

HOSPITAL DIETS IN CAPE TOWN.—The medical committee of the Groote Schuur Hospital have collaborated with the chief dietitian to give their views on and experience in dietetic treatment, and to suggest a practical basis on which individual needs can be worked out (*Review of Standard Hospital Diets*. Cape Town: Paul Kaston. Pp. 57. 5s.). The standards for children in health, as distinct from the special diets, have received careful thought; as in America, they are planned to contain all the necessary food factors. Dietetic treatment of disease follows the lines accepted in this country, except that the diabetic diets contain more protein and less carbohydrate than those current here. This is an important matter for the diabetic of limited means. From the patient's point of view it is perhaps a drawback that, except in one diet of high calorie value, no pudding is allowed. Diabetics should be encouraged to feel as normal as possible, and standard diabetic diets now in use in British hospitals include a pudding at midday. But perhaps South Africans are less addicted to puddings than the English.

## Reviews of Books

### New Paths in Genetics

J. B. S. HALDANE, FRS, Weldon professor of biometry in the University of London. London: Allen and Unwin. Pp. 206. 7s. 6d.

THE applications of the statistical method to human genetics by Fisher and Haldane, and their associates, are nowhere so conveniently assembled as here. Professor Haldane's clear vigorous style is a great help when the matter to be presented is so incomplete and, for many readers, unfamiliar; but it cannot be said that he has succeeded in his object which was to prepare a book for students of medicine, embryology, biochemistry and other branches of biology as much as for geneticists. Many students of medicine will find the going too heavy: those who persist however will learn about some of the main growing points of a study which doctors cannot afford to overlook. They will also learn more about the author, from his preface and his obiter dicta, than is sometimes discernible in scientific treatises. The circumstances in which the book was prepared and published in 1940-41 probably account for the indifference shown by Professor Haldane to relevant work in the United States and elsewhere—for instance, Jarvis's findings in phenylketonuria.

### Disability Evaluation

(3rd ed.) EARL D. McBRIDE, MD, FACS, associate professor, orthopaedic surgery, University of Oklahoma. London: J. B. Lippincott. Pp. 631. 55s.

IN its first edition this book broke new ground and now in the third edition Professor McBride has used his experience to clarify and enlarge some sections and to add new chapters. Of these, the two most important are that setting out a schedule of evaluations of partial permanent disability and that on the doctor as an expert witness. He suggests an ingenious method of assessing percentage disability resulting from injury. The first few chapters deal largely with compensation laws and the legal aspect of injury, but these are not of direct interest to British readers because of administrative differences between this country and America. But this does not detract from the value of the clinical discussion. These are in any case problems common to the two countries; thus he says: "It would seem as if an employer should be forced by law, if necessary, to find a place in his organisation for the convalescent employee." He thinks medical evaluation of disability ought to be standardised; if this could be achieved the odious spectacle of two doctors swearing to the truth of diametrically opposite opinions would be less common. In the main the book is a presentation of the clinical aspect of injuries of all types, and of all parts of the body; diagnosis, treatment, aftercare and disability, temporary and permanent, are all considered. His matter ranges from elementary descriptions of examination and treatment to complicated problems of muscle mechanics and joint movement. Illustrations are plentiful and the diagrams, photographs and X-ray pictures are all of good quality. His material is well organised and on the whole presented in a clear and uncomplicated manner; the chapters on functional disorders and "industrial back" merit special mention. The volume is one of the best reference books of its kind.

### Development of Occlusion

WILLIAM K. GREGORY, PhD, DSc, professor of vertebrate palaeontology, Columbia University; B. HOLLY BROADBENT, DDS, FACD, director of research, Bolton study of facial development of growing child, Western Reserve University; MILO HELLMAN, DDS, ScD, professor of anatomy and oral surgery, Columbia University. London: Humphrey Milford, Oxford University Press. Pp. 72. 9s. 6d.

THIS is the story of the development of dental occlusion set out in three sections by American research scientists. Professor Gregory deals thoroughly with the evolution of dental occlusion from fish to man. The evolutionary sequence can be traced in teeth with greater precision than in any other organ of the body because the hardness of the teeth protects them from the ravages of time.

Professor Broadbent discusses the ontogenetic development of occlusion. During the past 12 years his department has taken standardised cephalometric radiograms and tracings from 5000 Cleveland children, monthly, quarterly, bi-annually and annually. Diagrams show the temporary and permanent dentition from the age of 1 month to 18 years. He points out that at birth the jaws contain the partially calcified crowns of no less than 20 deciduous teeth, and the crypts of the first permanent molars, and his diagrams show that at 7 years the crowns of all except the wisdom teeth are calcified. Only if a child has a normal healthy development will the bony skeleton achieve its destined size and form, and dental occlusion be perfect. Professor Hellman points out that it takes a third of life to reach adult dentition in man, and stresses the importance of the expansion of the dental arches in orthodontia to ensure normal occlusion.

### Facts for Childless Couples

E. C. HAMBLÉN, MD, associate professor of obstetrics and gynaecology, Duke University School of Medicine, North Carolina. London: Baillière, Tindall and Cox. Pp. 103. 11s.

HERE is an excellent and much needed counterpart to the innumerable popular manuals on contraception already in the hands of the public. People are steadily recognising that something can be done about sterility but are still vague about what investigation and treatment entail, and what the chances of success may be. In this little book Dr. Hamblén, briefly and in simple language, has covered that ground. Much of what he says is dogmatic and might be questioned but this can be forgiven in a short book not intended as a text for experts.

### Vitamins in Medicine

FRANKLIN BICKNELL, DM Oxf, MRCP; FREDERICK PRESCOTT, PhD Lond., MRCS. London: Heinemann. Pp. 662. 45s.

THIS comprehensive work is well illustrated and documented. While there has been no parochialism in the selection of the literature or illustrations, it is a pleasure to turn over the pages and find that a modicum of English material has been included. Vitamins A, B, C, D and all the other old friends are there, and the new faces also, such as pantothenic acid and pyridoxin. Emphasis is laid on the clinical aspects of the subject, and the authors have tried to summarise the knowledge at present available; but they write critically and are refreshingly frank about their own opinions. They tell us exactly what they think about pasteurised milk and dental caries; in discussing the relative efficacy of vitamins D<sub>2</sub> and D<sub>3</sub>, they admit that the evidence is contradictory and give it in detail—but they make their own view clear that D<sub>2</sub> is the better. There are a few questionable statements in the book, and it is a minor annoyance that the references are not listed alphabetically and numbered in that order. The authors must have found it difficult to produce a book of this calibre in 1942, but paper shortage has not been allowed to interfere with its publication: now is just the time when a book of the kind is wanted. It will be a standby to all who are interested in biochemical medicine, especially those who will be called upon to visit Europe some time in the next few years to help the starving millions to regain their health.

### Handbook of Allergy

For Students and Practitioners. WYNDHAM B. BLANTON, MD, professor of clinical medicine and chief of immunology clinic OPD, Medical College of Virginia, Richmond. London: Baillière, Tindall and Cox. Pp. 190. 16s. 6d.

THIS book condenses the subject of allergy to meet the requirements of courses usually given in American medical colleges as part of the curriculum. As yet the subject has not reached such prominence in this country; nevertheless the busy practitioner will find the subject presented here clearly and precisely. The book covers the causes (inhalants, ingestants, absorbents, infectants, contacts) and the results—that is, the clinical manifestations of allergy. No details of treatment are given. The appendix contains a series of egg-, milk- and wheat-free diets and recipes of interest mainly to American patients since most of the alternatives are not obtainable by the allergic English just now.



# THE LANCET

LONDON: SATURDAY, FEBRUARY 27, 1943

## MEDICAL PLANNING

OFFICIAL pronouncements on the Beveridge report were more encouraging in substance than in form. Commenting on Sir JOHN ANDERSON'S statement, the *Times* points out that, with all its limitations, no speech ever delivered in the House of Commons has committed a government to more far-reaching measures of social advance. There are disappointments; but it is satisfactory that the Government welcomes the conception of a reorganised and comprehensive health service and is to begin negotiations immediately with the medical profession. It is also satisfactory that the council of the British Medical Association are asking their representative body and the panel conference for a mandate to coöperate in the preparation of a scheme of health and rehabilitation service available to every member of the community (see p. 284). Their main proviso—that doctors working under such a scheme shall, with suitable reservations, remain free to see insured persons as private patients—is met by an assurance that the Government do not want to "force the new services on those who continue to prefer to make private arrangements for medical attendance or hospital treatment."

The Government's intentions for the future of medical services became clearer in the debate. Sir KINGSLEY WOOD spoke of "almost a complete revolution in medical ideas and prospects," but Sir JOHN ANDERSON explained that there must be the least possible disturbance of existing association between doctor and patient and that the well-being and integrity of the medical profession, and also the position of the great voluntary hospitals, must be safeguarded. His most significant statement, perhaps, was that the ultimate responsibility for the adequacy and efficiency of medical service in any area must be laid on "the well-tried local government machinery working very often over larger areas perhaps, and certainly working in consultation and collaboration with voluntary agencies." Without doubt the present local authority areas are too small to support individual health services, and some kind of regional solution appears inevitable. But a choice will have to be made between regional services controlled from the centre and regional services controlled locally. The Government shows no present leaning towards a National Medical Corporation, and presumably relies on the Ministry of Health, acting through the local authorities, to achieve the necessary unity in essentials.

## PRIVILEGES IN HOSPITAL

WHEN we have reached the desired estate in which every citizen can obtain all treatment for every medical and surgical disability, will hospitals still offer privileges to patients who have money to buy them? In theory the answer is No; but in a country where progress is by evolution rather than by revolution it may be long before theory becomes practice. There may be at least a transitional period in which

the custom of purchasing extra comforts will survive; and it behoves us to consider what should be allowed for the luxury of the well-to-do which is neither to their detriment nor to the detriment of those not so affluent.

The subject is less academic and remote than it appears; for it affects the structure of buildings. Of recent years pay-beds have been started in the wards of certain hospitals. If this had been done because the patients could afford to pay ad hoc and not only by insurance, all would have been well. Payment was accepted in this way, however, not merely for the service of the ward, but also for certain additional advantages, which were the very things that many were beginning to demand for all. These advantages included a partial privacy, supper, a wardrobe, and the right to have visitors daily. In some hospitals the beds are fully exposed to view; in others curtains can be drawn to surround the head; in very modern ones rails are fixed all down the wards with curtains hanging so that the patient is secluded from sightseers when performing the rites of nature and of hygiene. Anyone who has seen this last arrangement will agree that it should become the rule for all hospitals, municipal or voluntary; but the fact that this degree of privacy ranks as a purchasable extra delays its general application. As for suppers, if these are needed for one they are needed for all. Likewise a cupboard in the wall beside each bed should now be deemed a necessity in planning a new ward. But the "extra" that is most highly prized is the right to have daily visitors. That a husband should be unable to see his wife except on Sunday or by losing half a day's work on Wednesday is wrong. He should be allowed to go in every evening when his work is done. This verges on the therapeutic, for she will sleep the better when she has had news of her children.

Every ward will in the future have separate rooms for the desperately ill, for those recovering from operation and for those that need privacy as a part of treatment, and none must be precluded from the use of such rooms because it has been bought by others. Perhaps too we may look forward to a time when those with money will actually prefer to go into the general ward, because it is better for them mentally, morally and physically. It is not generally realised how bad for the patient is the modern nursing-home or private block. Physically, ventilation cannot be attained in such a building except by opening all windows and propping open all doors for a period at stated times of day; a condition that the occupants of the room do not pay for. Mentally they are not conducive to recovery. One patient, anxious to get her money's worth, rings the bell every few minutes for the nurse; another, having hired a telephone, is able to invite her friends at half-hour intervals throughout the day—though visitors ad lib are as injurious as weekly "hours." Put both these patients into a ward and each is the better for it; the one because she realises that others are worse than she, the other because she is controlled by a healthy discipline. There are of course a few people who need to work when ill and to converse on matters that should not be heard by all; but it should not be beyond the powers of the administration to arrange for these exceptions.

The one thing that must not be evaded by payment is to be used for teaching. The person who is distressed by becoming the object of a demonstration is not necessarily a person who happens to have money: he is found in all walks of life. The decision whether a patient should be excluded from the teaching round should depend on his physical and mental condition, not his income. Some thoroughly enjoy being talked about; others are upset thereby. It is probably inadvisable to use the former for teaching as much as they would wish, but it is often good for the latter to put up with a little. When they understand the need, most people are willing—indeed glad—to turn their illness to good account by contributing to the education of future doctors and nurses; and they themselves will benefit from this service, provided they are made to feel useful.

### RECOVERY OF NERVE FUNCTION

WAR injuries have given a fillip to the study of regeneration of nerves, and modern work lays increasing emphasis on recovery of function. Regeneration is not complete when new nerve-fibres have grown down to the end-organ: it is only achieved when they are sufficient in diameter and medullation to carry impulses of such frequency and velocity that this function is possible.<sup>1</sup> ADRIAN, GASSER and others have shown that each function is mediated by nerves of a particular diameter, the large fibres conducting faster than the small. Thus, though the spinning of new fibres is a stage in regeneration, recovery is complete only when the nerve has returned to its original state. It is doubtful whether this ever happens after the suture of a divided nerve. No special mechanism ensures that growing fibres are directed back into appropriate pathways, nor does recent work support the hypothesis of chemotactic or other attraction of such fibres towards their end-organs.<sup>2</sup> TELLO's experiments seemed to show that fragments of peripheral nerve implanted in the brain attracted bundles of outgrowing cerebral fibres, but LE GROS CLARK<sup>3</sup> has now shown that this was a misinterpretation and that few or no fibres grow into such grafts.

Severed nerves unite by means of an outgrowth of the neurilemma cell of Schwann from the peripheral towards the central stump; from the central stump there simply seems to be an outflow of viscous axoplasm. Streams of this fluid pour from the central fibres (which become smaller in consequence) and spread along the surfaces of the Schwann cells and into the tubes formed by the endoneurium of the peripheral stump. These tubes, from which the axons and myelin have disappeared, are occupied by the hypertrophied protoplasm of the Schwann cells; the new fibres grow over the surfaces of these cells<sup>4,5</sup> and are later enclosed within their protoplasm which then produces a new myelin sheath. Thus the growth and orientation of Schwann cells in the scar deserve special study in relation to nerve suture, since these cells guide the fibres for the most hazardous part of their journey. Once within a tube in the peripheral stump the fibre is led all the way to the end-organ with which that tube is connected. Un-

fortunately we know little of what happens if the connexion proves to be an unsuitable one. Since fibres are not specifically attracted to the correct peripheral pathways, a large central fibre can become connected with a large peripheral tube only by good luck.

Anything which inhibits the outflow of axoplasm is likely to prejudice the degree of regeneration achieved; thus it has been suggested that nerve suture should be carried out as early as possible because delay gives time for the tubes in the peripheral stump to shrink, and so to retard or prevent recovery.<sup>6</sup> Some return of function can be expected even when nerves are sutured years after the injury, so that there is a temptation to delay operation in the hope of spontaneous recovery. This practice has probably spoiled the best chances of many nerve lesions; as time passes the Schwann cells become less active, muscles (and probably skin) atrophy, and other trophic disturbances cause trouble. We need further information about the rate of such changes before we can decide the best time for operation, but recent work all favours early suture.

It is difficult, however, to diagnose complete interruption of a nerve in gunshot wounds. A nerve trunk may suffer injury varying from the formation of a long stretch of impassable scar to a very slight lesion from which recovery can occur without surgical intervention. The lesion is not known in the cases of spontaneous recovery, but the axons are probably interrupted while the connective tissues remain intact and maintain continuity of the stumps—a condition lately named axonotmesis<sup>6</sup> to distinguish it from complete section of the nerve or neurotmesis. Nerve contusion<sup>7</sup> has been suggested as an alternative term for axonotmesis; but the condition in which the axons degenerate and the tubes are spared forms a group separable from the many cases of "nerve" contusion in which the internal anatomy of the nerve is severely deranged. It is still impossible to distinguish the two types at the outset; a step towards providing criteria would be to collect information about the rate of recovery after the various lesions. In studies of nerve regeneration one must distinguish between the rate of advance of the tips of the axons and the rate at which they become medullated sufficiently to mediate any given function. In the rabbit "functional completion" of the new nerve has been shown<sup>8</sup> to advance along the peripheral stump at the rate of about 2 mm. a day after nerve suture—whereas the axon tips advance at the rate of 3.5 mm. a day. Study of human cases on the same lines would probably yield similar results. There is evidence already that the rate of nerve regeneration in man sometimes exceeds the widely quoted 1 mm. a day.

The rejoining of some at least of the tens of thousands of fibres in a peripheral nerve with their end-organs is thus accomplished without any specialised mechanism. The fluid state of the axoplasm and its power to spin new fibres are attributes retained from the embryonic state; so is the power of the Schwann cells to apply themselves to the new fibres and medullate them; true these cells must first

1. Young, J. Z. *Physiol. Rev.* 1942, 22, 318.

2. Weiss, P. J. *exp. Zool.* 1934, 68, 393.

3. Le Gros Clark, W. E. *J. Anat.* 1942, 77, 20.

4. Weddell, G. *Ibid.*, p. 49.

5. Holmes, W. and Young, J. Z. *Ibid.*, p. 63.

6. Seddon, H. J. *Brit. med. J.* 1942, II, 237.

7. Brain, W. R. *Ibid.*, p. 349.

8. Gutmann, E., Gutmann, L., Medawar, P. B. and Young, J. Z. *J. exp. Biol.* 1942, 19, 14.

proliferate and become dedifferentiated, which might be regarded as a special preparation for regeneration. The third agency in the regenerative process is the connective tissue of the endoneurium, which provides Schwann tubes not only in the nerve trunks but also in the plexuses and so directs the advance of the new fibres. It is still only possible to guess why conditions do not allow of regeneration within the central nervous systems. SUGAR and GERARD however have recently observed functional recovery after complete division of the spinal cord in young rats<sup>9</sup>; LE GROS CLARK on the other hand has been unable to find any signs of regenerative activities on the part of neurons of the cerebral hemispheres of rabbits. In the cord it seems that neurons are able to put out processes, but under ordinary conditions they find no suitable pathways, perhaps because of the absence of suitable connective-tissue tubes, or of Schwann cells. SUGAR and GERARD inserted grafts (such as pieces of peripheral nerve) which may have helped to provide pathways. There can be no prospect at present of any such outstanding advance as would make it possible to repair lesions within the CNS, but our knowledge of the powers of repair in peripheral nerves is advancing steadily, and with it the methods of treatment of nerve injuries. Spectacular results can hardly be expected; the process of nervous regeneration is bound to remain slow; but the present policy of segregating nerve injuries in special centres provides the proper conditions for continuous developments in treatment.

### SURGERY IN THE TROPICS

In the tropics surgery is every doctor's business, and a medical officer whose interests lie perhaps in the abounding protozoal diseases of East Africa cannot refuse to exchange the microscope for the scalpel when confronted with a forearm mangled in sisal machinery, or a ruptured uterus. Nor can he leave to her own devices a woman with an ovarian cyst so huge that she can do no more than lie in the sun, but who still refuses to be carried more than a mile or so from her home. A man with a scrotum weighing 50 lb., heavy with elephantiasis, will entrust it to the local medical officer, but too often will not consent to go further afield than the local hospital; and the expert surgeon cannot be everywhere, hindered as he is by the problems immediately to his hand. Every medical man is his own surgeon, therefore, and must be ready to perform a caesarean section, to amputate a limb, to repair a vesico-vaginal fistula, to plaster a fracture, to deal with countless hernias and hydroceles, and to have a plan for the treatment of those abundant ulcers which fill his hospital.

Not much is written on tropical surgery, yet there are plenty of surgeons with vast experience and it is a subject whose importance goes beyond the immediate results. Dramatic cures, such as are often obtained, have incalculable value in inducing Africans not only to submit their lumps for removal, but also to entrust their fevers and worms, and ultimately their sanitation and infant feeding, to the supervision of those in whom confidence has been established. Lord HAILEY<sup>10</sup> has stated that "disease of

the type which causes most mischief in Africa is generally a mass infliction, and must be attacked in the mass"; but it is difficult to influence whole populations without their willing coöperation, and coöperation is impossible without confidence. Successful surgery creates confidence.

Describing his surgical experiences in the East African campaign, ERASMUS<sup>11</sup> gives a catalogue of diseases that will be strange to western surgeons. Ulcers, either arising from infestation with chiggers, or the true tropical phagedænic ulcers of unknown ætiology, are constant problems; but there is interest in the observation that no tropical ulcers were observed in West African troops, whose rations were supplemented by a generous supply of palm oil and nuts. That nutrition plays a part in the causation of tropical ulcer has long been suspected, and the point has recently been made by LUTTEROTTI<sup>12</sup> in Abyssinia; but LOUW<sup>13</sup> has observed that ulceration is comparatively rare in transport drivers, whose skins are usually oily. Next to ulcers, the condition most frequently observed by ERASMUS was pyomyositis, but this again was not seen in the West African troops. There has been no lack of controversy over pyomyositis; it has been attributed to filariasis, but ERASMUS reports the finding of *Staph. aureus* in all his cases and rejects the filarial theory. The long muscles are the principal sites of this inflammation, but he has seen it in the sternomastoid and other less easy muscles: he admits a number of mistakes in diagnosis, but there would be few who could distinguish between perinephric abscess and pyomyositis of the quadratus lumborum.

Filariasis is common in East Africa, and its surgical sequelæ are legion. ERASMUS recognises the inflammatory and the obstructive results of this infection—the former including lymphangitis, fever and abscess formation, the latter elephantiasis and the lymphatic varices. Malaria may present surgical problems, and "almost any acute abdominal emergency may be simulated," as a rule without diarrhoea in this author's experience. The danger of ruptured spleen, of course, lies rather in dissimulation than simulation; delayed hæmorrhage and delayed diagnosis, after trivial injury, provide one of the classical pitfalls of abdominal surgery. For the rest, ERASMUS mentions appendicitis, perforated peptic ulcer, and carcinoma of the liver. The first two are rare but should not be regarded as impossible in Africans; the last is commoner in Africans than in Europeans. The bulk of the urological surgical work was due to schistosoma infection, and cases of hydronephrosis and of carcinoma of the bladder were attributed to this worm. Guinea-worm is common in West African troops, but not in East African natives; the consequences of infection of the worm track can be disastrous.

These are some of the problems which will confront the tropical surgeon, but he will be a fortunate man who has been taught what to expect and who has not to learn his job by hard experience. It seems evident that instruction in tropical medicine should include more surgery than is the custom for those entering upon a career in hot climates.

11. Erasmus, J. F. P. *S. Afr. med. J.* 1942, 16, 379.

12. Lutterotti, M. *Dtsch. trop. Z.* 1941, 45, 697.

13. Louw, J. H. S. *S. Afr. med. J.* 1942, 16, 43.

9. Sugar, O. and Gerard, R. W. *J. Neurophysiol.* 1940, 3, 1.

10. Hailey, Lord, *An African Survey*, London, 1938.

## Annotations

### A MASTER ACTIVATOR

Sir Frederick Gowland Hopkins, OM, FRS, who is retiring this year from the Sir William Dunn chair of biochemistry at Cambridge, has exerted a remarkable influence upon biochemistry and medicine during a long period of service to the university. After leaving Guy's Hospital for Cambridge, he became tutor at Emmanuel College and taught physiological chemistry to successive generations of students, all of whom can well remember his stimulating personality, his vigour and the width of his penetrating knowledge: when asked about any point, he not only knew the relevant literature but had usually thought about it deeply enough to hold a view. The number of his pupils who have occupied distinguished positions is a testimony to his success as an advanced teacher. When freed from college duties by Trinity College, where he became praelector in biochemistry, he was able to devote himself more definitely to his scientific work; but he was not made actual professor of biochemistry until 1914. None who have had to do with him, either in the Cambridge school or elsewhere, will forget his simplicity and unflinching courtesy, or his deep and continuous human interest in all around him.

Important as Hopkins's activities have been in teaching and stimulating research in biochemistry, his contributions to research have had the rarer quality of opening successive new chapters. His isolation (with S. W. Cole) of the amino-acid tryptophane paved the way for work on essential amino-acids in nutrition; it formed a fitting introduction to his well-known studies on accessory food factors or vitamins, which have proved of incalculable importance. His observations on glutathione, published shortly after the last war, again brought to effective focus a large group of biochemical phenomena in which the sulphhydryl group is involved. The final isolation of glutathione, requiring the separation of a difficult substance from biochemical mixtures, reveals the hand of a master. Again, his work with colleagues upon xanthine oxidase was a starting-point for immensely significant investigations of enzymes concerned with tissue oxidation—investigations which are beginning to yield large dividends for medicine—and in this connexion mention must also be made of his classical research (with Savory) on Bence-Jones protein. Nor can even the shortest sketch of his crowded life omit reference to the famous work upon lactic acid in muscle carried out in collaboration with the late Sir Walter Fletcher. A whole edifice of knowledge of the intimate mechanism of carbohydrate metabolism has been based on it.

Sir Frederick was an original member of the Medical Research Council and also served on the Agricultural Research Council. He received the Nobel prize in 1929, was president of the Royal Society for five years from 1930, and became a member of the Order of Merit in 1935. His colleagues in medicine respectfully and affectionately wish him many happy years of rest after great achievement.

### A TEST FOR MYASTHENIA GRAVIS

ATTENTION has often been drawn to the similarity between the symptoms of myasthenia gravis and curare poisoning. It is now suggested<sup>1</sup> that there is more than a similarity: that curare in fact "produces artificial myasthenia gravis," and that "physostigmine is a specific antidote for curare intoxication and relieves the symptoms of myasthenia gravis." The second of these claims is simply a statement of fact. It has been found that the myasthenic patient is abnormally sensitive to curare, one-tenth of the average dose required

to produce generalised paresis inducing profound exacerbation of symptoms in myasthenia. Curare can thus be used as a diagnostic reagent. Whereas intravascular injection of 'Prostigmin' (Roche) produces a muscular weakening in the normal individual which it does not produce in the myasthenic, administration of curare may be used conversely to induce in a myasthenic a weakness which it would not produce in the normal person.

Disagreement is so often found among physicians in the diagnosis of myasthenia gravis that it would certainly be useful to have another reagent added to the diagnostic armamentarium. At the same time full regard must be had to the potential dangers of so powerful a drug as curare when given to a sensitive and enfeebled person. Fortunately the antidote is at hand in prostigmin.

### BOURNEMOUTH CANCER CLINIC

THE county borough of Bournemouth, with a fine sense of civic responsibility, has not allowed the difficulties of the times to interfere with its care for sufferers from cancer within its borders. Other local authorities have accepted release from the duties imposed by the Cancer Act 1939, but Bournemouth has gone ahead with its scheme. A free municipal cancer clinic has been established at the Royal Victoria Hospital, under the direction of Mr. Sampson Handley, consulting surgeon to the Middlesex Hospital and a recognised authority on the pathology and treatment of cancer. The Ministry of Health has sanctioned its establishment for an experimental year, during which the experience gained will be of exemplary value when the wider adoption of the act is practicable. The 1939 act, it will be remembered, gave everyone who believes himself to be suffering from or threatened with cancer the right of access to special free clinics which must be established on a regional basis by county and county borough authorities. The right to free treatment is also granted under arrangements which it becomes the duty of these local authorities to make and to pay for. They have in particular to see that adequate facilities are available for treatment by surgery, by radium and by deep X rays. This treatment is to be concentrated so far as is possible in those few large hospitals which have on their staffs skilled radiotherapists and physicists as well as surgeons.<sup>1</sup> Any necessary additional beds are to be provided in such hospitals and local authorities may make contributions to the capital and maintenance costs involved. Consultation and follow-up centres are to be provided and records kept on forms approved by the Ministry. Local authorities are advised that publicity must be given to these arrangements. Medical practitioners are to be informed of them. The public must be reassured and (in the words of circular 1813) encouraged to utilise the available facilities whether or not they have previously consulted their own practitioners. It is yet to be shown whether such a scheme in practice will not create a wave of cancer hysteria and bring nervous people to the clinics in such numbers as to make it unworkable. Or will the public shun the clinics as violating the privacy of their health concerns? Will the scheme interfere with the relationship between the patient and his family doctor? The answer to these questions may be inferred from experience of the tuberculosis service and can only be given by trial. Lay opinion, it may be feared, entertains undue hopes of the influence the act when it comes into full operation may exert in lowering the death-rate from cancer. The major function of the clinics may well be to act as centres of enlightenment. They should drag the unpleasant subject into the open and deprive it of the

1. Specific proposals have been made by Dr. Ralston Paterson (*Lancet*, 1942, ii, 317), and by the Faculty of Radiologists in a report reviewed on p. 248 of our last issue.

1. Discussion reported in *Trans. Amer. Neurol. Ass.* 1942, p. 102.

phosphorescent horror which secrecy and repression have created round it; and so by degrees the public will seek earlier advice for doubtful symptoms. Directors of cancer clinics will need wide clinical experience of the disease in all its forms based upon study of its pathology and a first-hand knowledge of the results of treatment. To avoid an unfair burden falling upon the finances of Bournemouth and the accommodation of its hospitals the regional basis of the pioneer scheme will be strictly observed and its benefits restricted to the inhabitants of the borough.

### TESTS OF MENTAL DETERIORATION

INTELLECTUAL deterioration is so fundamental a sign of organic cerebral disease that its early detection is diagnostically important, especially when it is necessary to evaluate the symptoms complained of after injury to the skull, or cerebrospinal fever. Psychological methods more refined than those commonly used by the clinician have been introduced, some of them piecemeal and some as a group or "battery" of tests; the most familiar of the latter, devised by Babcock, relied upon the assumption that command of vocabulary is less impaired by organic cerebral disease than are other intellectual functions, and that this disparity can serve to detect, and measure, the degree of deterioration. Goldstein, and others following him, have emphasised how much organic damage reduces the capacity for abstract thinking, and have accordingly used tests that show up any failure in this direction. At a meeting of the section of psychiatry of the RSM on Feb. 9, E. L. Trist reported a detailed investigation which he and V. Trist had made into the problem. Four tests of abstract thinking were employed; they required the subject to state similarities, sort ambiguous shapes, interpret form in ambiguous pictures, and carry out a sorting test modified from that of Weigl. Three groups of subjects were examined: a group of 25 persons who had been treated for general paralysis of the insane, with fairly satisfactory results, was compared with neurotic persons with low intelligence scores on the matrices test, and with 125 normal subjects. It would be premature, in Trist's opinion, to suppose that such a battery could at present be used, with confidence, for the clinical diagnosis of dubious cases of organic deterioration. At the same meeting, M. B. Brody described a series of tests, some of which like those of Trist, were concerned with abstract thinking, but which covered, on the whole, a wider range and were interpreted in a more elastic way. The actual tests employed were those of vocabulary, paragraph memory, sorting, detection of absurdities, cancellation, recognition of pictures and the meaning of proverbs. Brody likewise emphasised the diagnostic limitations of the procedure, and insisted that the signs must not only be observed, but evaluated with due regard for their occurrence also in normal persons of even high intelligence. Abnormality could be inferred when these signs were prominently and repeatedly displayed in tests which the patient, before his illness, could certainly have performed well. Brody would be reluctant to interpret the psychometric data alone, but would consider them as informative when taken in conjunction with the rest of the clinical picture.

### STABILISING LONDON HOSPITALS

THIS year King Edward's Hospital Fund for London enters upon the forty-sixth year of its beneficent work. The publication of a short history of its origin and development is timely and gives an opportunity for reviewing the extraordinary changes in the financial and constitutional situation of the London voluntary hospitals which have taken place in its time. From being almost completely bankrupt most of them have achieved freedom from debt; they have largely been rebuilt and re-equipped; and on the constitutional side

they have been redeemed from that isolation which sometimes led to overlapping and duplication of resources. The fund was founded by King Edward VII—then Prince of Wales—to commemorate the diamond jubilee of Queen Victoria. His concern for the desperate condition of Guy's Hospital inspired his ambitious scheme for rehabilitating the finances of all the London hospitals. From the beginning he presided at all the meetings, generally at Marlborough House, and when the preliminary outlines were settled he sent a long letter to the press, stating that the fund was to be a permanent institution which aimed at securing an annual increase in the total income of the hospitals of £100,000 to £150,000 in subscriptions from those who had not hitherto regularly contributed. Before he died the latter figure had been attained, and within a year of its founding the fund received well over £200,000. He also insisted that income only should be distributed and a capital sum built up. Mr. Frank Long's account of the fund's foundation and achievements shows that it began to distribute monetary aid the year after it was founded, when £56,000 was given to a comparatively small list of the most urgent cases. Since 1931 it has distributed each year at least £300,000 while its permanent capital has steadily increased. But the financial side of its work, though striking, is less important than the changes and reforms which it has been instrumental in introducing and fostering in the hospital world. Financial aid could not be given on any haphazard plan, so that the fund has had to survey the needs, the buildings and the projects of the hospitals in the metropolitan area. From this practice have sprung the economies in accountancy and expenditure, the approval of building schemes and the other activities which the fund now helps to control. In 1907 the fund was incorporated by Act of Parliament. The war of 1914 brought fresh problems and vastly increased expenses to the hospitals, but thanks to its prudent finance, the continued support of the public, and the large contributions of wealthy subscribers, the fund was able to maintain and even to increase its distributions. In the depression years it rescued the hospitals from an otherwise inevitable decline in progress, and even ensured that in 1924 there were more available beds and better services than in 1914. It has thus stabilised the voluntary hospital system of London; and whatever changes may be in prospect in the approaching medical reorganisation King Edward's Fund will undoubtedly continue to give good service.

### SYMPATHETIC OPHTHALMIA

Is sympathetic ophthalmia as great a danger to eyes injured in warfare as is commonly supposed? Loewenstein<sup>1</sup> has studied the medical history of previous wars and has collected some unexpected statistics. In the Crimean and American Civil War the incidence of the condition was high, but after reviewing the records of the latter war Dimmer<sup>2</sup> came to the conclusion that there had been a good deal of confusion between sympathetic ophthalmia and sympathetic irritation—irritation being no more than a mild degree of photophobia and lachrimation in the sound eye following injury to the other eye. The medical history of the 1914-18 war is more exact. After two years of it Jessop<sup>3</sup> had not found a single case of sympathetic ophthalmia in England. None was found in Austria or Hungary by Dimmer, Salzman and Grosz,<sup>3</sup> while Reis studied 2000 eye injuries on the German western front and did not discover one instance of the disease. Sir Arnold Lawson's<sup>4</sup> report on war blindness at St. Dunstan's written in 1922 (by which time one would have expected all cases of sympathetic ophthalmia to have come to his notice) emphasises the

1. Loewenstein, A. *Bull. Czech. med. Ass.* 1943, 1, 37.
2. Dimmer, F. *Klin. Mbl. Augenheilk.* 1916, 57, 257.
3. Quoted by Loewenstein, loc. cit.
4. Lawson, A. *War Blindness at St. Dunstan's*, 1922, London.

notable absence of this disease in war-blinded men. Only 4 cases of sympathetic ophthalmia passed through St. Dunstan's, and not one case of blindness from this cause has been a result of disintegration of one eye by shell splinters or bullets. On the final count, after 4½ years of war the French Army reported 35 cases, the German 13, and the Americans 1 dubious case only. Considering the enormous numbers of eye injuries these figures are very low—much lower than the records show for peacetime injuries. Lawson expected this, for in his opinion sympathetic ophthalmia is a particular form of sepsis, and missiles entering the eye in war-time are usually aseptic.

Do these low figures mean that the danger of sympathetic ophthalmia has been exaggerated, or were they due to the radical surgery formerly employed, and the excision of all injured eyes that did not at once settle down? Probably both factors come in. Certainly an eye with a perforating injury is better removed if there is no chance of it becoming a useful organ of vision, but much experience is necessary before the verdict can be given, and it is unfair to leave such an important decision to any one but an eye surgeon. It seems likely that if the ophthalmologist can be allowed to work near enough the front line, a great many eyes might be saved which would otherwise be sacrificed through lack of anyone sufficiently experienced to bear the responsibility of "hanging on." If excision is necessary the greatest care must be taken to preserve all the conjunctiva, for on this depends the size of the socket and the ability of the man to wear a glass eye of normal size. That a glass eye should be unobtrusive is important to the young man when he returns to civilian social life. It is no easy task to enlarge a contracted socket, and few of the sockets so enlarged are wholly satisfactory.

#### ENDOCRINE TREATMENT OF PROSTATIC CANCER

Lane<sup>1</sup> is concerned with the palliative effects of castration in prostatic cancer. The design of this operation is to cut down the supply of androgen and so to hinder the growth of the neoplastic tissue; for the cells of a prostatic cancer are commonly differentiated enough to be affected by gonadal hormones. Other papers<sup>2,3</sup> on this subject have appeared and this additional material, which includes the early results in 115 cases most of which benefited by castration, also notes results of giving oestrogen either alone or as an adjunct to castration. An unfortunate impression seems to prevail that oestrogen and androgen neutralise each other, much as an alkali will neutralise an acid. Though in some circumstances oestrogen will prevent the biological action of androgen it will do so only if present in sufficient proportion; in lower concentrations oestrogen may accentuate the action of androgen. Moreover transmutation of oestrogen into androgen and vice versa is known to be possible in the body. Further experience will therefore be needed before the administration of oestrogen can be regarded as an efficient alternative to castration. Herbst<sup>3</sup> states that in some instances the malignant process in the prostate has been accelerated rather than retarded by oestrogen.

#### VENEREAL DISEASE PUBLICITY

As part of the welcome campaign to combat venereal disease the Ministry of Health, in collaboration with the Ministry of Information, and with the help of the Central Council for Health Education, has published an advertisement in the daily press drawing attention to some facts about these diseases. This plain state-

ment sets out the incidence of syphilis and gonorrhœa, the dangers of transmission of disease to a new generation, and the good results to be hoped from early treatment. It has been ably drawn up and is in line with three pamphlets<sup>1</sup> lately issued by the council for distribution by local authorities. Unfortunately, as the *Daily Mirror* (Feb. 19, p. 3) has pointed out, the original wording of the advertisement has been watered down to meet the mistaken sense of delicacy of the proprietors of the daily press. This is a second occasion on which prudery has been allowed to hinder health education: it will be recalled that about a year ago advice to the public about washing the hands after evacuation of the bowel had to be withdrawn because the papers could not bring themselves to print "water-closet." In the present instance the precision of the original advertisement has had to give place to vagner general statement in three paragraphs. The actual loss of information is not great but the facts are not quite so easy to follow and a parenthesis identifying syphilis and gonorrhœa with pox and clap has been expunged. It would be well to bear in mind that this advertisement has been designed to reach the simplest people; a barricade of unfamiliar terms may seem almost as impenetrable to them as a barricade of silence.

#### SAFE MILK

THE Tuberculosis Association, at a meeting on Feb. 19, passed an unopposed resolution advocating that all milk should be boiled before it is drunk. They were moved to what may sound an extreme measure by the fact that even pasteurisation, as carried out in war-time, is not proving completely effective in removing tubercle bacilli from milk. This failure is explained by loss of skilled staff and hence difficulty in maintaining adequate care of plant. Nevertheless pasteurisation, if properly carried out can provide 100% safe milk, as Toronto has proved. A medical deputation received by Lord Woolton and Miss Florence Horsbrugh on Feb. 18 drove home this point. Prof. L. P. Garrod noted that 2000 children die yearly of milk-borne tuberculosis, and Dr. Alan Moncrieff emphasised the distinction between safe milk—which we cannot afford to wait for—and clean milk, which we may hope to get in time. Sir Alfred Webb-Johnson and Prof. R. M. F. Picken also spoke emphatically, and Prof. W. H. Tytler said that the case against untreated milk as a carrier of disease is as strong as the case against the mosquito as the carrier of malaria.

The Government has just announced that it favours extension of the feeding of children in schools, of which the milk-in-schools scheme forms an important part. But it is clearly improper that any milk should be officially distributed unless its safety is guaranteed.

Dr. JOHN FREELAND FERGUS died at Glasgow on Feb. 18 in his 78th year. Physician, hospital manager, medical historian, verse and play-writer, he had been president of the royal faculty of physicians and surgeons, and a member of the university court.

1. "What are the Venereal Diseases?" "Facts on Sex for Men" and "Women in War-time." Issued by the Central Council for Health Education, Tavistock House, Tavistock Square, London, W.C.1.

NURSING, A PRIORITY SERVICE.—Speaking to a meeting of nurses at Manchester on Feb. 15 Miss Florence Horsbrugh said that the Rushcliffe report had given them a new deal and made nursing more than ever war-work with a future. Nursing was being given the highest priority by the Government, and girls who had registered for national service could choose nursing as their job at any time before their call up. They were in the same position, Miss Horsbrugh pointed out, as men who volunteer for flying duties in the RAF.

1. Lane, T. J. D., *Lancet*, 1943, i, 166; and see p. 177.  
2. Alvea, E. P. and Henderson, A. F. *J. Amer. med. Ass.* 1942, 120, 1099; Creevy, C. D. *Ibid.*, p. 1102; Thompson, G. J. *Ibid.*, p. 1105; Nesbitt, R. M. and Cummings, R. H. *Ibid.*, p. 1109; Gutman, A. B. *Ibid.*, p. 1112.  
3. Herbst, W. P. *Ibid.*, p. 1116.

## Medical Societies

### NUTRITION SOCIETY

A MEETING of the English branch of this society was held at the London School of Hygiene on Feb. 6 to discuss

#### Nutrition in Pregnancy

Mr. F. H. A. MARSHALL, ScD, FRS, who took the chair at the first session, referred to the remarkable powers of adjustment of the foetus, enabling it to survive under different conditions. Not only did gestation time vary from species to species but it could be prolonged up to  $\frac{1}{2}$  times the normal by using extracts of corpus luteum.

#### FETAL DEVELOPMENT

Mr. ALECK BOURNE, FRCOG, said there was no doubt the diet of the mother affects both the development of the foetus and the function of the uterus during labour. Faulty nutrition was certainly one of the reasons for the neonatal mortality of 41.7 per 1000 in illegitimate infants compared with 27.7 in normal. Birth-weight was apparently unaffected by the mother's nutrition unless this was extremely deficient, but the vigour of the infant might be impaired. In prematurity, vigour was more important than weight alone. The death-rate of premature infants was inversely proportional to their birth-weight, but a 5 lb. baby from a small mother had a better chance of survival than one from a big mother, and a 5 lb. baby of 40 weeks than one of 36 weeks. Such considerations emphasised the importance of vigour rather than birth-weight alone.

Mr. A. S. PARKES, ScD, FRS, in a paper read by his wife (Miss Ruth Deanesly, DSc), described experiments on rabbits in which he found that excess of anterior pituitary hormones led to superfecundation, so that over 30 embryos might be implanted; but very few came to term, so the number of young was normal. These results suggested that the limiting factor in the development of the embryo was the nutrition of the mother.

Dr. ALAN MONCRIEFF said it was widely recommended that the diet of the mother should be restricted in protein so as to reduce the size of the infant; there was at least one nursing-home where pregnant women are placed on a vegetarian diet with this object in view.—Prof. ESTHER KILLICK, MRCP, asked whether the loss of weight in the first few days after birth could not be avoided by appropriate treatment.—Mr. BOURNE, in reply, said there was no evidence that reduction in the protein of the mother's diet alters the weight of the foetus, but it was likely to reduce the efficiency of uterine function during labour. The initial loss of weight of newborn infants might possibly be obviated if great care were taken to prevent heat-loss from the moment of birth and to begin feeding at once, but the advantage was not evident.

Mr. JOHN HAMMOND, DSc, FRS, said that the factors determining the distribution of nutrients between the foetal and maternal tissues were probably similar to those responsible for their relative distribution in the different tissues of the mother. It was known that the latter is determined by the relative metabolic rates of the tissues. If the diet was reduced, the distribution to all tissues was reduced: this meant, for example, that fat, which has the lowest metabolic rate, was the first to lose its supply; indeed, on further reduction of the diet it might even be mobilised to supply other tissues. It seemed that the metabolic rate of the foetus was at first high, lying between that of the brain and of the bone cells of the mother. Later it fell, and there was less competition between the foetus and the maternal tissues, but it remained high enough for depletion of the maternal diet to affect many of the maternal tissues before affecting the foetus. That nutrition might be a limiting factor in foetal development was seen in crosses between a large stallion and a small mare: because of the limited size and nutritive power of the uterus the foal at birth was smaller than would be expected on genetic grounds. Similarly an increase in the number of young resulted in a decrease in individual weights: a rabbit born singly might weigh 95 grammes, whereas the average weight in a litter of 11 might be 45 g. The effect of maternal nutrition was also shown by ewes kept on varying planes of nutrition; a low plane did not affect the weight of a single lamb (about 9 lb.) but would reduce the weight of

twin lambs from 9 lb. each to about 6 lb. The birth-weight was not unimportant; for it affected not only anatomical but also physiological development.

Prof. F. G. YOUNG, DSc, agreed that in humans only a severe reduction in the plane of nutrition would alter birth-weight; many claims to have done this with less restricted diets were probably to be explained by their causing premature delivery. The People's League of Health had found that supplements of vitamins and salts given in pregnancy had no significant effect on the birth-weight, although it was followed by decrease in stillbirths and in pregnancy toxæmia. In confirmation of other work, they had demonstrated a higher birth-weight in multigravida, which seemed to be due not to age but to order of birth.

Dr. W. H. NEWTON pointed out that non-nutritional factors played a part. If young mice were removed the week before parturition the weight of the mother continued to increase normally until the placentas were expelled.—Prof. O. KESTNER said that the heat-regulation of puppies or kittens born in litters of four or five was inferior to that of animals of litters of one or two.—Mr. A. L. BACHARACH suggested that isotopic elements would probably be of use in testing Dr. Hammond's theory.—Dr. HAMMOND, in reply, suggested that the increase in weight of mice after removal of the foetus was due to placental hormones. He agreed with Mr. Bourne that the plane of nutrition of the mother affected the ease of labour less by its effects on the foetus than by its influence on the development and functioning of the uterus.

#### NUTRITIONAL FUNCTIONS OF THE PLACENTA

Sir JOSEPH BARCROFT, FRS, said it was important to decide whether the placenta had any real nutritive function or whether it acted simply as an ultra-filter. Sodium ions and oxygen were examples of nutrients that pass across the placenta much more slowly than across capillary walls. This resistance might be reduced in many ways, structural or physicochemical. Among the structural devices were an increase of the surfaces in contact by means of villi, the development of a network of foetal capillaries over the villi, or reduction in the number of layers in the placenta from a possible six to as few as one. In the case of oxygen a further device was that by which the blood in the foetal and maternal capillaries flows in opposite directions; thus the most reduced foetal blood meets the most reduced maternal blood and the transference of oxygen proceeds most efficiently. Among physicochemical devices was the oxygenation of foetal blood at relatively lower tensions, which facilitated transfer of oxygen from the maternal blood. In the sheep this effect was accentuated by the acidosis present. The transfer of water could not be explained by osmosis and was apparently due to differences in hydrostatic pressure. Salts such as those of calcium and iron were required in relatively small amounts, and the placenta offered little barrier to these. It would seem that the size of the foetus might well be limited by the placenta—especially by the quantity of oxygen which might cross it. Appearances, however, could be deceptive: the placenta of the horse looked very inefficient, but the foal was born in a very advanced stage of development.

Mr. T. MOORE, DSc, referred to work on rats showing that transfer of vitamin A to the foetus is very limited, so that the young have low reserves. The high vitamin-A content of colostrum compensated for this.—Mr. H. HOCH, DPh, had found that the amount of vitamin A in foetal blood is parallel to that in the maternal blood. Carotene, however, was much lower in foetal blood and bore no relation to the amount in maternal blood.—Prof. P. ELLINGER, MD, asked whether the electrical properties of the elements might not account, at least partly, for their properties in placental transfer.—Prof. W. J. HAMILTON, MD, and also Prof. A. St. G. HUGGETT, MB, drew attention to the different types of placenta in different species, their different structure and thickness and also the change in thickness during the course of pregnancy.—Mr. A. N. WORDEN said that newly born lambs had no vitamin A at all and derived a great quantity from colostrum.—Sir JOSEPH BARCROFT, in reply, agreed that there were differences in placental type and structure and changes in thickness. It was just these differences which made the problem so real,

for they were unrelated to the stage of development reached by the young at birth.

#### DIET OF THE PREGNANT WOMAN

Prof. HUGGETT pointed out that the rate of growth of the foetus is inborn and depends on genetic constitution. If the animal was deprived of nutrients the resulting impairment of growth could be rectified only with the greatest difficulty. The foetus, however, would be affected only if the diet were severely deficient; the maternal health and reserves would first be affected. This was shown by the results of feeding tests such as those of the Toronto workers, the People's League of Health and the Birthday Trust, in which the beneficial results were much more evident in the mother than in the infant. Reviewing war-time diet in relation to pregnancy, Prof. HUGGETT thought that, apart from a shortage of iron and a possible slight shortage of animal protein, it was adequate. If, however, the allowance of one pint of milk a day was not taken there would be a serious shortage of calcium and phosphorus.

Dr. MARGARET BALFOUR gave a short account of the Birthday Trust experiment. The supply of extra food to pregnant women in depressed areas had produced an improvement in both mothers and infants compared with controls. The experiment had also had an educative influence on the mothers in showing the importance of correct feeding.

Prof. J. R. MARRACK, MD, said that, even after the addition of supplements, the diet in the Birthday Trust experiment was still very poor. To help in evaluating nutritive factors in pregnancy, supplements should either be such as to produce a completely satisfactory diet or they should consist of one factor at a time. A problem still to be solved was the real cause of the increased vitamin requirements in pregnancy. In view of their increased requirements, pregnant women would be excellent subjects for studying the effect of war-time diet, e.g., the adequacy of iron supplies.—Dr. H. M. SINCLAIR felt that the incidence of anaemia in pregnancy had been exaggerated because many observers did not allow for pregnancy hydræmia. Many of the results in the experiments of the People's League of Health and of the Toronto workers were open to criticism and he wondered whether the controls in the Birthday Trust experiment were adequately selected.—Dr. LUCY WILLS said that the hydræmia in pregnancy was often over-emphasised, as shown by the fact that the decrease in hæmoglobin was often unaccompanied by a decrease in red cells.—Dr. BALFOUR, in reply, stated that the selection of the controls in the Birthday Trust experiment was in the hands of the medical officers; even though the controls were of better social status than the experimental women this would only favour the former. In tests of this kind on human subjects the selection of cases was less easy than with experimental animals.

#### STILLBIRTH AND NEONATAL MORTALITY

Mr. R. M. TITMUS spoke of the enormous wastage of life represented by miscarriages, stillbirths and infantile mortality. In the three years 1936-1938 there were at least 90,000 spontaneous abortions, 75,000 stillbirths and 103,000 deaths within the first year. This total of over a quarter of a million represented about one in eight of the 2 million pregnancies in the three years. From 1937 onwards there had been no change in the rate of stillbirths or of deaths in the first 24 hours, but there had been a fall in the deaths at later ages, which became increasingly noticeable up to one year. This meant that neonatal mortality represented a greatly increasing proportion of infant deaths. It was well known that infant mortality is associated with socio-economic indices but less well known that this is also true of stillbirths. Both appeared to be affected partly by social status and partly by the availability of adequate nursing and medical care. The social differences for infant mortality were striking; the neonatal death-rate of the poorest class was 50% higher than that of the richest class and the ratio rose to over 400% for deaths between 6 and 12 months. There was considerable room for further reduction of this large loss of life.

Mr. GEOFFREY BOURNE, DSc, said that infantile mortality was lowest (40 per 1000) in countries such as New Zealand and Australia which were the best fed.

Italy, Spain, Egypt and Japan had rates three times as high. Similarly, stillbirths were 26 per 1000 in New Zealand against 40 in England and Wales, and deaths in the first year were 19 per 1000 in New Zealand against 30 in England and Wales. Nursing and medical services, as well as nutrition, were factors concerned in the production of these low rates. In Europe during this war there appeared to be no increase in Germany but a large increase in Holland, the south of France and especially in Greece.

Miss I. LEITCH, DSc, believed that the greatest cause of death between the first and twelfth month was infectious disease, in which, apart from diet, such factors as clothing and housing played a part. The reason why improved feeding and obstetrics had less effect on stillbirths and neonatal mortality might be partly due to the carrying to term of infants who in poorer conditions would have been lost at an earlier stage. This was supported by a slight increase in malformations at birth.—Prof. HUGGETT mentioned a recent statement by Mr. Howard Kershner, director of the American Friends Relief Service, on conditions in Vichy France. The growth of children had declined appreciably, and Mr. Kershner had stated that the birth-weight had also decreased by 33%. There was no doubt of the accuracy of the first statement, but conditions of clinical work in Vichy France were such that it was impossible to substantiate the second.—Dr. E. J. BIGWOOD said that there was evidence from Belgium that the poor diet now consumed by many women, containing some 1500 calories, had not affected birth-weight.

Mr. F. BERGEL, PhD, asked whether there was any possibility that vitamin-E deficiency played a part in the creatinuria of pregnancy as it had been suggested it does in muscular dystrophy.—Dr. SINCLAIR thought that the results of several recent workers had thrown doubt on the validity of the relationship between vitamin E and muscular dystrophy.—Dr. FRANKLIN BICKNELL held that this recent work was open to criticism.—Dr. MOORE recalled that muscular dystrophy in rats due to deficiency of this vitamin could not be cured by its administration.

Brigadier F. A. E. CREW, MD, FRS, chairman of the second session, thought that Dr. Hammond would be interested, from the point of view of the relative demands of the tissues, in the composition of aborted twins which were common in cattle and of which a specimen examined by him had normal skin and hair, imperfect bone and the rest an unorganised mass. No-one had mentioned the persistent higher mortality of males from the moment of conception, which he had also observed in day-old chicks; maleness might almost be considered a disease.

#### MEDICAL SOCIETY OF LONDON

At a meeting of this society on Feb. 15 with the president in the chair a discussion on recent advances in the knowledge and treatment of

#### Bright's Disease

was opened by Dr. HORACE EVANS. He began by saying that 14 years' study of this condition at the London Hospital, in association with Prof. A. W. M. Ellis<sup>1</sup> and latterly Dr. Clifford Wilson, has had the result of emphasising the genius of Richard Bright, to whose memory he paid tribute. Since those famous initial observations, based on clinical and pathological foundations, nearer landmarks were the separation by Allbutt in 1895 of "essential hypertension" as an entity and the publication in 1914 by Volhard and Fahr of their monograph. The innumerable classifications since proposed (but seldom seconded) have, Dr. Evans thought, done more to hinder than to advance knowledge in this field, because for the most part they have been based not on the full clinical course of the disease but on random cross-sections, without reference to the original onset or the ultimate end. The London Hospital unit has concluded that cases of Bright's disease, excluding essential and primary malignant hypertension and miscellaneous conditions such as acute focal or acute interstitial nephritis, and amyloid disease, can be separated into two main types, differing not only in

1. See Ellis, A. W. M., *Lancet*, 1942, i, 1, 34, 72, 300.



their pathological characteristics, but also in the main features of their clinical course.

The more common type I nephritis, 225 cases of which, seen within four weeks of onset, have been analysed, occur in an earlier age-group (children and young adults), are preceded in 80 per cent. of cases by infection—usually an upper respiratory infection such as sore-throat or tonsillitis—and are accompanied by malaise (headache, tiredness, vomiting). Hæmaturia is almost constant and usually enough to make the urine smoky. (Edema is common, chiefly in the face and legs, but is relatively slight and usually transient. Albumin, though always present in the urine, is seldom seen in great quantity for long. Finally, some 80 per cent. of the cases recover.

By contrast, in type II nephritis, age-groups are affected more equally; there is no undue incidence in children and young adults. The onset is insidious, and unaccompanied by general symptoms. Patients usually complain first of the oedema, which is more conspicuous and more lasting than in type I. No history of previous infection can be obtained. Albuminuria, which has been demonstrated in a few cases before the onset of oedema, is usually marked, and long-continued: the patient does not complain, as in type I, of discoloured urine—for blood is typically present in the urine only in microscopic quantities—but he may assert that he is passing very little urine during the periods of increasing oedema, or that the urine is frothy, likening it to soap-suds or champagne (according to his income). The outlook in this type of nephritis is much worse than in type I, and after a course of some 5–7 years 80 per cent. have died.

These two clinical types show a corresponding anatomical difference. Seen at an early stage the type I kidney shows diffuse glomerular change with acute afferent arteriolar necrosis, whereas type II shows primary tubular degeneration with some glomerular hyalinisation. In the former type at a later stage the changes are those of vascular hypertension with gross contraction of kidney substance and reduction in number of glomeruli: in the later stage of type II nephritis there is progressive uniform glomerular hyalinisation without gross reduction of kidney substance or of number of glomeruli. A diffuse fibrosis occurs, but the changes of vascular hypertension are but rarely seen.

While in broad outline the two types follow the courses outlined above, there are some cases of each type which develop along different lines and make the final picture much more complex. About 15 per cent. of type I cases show a residual albuminuria which, after 20–30 years, may end in vascular hypertension with uræmia and death in renal failure. It is in this variant that the initial attack, often mild, may be easily missed. In the remaining 5 per cent. of type I nephritis, death takes place early, either in the acute stage from heart-failure, anuria, infection, or hypertensive complications, or in the course of a few months with hypertension, oedema and progressive renal failure, the "subacute nephritis" of Volhard and Fahr.

Death with hypertensive changes and uræmia is the outcome of 80 per cent. of type II nephritis cases, after some 5–7 years of albuminuria and oedema. In a few patients it may come earlier, usually from intercurrent infection. Less than 5 per cent. of the cases recover, and it is this small group which has been in the past separately described as lipid nephrosis. In the opinion of the speaker and his colleagues, there is no justification for this.

The end stage of the two types may thus be very similar—a similarity common also to the end stages of some cases of pyelonephritis, pregnancy toxæmia and malignant hypertension. The explanation of this may be found in the concept of the "vicious circle" in Bright's disease; renal ischæmia and other processes producing hypertension initiate vascular changes in the kidney which may further decrease the blood-supply of the surviving tissue. Substantial support for this concept has been given by the experimental work of Wilson and Byrom, who were able to show that constriction of one renal artery in the rat produced hypertension with vascular changes in the opposite and unprotected kidney. If the vicious circle can be interrupted before hypertension has produced irreversible renal damage—

e.g., in unilateral renal disease by removal of the diseased kidney—a cure may be effected, and this has been done in several cases. More usually, however, a temporary benefit only is secured, a staving-off of the final malignant phase; this is thought to be due to the establishment in such cases of vascular change, the effect of hypertension itself in the primarily undamaged kidney.

Dealing with other types of renal disease, Dr. Evans mentioned acute focal nephritis, characterised by hæmaturia in the course of an acute infection, and suggested that this might be found to be related to the type I nephritis group. Recurrent attacks of hæmorrhage from the kidney, as in some cases of purpura, might produce some permanent residual change.

For type I nephritis complete rest in bed is essential. A starvation regime has been found satisfactory, even for children—one pint of orange juice (or its war-time equivalent) daily for 5–10 days. Heart-failure demands venesection: this and lumbar puncture will relieve hypertensive encephalopathy, while for anuria Dr. Evans, deprecating surgical interference, recommended an intravenous glucose drip.

Type II nephritis should also be treated in bed. Diuretics are not called for in the initial treatment, for during the first three weeks on a restricted fluid and high-protein diet there is usually a spontaneous diuresis. In cases where this does not happen, mercurial diuretics may with advantage be used. No ill effects have been seen from repeated intramuscular injections, but there have been seven or eight deaths during the intravenous use of these drugs, the mechanism of which is not understood. The chief disadvantage of intramuscular injection is pain, and this can be obviated by the preliminary injection of procaine. Infection should be treated along the usual lines, and vomiting by reference to its cause, which might be heart-failure, digitalis, morphia, or increased intracranial tension. Hypertension should be treated by rest and phenobarbitone, and occasionally by venesection. The excellent results of nephrectomy in some early cases of unilateral renal disease warrant urographic investigation in all young patients where this diagnostic possibility may be entertained. Denervation of the kidney he has found uniformly disappointing. In summary, Dr. Evans stressed the division of Bright's disease into the two types, and the differentiation from benign and malignant hypertension, in which he said there is no definite evidence as yet of a renal origin.

#### DISCUSSION

In the discussion Dr. GEOFFREY MARSHALL told of a patient he had seen 35 years ago when he was clerking in the wards. The man had been examined by Sir James Goodhart for an hour and a quarter, and sent in without a diagnosis. Seven members of the staff produced five different diagnoses, none of which fitted the post-mortem finding of small, pale, shrunken kidneys. At that time some 25 cases had been autopsied at Guy's Hospital, of which only 9 had been diagnosed as nephritis before death.—Another speaker from personal experience of the patient's point of view complained that despite the apparent advance in diagnosis, no advance had been made in aetiological theory since the days of Bright. He himself found 'Salyrgan' more effective and less painful than 'Neptal,' an observation confirmed by his physician.—The PRESIDENT emphasised the importance of the diastolic pressure as the criterion of "pathological" hypertension.

Dr. EVANS in his reply said that sepsis, if severe, should be dealt with irrespective of the kidney lesion, while the removal of mildly infected tonsils was best postponed to the fourth or fifth week: that might cause a transient hæmaturia, but seldom more. He agreed with several of the speakers on the sometimes devastating character of the proctitis following use of mercurial suppositories.

UNIVERSITY OF CAMBRIDGE.—Sir Frederick Gowland Hopkins, OM, will resign from the Dunn chair of biochemistry on Sept. 30.

The Raymond Horton-Smith prize for 1941–42 has been awarded to Major E. T. C. Spooner for his essay on the bacteriology of war wounds.

## In England Now

### *A Running Commentary by Peripatetic Correspondents*

It would be an amazing fact if gravity, which gives us wrinkles, piles, pendulous breasts, probably enlarged prostates, and finally lowers us to the grave, did not affect our thoughts also. But, of course, it does and its graduated mechanism can be discerned in the two interim medical planning reports. The "old" report is full of benignity, placates everybody and does not face difficulties: "The patients, they must have everything of the best, of course. The doctors, they must have the same too. Night work? No, no, certainly not, or an absolute minimum. The state, being impersonal and therefore unhurttable, must grant the powers, pay up, but not control." The "middle-aged" report is a far more Olympian affair. It takes cognisance of the gravitational matters, the world background and human frailty, the traditional wrecker of human schemes. Its "parallelism" is a fair compromise between the jealousies and antagonisms, which according to the postwar biographies prevail even in the highest political circles, and that awful atrophy of judgment, aggressiveness and humour which lets a Führer function. What I should like to see now is a report from them who have not long ceased to fight gravity successfully; but they are fighting other things. When they do come home we shall have a mass of experienced young men of character, and I hope they will redraft all the blue prints, both medical and political. I believe that in the affairs of man there is a biological sequence of peace after war, provided, as would be natural, the peace is directed by them who fought. After all it was a failure of character ("There is no more certain way of losing a general election than proposing rearmament," is a nice example), not of intellect, which made the interval between the war to end war and this war so uneasily short. If we hand the country back to the same crowd, or their heirs in law—stockbrokerage, society, big business or trade unionism—we shall probably get the same cycle again. This is no squib from an ambitious youngster, but from an old crock, well out of the arena, who wants to see the Christians eat the lions.

Few occasions upset the medical man's day so effectively as having to appear as an expert witness in the County Court. There is an atmosphere of hushed expectancy as he pushes open the resisting swing-door of the court-room. All eyes are upon him, to his embarrassment, as the door closes abruptly behind, almost precipitating him down the few steps towards the wooden "Seats for Witnesses." Already litigants with their supporters are assembled communing with each other in subdued whispers. Seated, the doctor has time to pull his wits together in anticipation of the ordeal in the witness-box. Three black-gowned figures, for all the world like crows, flap through the swing-door, and hurry silently, robes ballooning behind them, towards the long table where they settle in a row, proceeding to sort and arrange legal-looking documents. A fourth enters with nonchalant air: apparently a personage of some importance, a barrister wearing a frizzed tie-wig, conscious of his own dignity, though his hands are deep in his breeches' pockets.

A door beside the still empty Bench now opens, and a name is called. Nervously first one hurries across the room, then another; one conjectures that minor cases are being settled "in Chambers." During this proceeding, the three crows softly flit about interrogating witnesses, till all seems to be settled and ready. Meantime, the doctor watches the hands of the clock. At 11 AM promptly in bounds His Honour, the court upstanding, and almost before he is seated the court opens. First one crow then another jumps up "may it please your Honour," who grunts assent. Debts are taken at once; then "applications"; then the business we came about—a hair-dye poisoning, defendant being a hairdresser, her one-time client the pursuer, suing for damages.

The brunetted pursuer averred that she had been poisoned as the result of the inexpert application of a well-known hair-dye by the hairdresser, whereby she had suffered much pain and swelling of scalp, face and

buccal mucosa, so that her doctor, visualising the possibility of oedema of the glottis, had her admitted to hospital. But having gone a-soldiering he could not now be called. In his place two consultants were called: both admitted that they did not obtain any part of the contents of the bottle of dye for chemical analysis or for use in a patch test. Both, however, had seen the patient, one while she was in hospital, the other many months after while there still remained some extent of dermatitis.

The case for the defendant (she was blonded) was next submitted: that due care was taken to apply the dye according to the maker's directions; that thorough washing followed, so as to remove all unfixed dye; and that, in any case, the pursuer was unduly sensitive to the particular chemical dye. His Honour, not so old in years, though old to the ways of men and women, proceeded to sum up thus: Pursuer had, a number of times on her own admission, herself applied the same dye without apparent harm to her skin; she knew that this dye contained a noxious substance and she took the risk; so he found for defendant and allowed costs.

A medical witness feels that he is no sooner in the box than he is out of it; he loses all sense of time; he is thankful to be "released" by the judge, then to hurry out of the rather oppressive air of the court-room into the airy traffic of the street. What he has said, he cannot remember; but he likes to recall his paucity of words and cautious replies; how he contented himself by answering yes or no, only qualifying his reply if asked to explain, not being too eager to reduce a technical answer into popular terms in case he might tie himself in a knot! And he firmly resolves that in future he will take and keep a short record of each case at the time of medical examination. Case notes, if in ink and taken at the time of examining, no judge will disallow when produced in the witness-box. It is humiliating to keep replying "I don't remember"—as humiliating as to be asked querulously to "Speak up!"

Once a week I go to the factory, and for 3 hours forget I am a doctor. Our factory is not a very grand affair, but our production figures are excellent. Before the war it used to be the workshop of a garage. Now the small room is crammed with machinery—capstan lathes, small lathes, a milling machine, large and small drills, a bandsaw, grindstones and innumerable spare parts. It is working for 23 out of the 24 hours, and much of the labour is part time—the clerks from the local bank, the wardens from the local ARP post, the civil servants from a large government office, and the ladies from a local block of flats (they came first to find out what all the noise was about; it was stopping them from sleeping; they stayed to become enthusiastic workers). I seldom work more than one night on the same machine, so I am picking up a little mechanical knowledge about a lot of things. But even in these short three-hour spells I get an inkling of the potential boredom of the factory worker on mass production. I should guess that this is only likely to be serious where the intelligence of the worker is far in excess of the intelligence required. I find myself clock watching. Then when 9 o'clock comes and I wash under the soapy lubricating fluid on one of the capstan lathes, I feel a righteous glow; and I catch my tube to home and supper with a tired back but a light heart.

We are in charge of Mr. Dilley, Mr. Smith and Arthur. Mr. Dilley is very gloomy; Mr. Smith is very cheerful; and Arthur comes somewhere in between. Mr. Dilley is a philosopher; Mr. Smith is a critic of life; and Arthur works so hard he can only be an engineer. "Twelve hours a day for two years, bar Sundays," said Arthur; "I had two days off Christmas, and I didn't know what to do." "I should have stayed in bed," I said. "I did," said Arthur. Mr. Dilley confined himself to two remarks per night for my first eight weeks:—"You here again"; and "here's your three bob—pay your taxi home. At the end of this period they discovered my profession. Next Thursday night Mr. Dilley and Mr. Smith approached me:—"We want to ask you something," they said. "Is it gravity that causes the food to travel through the bowels?" I gave a short lecture on peristalsis. "And another thing," they went on in chorus, "it's a bit unpleasant, but how is it that everything

goes in different into your mouth and comes out the same at the other end?" I gave a short lecture on bilirubin. The next question came from Mr. Smith only. "This one may not be quite up your street. Why does the magnetic North change its position?" I had to confess that it wasn't up my street, so Mr. Smith is going to try the Brains Trust.

Mr. Smith has some original views on "Music While you Work." "This negro music," he explained, "was invented with a purpose. It's all right in its place but it's all wrong in a factory. It's intended to produce sexual excitement, and I've no doubt it's very effective. But it makes our lads cheeky. And they go trying to work in rhythm with it and they've smashed ten pounds worth of tools. It's no joke in a little place like this," Mr. Smith has also given me his views on religion, Professor Joad, the Air Training Corps, and India. But none of these is quite suitable for recording here.

It does not pay to take short cuts in Army routine. One day in his office the CO said to me, "Tell the carpenter to come and hammer on this form to make it safe for the Matron to sit on. I am afraid that it may collapse under her." In my own office I repeated this almost verbatim to the sergeant-major and shortly after overheard him outside instructing the orderly sergeant to "Tell the carpenter to go to the CO's office to hammer on a form to make it safe for the Matron to sit on." The orderly sergeant was then heard to pass on these instructions, with suitable adjectives, to the orderly corporal. This individual, it seems, then repaired to the carpenter's shop and informed the enterprising tradesman of the circumstances requiring his assistance; only to be told that the quartermaster's permission would be necessary before such repairs to barrack equipment could be undertaken. To this end the orderly corporal presented himself at the quartermaster's office. "Sir," said he, "may the carpenter go to the CO's office to hammer on a form to make it safe for the Matron to sit on?" "Submit it in writing," quoth the QM. Returning to the company office the orderly corporal committed his request to paper and returned in triumph to the QM who, not paying much attention to it, said "What's this?" The corporal explained. "Submit it on the proper Army form," said the QM. The unfortunate corporal, feeling that the situation was getting a little out of hand, enlisted the aid of the company clerk and between them they vainly searched the hospital for an hour for the appropriate Army form. Finally they neatly made out a pro-forma and on it typed a request to the effect that carpenter should go to the CO's office &c. This the corporal handed to the QM. "What's this?" said the QM somewhat unnecessarily. The abashed corporal diffidently explained that it was a request on a pro-forma of the appropriate Army form that the carpenter &c. &c. "Ho!" quoth the QM, "that's not the right way to do it. Hand it in to store as US and draw a new one."

And so was the Matron's person safeguarded against accident. As Robb Wilton might have said, "It was all a matter of form."

It is, I suppose, too much to hope that after the war one will be permitted to go on wearing all the clothes one is wearing now. But I shall make a determined fight for certain garments: that pair of corduroy breeches, for instance, that I bought in my extremity from a French tailor at St. Omer in 1917; that cubbing coat of undistinguished colour and lamentable cut now heavily darned and patched by my own fair hand and invaluable for shooting; those various pairs of grey bags—the accumulation of years—all more or less threadbare and distasteful to a feminine eye but still, in my view, eminently wearable for years yet; those khaki shirts, so bleached by frequent laundering as to be no longer recognisable as khaki, but still beautifully warm and comfortable. On the other side of the picture is that new dress suit—the second of a lifetime—fashioned of midnight blue (as the tailors call it) which was made and completed for me in August, 1939. Except for fittings I have never worn it yet. And I don't much care if I never do.

## Parliament

### ON THE FLOOR OF THE HOUSE

MEDICUS M P

THE Beveridge debate revealed grave differences of opinion in the House. The vote of 119 members, including the leader of the Labour Party, Mr. Arthur Greenwood, and the GOM of the House, Mr. Lloyd George, marks the end of the military war period in Parliament and the opening of the period of post-war reconstruction. Mr. Graham White, speaking for the Liberals on the original and colourless "peg" motion proposed by Mr. Greenwood, described the debate as "the first of a long series of discussions upon the social services and of proposals for reconstruction during and after the war." But the Government gave no clear indication of their decision on the main directive of this vast plan for social rebuilding. Below that level of consideration one of the major issues discussed was the reorganisation of our medical services. Sir William Beveridge's assumption of a "unified and comprehensive health service" has been accepted by the Government. Sir John Anderson, first of the three ministerial spokesmen, said that the conception of this service did not "necessarily spring from . . . the Report," and indeed at the Ministry of Health in London and at the Scottish office a close study of the project has been proceeding for about eighteen months. Sir John propounded a service under local-government control in the different areas in collaboration with voluntary agencies. There is to be free choice of doctor and the least possible disturbance of the existing relation between doctor and patient. The Minister of Health did not intervene in the debate and that perhaps explains why no further indication was given of the scope of the new medical service. No hint of any plan for attack on the problem of preventable diseases, of measures for securing the increased number of men and women doctors who will be required to remedy the admitted inadequacies in dentistry and ophthalmology. Nor was the place of the medical services at the armistice discussed, when there will be a call on our medical man-power for relief work in Europe, North Africa, India and elsewhere.

When Mr. Greenwood opened the debate he rightly stressed one of the main assumptions of the report—the maintenance of full and active employment in this country. On that the main directive depends. The key to prosperity, he said, is "developing production based on science and efficiency," the urgent problem "the switching over from war industries to industries of peace time," the main danger the shattering of the hopes of those who will return after they have achieved victory. There is cynicism in the Forces now and the Government must not allow the victors "to eat the bread of disillusionment." To avoid these dangers he urged that "a substantial amount" of the Beveridge proposals should be accepted and brought into law during this session.

To maintain "full employment" Mr. Greenwood asked for co-operation with the Dominions and Colonies and with the United Nations in the economic field. But at present the Government have said that no discussions are proceeding with the Soviet Union or the United States—a grave omission. It did, however, appear that the Government were considering expenditure on "education, agriculture, housing, roads, forestry, civil aviation, colonial development"—to give Sir John Anderson's list. The Chancellor of the Exchequer, speaking on the following day, stressed housing as an A1 priority and also civil aviation, the cost of which he claimed as a limiting factor on the social security proposals of Beveridge.

The last day's debate was overshadowed by the dissatisfaction of the House with the speeches of Sir John Anderson and Sir Kingsley Wood. The large group of Tories led by Lord Hinchinbrooke and including Quintin Hogg, who made a brilliant speech calling for reform if we want to avoid revolution, were intending to vote for their own amendment against the Government. The Labour Party, disheartened by the lack of vision and drive in the Government's statements, put down an amendment which amounted to a vote of no confidence. But Mr. Herbert Morrison, who wound up the debate,

made an abler speech than the other ministers and convinced the young Tories that all was well. They voted with the Government. But Morrison did not convince the Labour Party, they felt he was too "clever" and that his speech differed from those of the other ministers not in substance but only in form. The attempt to read the resolution of the National Council of Labour—which calls on the Government to introduce legislation at an early date to which the Government refuse to bind themselves—did not go down at all well. Morrison could not give a date "when a Bill would be produced." Sir John Anderson had no plan to suggest for maintaining full employment except vague generalities. Sir Kingsley Wood laid the chill hand of the Treasury on social enthusiasm, and the Atlantic Charter which declares freedom from want a war aim of the United Nations became a decorous background to normal Parliamentary procedure.

At the end of Morrison's speech Arthur Greenwood, who had moved the original motion, rose and said "the House will of course understand that in these circumstances I shall associate myself with the amendment." The Government had missed the great and glorious opportunity, as it was called in the debate, and the first large and important vote was cast against them. But there are many members, of all parties and not all represented in the votes given in the division, who are determined to make social security a reality. This is only the prelude to other debates.

#### FROM THE PRESS GALLERY

##### Beveridge Report Discussed

THE three days' debate in the Commons on the Beveridge report ended with a majority of 216 votes for the Government, but a substantial minority of 119, mainly non-official Labour members, went into the opposition lobby.

The main motion before the House in the name of Mr. ARTHUR GREENWOOD, was a peg on which to hang a general debate and for the first two days the Speaker, although strongly pressed, refused to call any of the amendments, which stood in the names of members of the extreme Right and the extreme Left. But on the third day he relented and permitted an amendment, put forward by over 50 members, to be discussed.

Mr. Greenwood's motion welcomed the Beveridge report as a comprehensive review of the present provisions in the sphere of social insurance and allied services, and "as a valuable aid in determining the lines on which developments and legislation should be pursued as part of the Government's policy of postwar reconstruction." No document within living memory, he said, had made such a powerful impression, or stirred such hopes, and the people of the country had made up their minds to see the plan in its broad outline carried into effect, and nothing would shift them. It was their due on grounds of social justice and in fulfilment of article 5 of the Atlantic Charter. Mr. Greenwood called on the Government to begin implementing the scheme without delay. He recognised that it was too early for a statement on details but the people did expect an assurance that the principles of social security are accepted Government policy. Children's allowances must be one of the pillars of the temple of social security, and comprehensive health and rehabilitation services were essential to any scheme to abolish want. Proper expenditure on hospital, rehabilitation and medical services, as well as on housing and education, was not crippling but a good investment. He could not share the view that the Beveridge scheme would be an intolerable burden on the State. He did not believe that the way to national recovery and prosperity was through the dark foetid channel of harsh restrictions and economy. Pounds, shillings and pence had become meaningless symbols. The key to prosperity was developing production, based on science and efficiency. A minister of social security with a staff of experts to deal with the different sides of this problem should be appointed at the earliest possible moment. Mr. Greenwood was anxious to see a start made, and he would not mind if a series of bills were passed bringing in the scheme by stages. The recommendations of the Tomlinson report, for instance, must be considered in relation to the larger plan, but he saw

no reason why they should wait until we had a complete plan for medical services. He hoped that a substantial amount of ground could be covered this session, and then the Government could, if necessary, introduce later a general amending and consolidating measure to fit the whole plan together into an integrated scheme.

Sir ARNOLD GRIDLEY supported the motion as a basis for discussion, but he suggested that cost could not be ignored, and that the country could only afford the Beveridge scheme if it was spread over a period of years. All would agree that our medical services should be brought within the reach of a wider public. In his view there must be an extension of state and municipal control but room must be left for private practice and at least a proportion of the voluntary hospitals. There were the strongest arguments for the retention of the friendly societies under proper safeguards and with improved methods. If common agreement was to be reached at this early stage it might be done, he thought, on the following lines: the establishment of a new ministry of social security; separate funds for each statutory benefit; an extension of National Health Insurance; the approval of maternity and marriage grants without delay; the removal of restrictions limiting the output of production; effective safeguards against malingering; and that all should contribute to and be eligible for old-age pensions. He was in favour of children's allowances being one of the first of the Beveridge proposals to be implemented. Sir Arnold doubted if there was any justification for setting up an industrial insurance board. He thought that people with incomes of over £600-£700 should go to their own doctors and pay for treatment.

Mr. D. G. LOGAN, speaking as one associated with the administration of an approved society, warned his Labour friends against allowing the Government to abolish approved societies. Some of those societies had considerable invested funds, and he questioned the right of the Government to take those funds "because there was a desire to bring a new Eldorado into operation without anybody knowing what it really meant."

#### OUR MEDICAL SERVICES

Sir JOHN ANDERSON, Lord President of the Council, who was the first Government spokesman, said he was not able to announce the adoption of the report in its entirety, but promised to give some definite assurances. The general lines of development of the social services laid down in the report were those the Government would wish to follow. They were not disposed to be deterred by doubt as to finance from putting their plans into shape, but apart from social insurance, which must take a high priority, education, housing, agriculture, must also be considered, and protracted negotiations were inevitable. The scheme would be worked out as rapidly as possible to the stage of draft legislation, and then the Government and Parliament would take their decision in the light of the financial situation at that time.

The Government, Sir John continued, welcomed the conception of a reorganised and comprehensive health service. This implied the reorganisation of the existing services. He defined "comprehensive" as a service covering the people as a whole, and including institutional treatment. Some eighteen months ago the Minister of Health had announced the general lines of a plan for reorganising the hospital services and the preparatory work of that plan had gone on steadily ever since. The health departments had given attention to other aspects of the personal medical services, notably the draft interim proposals of the BMA planning commission, and they would seek the help of local authorities, voluntary or professional organisations, in working out a reorganised service. The Government sought, he said, to secure, through a public, organised and regulated service, that every man, woman and child could obtain, easily and readily, medical advice and attention through the general practitioner, the consultant, the hospital and every related branch of professional up-to-date methods. The fullest use must be made of existing resources, including the services of the local authorities for tuberculosis and cancer. The idea of the new service must be co-operation of public authorities, voluntary hospitals and other voluntary agencies and the profession towards one common end. There must be no doctrinaire

scrapping of existing resources, nor must there be overlapping. Public health must not be many people's business and nobody's responsibility. Experience justified putting this ultimate responsibility on to the local government machinery, working often over larger areas and in collaboration with voluntary agencies. The interests of the medical profession must be safeguarded. The Government recognised that the profession was approaching this major reorganisation in a progressive spirit. Perhaps most important of all it was necessary to maintain to the greatest possible extent the principles of free choice of doctor, and of the family doctor relationship, as the background of general medical practice, and conversely to create the least possible disturbance of existing association between doctor and patient. This need not, in the view of the Government, be inconsistent with the principles of group public practice at well-equipped clinical centres which underlay most of the current thought on the future of family practice.

The Government, continued Sir John, had no intention of forcing the new services on those who preferred to make private arrangements for medical attendance or hospital treatment. Equally the position of the great voluntary hospitals must be safeguarded. Our public-health services showed ample evidence of achievement, but postwar reconstruction gave us an opportunity to pull together many of the loose strands of the last twenty years—an opportunity which would be quickened by the mass return of young doctors from the Forces. He had one word of caution. In some specialties, notably dentistry, ophthalmology and, Dr. Summerskill suggested, obstetrics, there was a deficiency of personnel, and it would inevitably be many years before this shortage could be fully made good.

#### CHILDREN'S ALLOWANCES

Before the publication of the Beveridge report the Government had come to the conclusion that whatever might be decided about cash allowances, the most effective measure was the fullest development of our child-welfare services. Two years ago about 350,000 children were being given dinner at school in England, Scotland and Wales. Last October the number had increased to 1,000,000, and now it exceeded that figure. Important proposals were being carried out now which would provide canteens for another 500,000 children, and it was likely that during 1943 a further provision for between 500,000 and 750,000 children would have been approved. It would be a considerable time before this benefit in kind would reach its maximum and some inequality would always be inevitable. Welfare services did not of themselves dispose of the arguments for cash allowances to parents, but it was important that these allowances should not be at a rate which would hinder the development of the welfare services. The Government were willing to consider extending these benefits free of cost as part of the scheme. They saw no difficulty in providing services equivalent to 2s. 6d. and even more per head per week, as against the 1s. assumed by Sir Wm. Beveridge. The Government therefore proposed that the rate of children's allowances should be fixed at 5s. for the second and other children instead of the 8s. recommended in the report.

#### OTHER BENEFITS

The Government's provisional view was that sickness and unemployment rates should be the same and Sir John hoped that it might be possible to fix rates not widely different from those in the report. The Government accepted the principle of the contributory scheme with a definite statutory relationship between contribution and benefit. It was the Government's considered opinion that unemployment and disability benefit should be of limited duration, although the period need not be the same in every case. An invalidity benefit at pension rates might perhaps be substituted for disability benefit after a prescribed period. Old-age pensions were one of the most difficult features of the report. The Government could not contemplate a scheme under which a contribution was to be settled now and imposed by legislative enactment, so that pensions would become payable at a specified rate rising over 20 years. They preferred fixed contributions and benefits now. The initial pension might be somewhat higher than that recommended in the report.

Sir John Anderson said that the Government thought workmen's compensation called for further consideration. Coming to what he described as "the very controversial question of the approved societies" he said that the system was one of unequal benefits for equal contributions. He could not contemplate the passing of approved societies in their present form without very keen regret, but if those societies had to go it was not because they had failed, but because there was no longer a place for them under changed conditions. It might, however, be possible for the societies to act as agents in the administration of the national scheme. The Government agreed that a death grant should be one of the benefits, though the amount would be subject to further consideration. The Government agreed that the administration of the insurance side of the entire social security scheme ought to be consolidated into one organisation. Whether that organisation took the shape of a new ministry or some kind of statutory board it would be set up as soon as legislation introducing the new scheme had been passed by Parliament.

Summing up, Sir John Anderson emphasised that there could be at present no binding commitment, but the Government adopted the Beveridge scheme in principle, and no reservations that he had made would affect the speed and vigour of the Government's preparations.

In the second day's debate Mr. QUINTIN HOGG said we must restate political problems in terms of practical idealism which would be acceptable to the young. The Government had failed in practice by failing to set up an organisation to give effect to their principles, and in idealism because there was not a word in Sir John Anderson's speech which kindled the smallest spark of imagination. "If you do not give the people social reform," said Mr. Hogg, "they will give you social revolution."

The CHANCELLOR OF THE EXCHEQUER reminded the House of the serious financial implications of the Beveridge scheme, and pointed out that social security was only one of many pressing postwar claims, including housing and education. To bring about a comprehensive medical service the Minister of Health and the Secretary of State for Scotland would begin negotiations immediately with the medical profession. A comprehensive medical service would involve adjustment in medical practice. There would be almost a complete revolution in medical ideas and prospects, and the negotiations and setting up of the new system must take a considerable time. It was vital that matters affecting an honourable profession like medicine should be settled with the greatest good will on both sides. As regards children's allowances there were considerable difficulties, not in connexion with the principle, but in the adjustment of income-tax allowances and such matters. The drafting of legislation would thus take time, and the Government must have an opportunity to survey the financial situation before finally committing themselves to the scheme. That, said Sir K. Wood, was not only reasonable, but if the Government did not do it they would be very irresponsible people. He declared that the setting up of a ministry of social security at this moment would retard rather than expedite the carrying out of the Beveridge plan. For instance, the responsibility for a comprehensive medical service must lie on the Minister of Health, and if a new minister was interposed it would only hamper and hinder the machine. Even if a minister of social security were appointed, his duty would be mainly confined not to matters like a comprehensive medical service or unemployment, but to the collection of contributions and things of that kind. Sir IAN FRASER, who followed the Chancellor, thought that the Government's case was better than their speakers had made it out to be.

At the beginning of the third day's debate the Deputy Speaker announced that he had decided to call the following amendment in the name of Mr. JAMES GRIFFITHS and other members:

That this House expresses its dissatisfaction with the now declared policy of his Majesty's Government towards the report of Sir William Beveridge on social insurance and allied services, and urges the reconsideration of that policy with a view to the early implementation of the plan.

Mr. Griffiths declared that the Beveridge plan had become in the minds of the people a symbol of the Britain they were determined to build after the war, and a test of the sincerity of the Government's promises. We could not

face the future without this scheme, and the Government had no right to ask the people to do so. If the plan could not be accepted during the war, what chance was there of it being accepted afterwards?

•Mr. W. GALLACHER said when guns, tanks and aeroplanes were needed they were ordered. The Chancellor did not say "We will have to consider finance before we begin production." Yet when we faced the question of producing strong healthy men, women and children the first thing we came up against was finance. He hoped that the Government would see their way to adopt the whole report with regard to workmen's compensation. Mr. R. D. DENMAN felt that the more we feared poverty at the end of the war the more urgent it was to implement the Beveridge scheme, for the poorer we were the more essential it was to have minimum standards. Mr. S. STOREY did not agree that the ultimate responsibility for the health services should be put on local authorities. Coöperation between the public authorities and the voluntary hospitals and agencies would not be easily attainable if one of the partners had over-riding powers. To place the responsibility on local authorities would also spell delay, for it would require complete reorganisation of their boundaries. Regional councils were being set up under the auspices of the Nuffield Provincial Hospitals Trust. He thought by an extension of this system we could contrive a flexible administration of our health services.

The HOME SECRETARY had a full House to hear him wind up for the Government. He declared himself mystified by the belief that the Government were trying to evade the issue or to double cross. They had accepted a whole series of important proposals, including a comprehensive health service based on universality, free benefit, no means test, medical reorganisation, free hospital treatment—And representative control of hospitals? asked Dr. H. B. MORGAN. Mr. Morrison replied that this was not a country where you can get everything on a uniform dead-level pattern. We should always have a lot of voluntary effort, and if it died British democracy would be dead. The Government had also accepted children's allowances at the rate of 5s. a week plus the development of a charter of child welfare which would give the Minister of Health freedom to go ahead. The principle of disability benefit had also been accepted. But because the Government propose to make long-term sickness benefit the same as unemployment benefit some protection against abuse is necessary. Mr. Morrison thought it better that the functions of health administration should remain with the state department already looking after health, and the feeding and medical inspection of children with the Board of Education. But the door to a Ministry of Social Security was still open—indeed Mr. Shinwell felt quite a draught. Mr. Morrison claimed that the Government had beaten the clock in reaching conclusions on a great and important report while they were beset with the problems of war.

#### QUESTION TIME

##### Medical Advisory Committee for Scotland

Commander T. D. GALBRAITH asked the Secretary of State for Scotland what steps he was taking to keep in touch with representative medical opinion in regard to current problems affecting the development of the health services.—Mr. T. JOHNSTON replied: By long-established practice, the Department of Health for Scotland has from time to time sought outside expert advice upon special medical problems. But I find there is in the profession a general desire for a regularly constituted committee to advise the department on the many problems with a wide medical interest which are confronting the country today. I have therefore set up a medical advisory committee whose terms of reference are "to advise on the medical aspects of problems relating to the health of the people." The following is a list of the members of the committee:

Sir John Fraser (chairman),  
Prof. E. P. Cathcart, FRCS,  
Dr. G. Matthew Fyfe,  
Dr. Catherine Harrower,  
Prof. James Hendry,  
Colonel T. D. Inch,  
Dr. D. Dale Logan,

Sir Alexander Macgregor,  
Dr. E. K. Mackenzie,  
Dr. A. F. Wilkie Millar,  
Mr. Robert Richards,  
Sir John Orr, FRCS,  
Prof. Adam Patrick,  
Prof. Sydney Smith.

##### Rushcliffe Recommendations

Dr. E. SUMMERSKILL asked the Minister of Health why the Rushcliffe Committee recommendations on the nursing

services were not made obligatory on all hospital authorities; whether he was satisfied that potential nurses would be attracted to the profession at a standing salary of £40 a year and that £55 was an adequate salary for the assistant nurse, category E; and whether he was satisfied that £70 a year was a fair salary to offer a fully qualified state-registered nurse.—Mr. E. BROWN replied: I have no power to impose the obligation suggested, but I do not in any case believe that such action would be necessary to secure the adoption of recommendations made by a committee so fully representative of hospital authorities and of nurses. I think that the adoption of the recommendations will materially assist in recruitment for the nursing profession and I see no reason to dissent from any of them. I have already commended these recommendations to hospital authorities and have informed them of the Government's readiness to give financial assistance towards the substantial increase in cost which they will involve.

##### Tuberculosis Allowances

Mr. W. GALLACHER asked the Minister on what date the financial scheme for persons leaving work on account of tuberculosis, announced by him in October, would commence operation; and whether it would apply to all such persons, including nurses.—Mr. BROWN replied: Detailed arrangements for the scheme are now at an advanced stage and I hope that it will be possible to bring the allowances into operation early in the coming financial year. They will cover all persons who suffer loss of income by giving up work to undertake treatment for tuberculosis.

#### BMA AND THE BEVERIDGE REPORT

At a meeting of the council of the association held on Feb. 3, Prof. R. M. F. PICKEN (acting chairman) presiding, it was decided to call a special meeting of representatives for Wednesday, March 31, to consider whether the association is willing to coöperate with the Government in preparing a scheme for national health and rehabilitation. The representative body will be asked to approve the following resolution:

That if Parliament, after consideration of the Beveridge Report, decides to accept the assumptions of the Report, and to put into operation the proposals of the Report, taken as a whole, including a scheme for comprehensive health and rehabilitation services for prevention and cure of disease and restoration of capacity for work, available to all members of the community, the association would be willing to coöperate in the preparation of such a scheme, provided (a) that the character, terms, and conditions of the medical service are determined by negotiation and agreement with the medical profession, and (b) that those members of the community who decide not to avail themselves in part or in whole of the benefits of the service open to them should not be precluded from obtaining the medical services they desire from doctors within the scheme, paying for such services privately, with the necessary safeguards to prevent abuse.

A special conference of representatives of panel committees will be called for the same purpose and at the same time, Dr. H. G. DAIN to preside over the combined meeting. In a preamble to the resolution (as circulated in advance to the divisions) it is to be made clear that the resolution does not imply a whole-time salaried service.

#### Infectious Disease in England and Wales

WEEK ENDED FEB. 13

*Notifications.*—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2073; whooping-cough, 1596; diphtheria, 895; paratyphoid, 4; typhoid, 1; measles (excluding rubella), 17,308; pneumonia (primary or influenza), 1542; puerperal pyrexia, 146; cerebrospinal fever, 124; poliomyelitis, 3; polio-encephalitis, 2; encephalitis lethargica, 1; dysentery, 85; ophthalmia neonatorum, 78. No case of cholera, plague or typhus fever was notified during the week.

*Deaths.*—In 126 great towns there were 0 deaths from enteric fever, 3 (1) from scarlet fever, 17 (1) from measles, 15 (3) from whooping-cough, 19 (2) from diphtheria, 34 (6) from diarrhoea and enteritis under two years, and 131 (13) from influenza. The figures in parentheses are those for London itself.

Birmingham reported 6 deaths from diarrhoea. Bristol had 7 fatal cases of influenza, Sheffield 6, Stoke-on-Trent 5.

The number of stillbirths notified during the week was 218 (corresponding to a rate of 32 per thousand total births), including 20 in London.

Public Health

A MILK-BORNE OUTBREAK OF DIPHTHERIA \*

WILLIAM GOLDIE E. C. G. MADDOCK  
M B ABERD, M R C P C I E, M D EDIN, F R C S E

(Emergency Public Health Laboratory, Pocklington)

SEVERAL outbreaks of diphtheria have now been described in which a milk-supply has been the vehicle of infection. Wilson (1933) collected 13 such outbreaks in Great Britain between 1912 and 1931, and Armstrong and Parran (1927) 26 in America from 1906 to 1926. In very few of the epidemics hitherto described, however, has the specific organism been isolated from the milk-supply, although it has often been demonstrated either in the nasopharynx of persons handling the milk or in ulcers found on the teats of cows. Bowhill (1899), Eyre (1899), Dean and Todd (1902), and Marshall (1907) have isolated the specific organism from milk in small outbreaks of diphtheria, although in all instances the number of bacteria present was said to be small. Klein (1901) claimed to have isolated the organism from one of 100 mixed London milks which were being examined for other purposes. In the outbreak to be described here *Corynebacterium diphtheriae* gravis was isolated from milk on two separate occasions.

FIELD OBSERVATIONS

In April, 1941, 3 of the 4 children of a farmer in East Yorkshire developed sore throats. The first child affected, aged 10 years, was not seen by a doctor. The second and third children, aged 11 and 8 years, became ill a week later and the clinical diagnosis of diphtheria was confirmed by bacteriological examination, *C. diphtheriae* gravis being cultured from their throat swabs. The two were removed to the local isolation hospital. Some days later nasal and throat swabs from the rest of the family were examined and *C. diphtheriae* gravis was isolated from the throat swab of the farmer's wife. She also was removed to the isolation hospital and was discharged with her two children at the beginning of June after four consecutive throat and nasal swabs from each of them had been reported negative. No steps were taken at this time to safeguard the milk-supply.

The farmer, his wife, 4 children aged 11, 10, 8 and 4 years, and a farm labourer lived in a small farmhouse. The cowsheds which were clean and airy were separated from the farmhouse by a concreted yard and adjoined a pail closet. Next to the house was a single-roomed dairy. The dairy contained a cold-water tap supplied by the town main, this being the only water-supply to the house. The farmer owned 5 cows and was himself responsible for the milking. His wife undertook the straining of the milk and the washing of the milk utensils. The daily yield of milk was 10-11 gallons and this was taken by the farmer himself in cans to a distributor in the neighbouring town. On his way he distributed small supplies to three houses. The remainder was mixed with quantities from other sources and the bulked milk was subsequently distributed raw to about 300 houses.

Between July 10 and 16, 7 cases of diphtheria occurred in the town, 4 of them in the houses supplied direct by the milk-producer and 3 in families supplied by the milk-distributor. As raw milk appeared to be a common factor in this outbreak a sample was examined at Pocklington emergency public health laboratory on July 17. *C. diphtheriae* gravis was cultivated from the sample and the sale of the milk was immediately stopped. The number of people at risk in the houses supplied direct was 18, and of these only the 4 affected persons together with a further child who was subsequently found to be a throat carrier drank raw milk. The 3 other patients also drank raw milk; one of these died within 48 hours of the onset of symptoms.

It has been observed (Godfrey 1929 and Picken 1936) that in milk-borne outbreaks of diphtheria the average age of the affected persons is higher than is generally found in other epidemics. The present outbreak affected 4 males and 3 females; the ages of the males were 8, 15, 38 and 69, and of the females 16, 22 and 34. It must be pointed out, however, that of the 18 persons in the 3 houses supplied direct by the farmer only 3 were under 16 and of these 1 developed diph-

theria and the other 2, one of whom was found to be a throat carrier, had both been recently immunised.

On July 21, two further samples of milk were examined, one unstrained and therefore not handled by the farmer's wife and the other strained by the farmer's wife. *C. diphtheriae* gravis was cultivated from the second sample but not from the first. At the same time throat and nasal swabs were taken from all members of the household. *C. diphtheriae* gravis was isolated from the throat swabs of the youngest son, aged 4 years, who subsequently developed clinical diphtheria, and from the throat of the farmer's wife. After the removal of these two to hospital further examinations of the milk were uniformly negative and the ban on its sale was removed on July 29. No further cases developed in the district at this time.

Further inquiries elicited the fact that the farmer's wife, who, as already mentioned, had been removed to hospital on the result of a positive throat swab, had a sore throat in March, 1941. She gave a history of a frequent feeling of rawness in her throat together with some swelling of the cervical glands and a spasmodic cough.

Throat and nasal swabs were also examined from all members of the three households whose milk-supply came direct from the farmer. An evacuee boy aged 11 who had previously been immunised with two doses of APT was found to be a throat carrier of *C. diphtheriae* gravis. As has already been said, he also drank raw milk and thus all the members of the three households who drank raw milk were accounted for. It was not found practicable to examine swabs from all the persons living in the 300 odd houses supplied by the milk distributor.

BACTERIOLOGICAL INVESTIGATIONS

The cases are divisible into: (1) those which occurred in the farm in April and which involved the 3 children and the mother, and (2) those in July.

In all instances swabs were inoculated on Löffler serum slopes and Neill's (1937) heated blood-tellurite medium. Samples of milk were centrifuged for half an hour and loopfuls of the sediment were similarly inoculated on Löffler and Neill's media. Smears from the Löffler slopes were stained and examined next morning and the tellurite plates were scrutinised at intervals up to 48 hours. Typical colonies were picked off the tellurite, inoculated on heated blood agar and after 18 hours' incubation were seeded into 3 tubes of Hiss's serum water containing 1% glucose, starch and saccharose respectively and into broth.

In the April series bacilli with the morphological characteristics of *C. diphtheriae* were easily recognised in smears prepared from Löffler slopes from the throat swabs of the farmer's wife and 2 children. On tellurite plates heavy and typical growth of the gravis type was observed in each case. The organism produced acid in glucose and starch and there was typical pellicle formation in broth. It has already been stated that the farmer's wife and her 2 children were discharged from hospital at the beginning of June after four consecutive throat and nasal swabs had been reported negative. On two occasions these examinations were carried out at Pocklington EPH laboratory and on the other two at another laboratory which used Löffler's medium only.

BACTERIOLOGICAL FINDINGS IN 10 SUBJECTS, EITHER PATIENTS OR CARRIERS

Subject	Pocklington EPH lab.			Lab. A		Lab. B	
	Exams. + ve	L +	T +	Exams.	+ ve	Exams.	+ ve
1	2	0	2	0	..	1	1
2	2	0	2	1	0	1	1
3	..	..	..	..	..	1	1
4	1	0	1	1	0	..	..
5	1	0	1	2	0	..	..
6	1	0	1	1	0	..	..
7	2	0	2	3	0	..	..
8	2	0	2	1	0	..	..
9	1	0	1	1	0	..	..
10	3	0	3	1	0	..	..
11	2	0	2	..	0	..	..

L + = positive result from Löffler's serum slopes.  
T + = positive result from Neill's medium.

The bacteriological findings in the 10 persons who were either patients or carriers in July are summarised in the table. Bacteriological examinations of swabs from 8 of them were also made at laboratory A where Löffler's medium only was

\* A report to the Medical Research Council.

used and of 3 at laboratory B where tellurite medium only was used. In the columns referring to the results at Pocklington only positive findings are given; in every instance the first examination carried out gave positive results. In the columns referring to results at laboratories A and B the figures given refer to the total examinations carried out. It will be seen that in no instance was a positive result obtained on Löffler's medium either at Pocklington or at laboratory A. At Pocklington on the other hand heavy and typical growth of *C. diphtheriae* gravis was obtained on the tellurite medium from every primary throat swab, and from the milk. The organism produced acid in glucose and starch and showed a typical pellicle growth in broth. Subculture of typical colonies from tellurite to Löffler slopes was carried out in several instances. Diphtheria bacilli were recognised in smears prepared from these slopes but barring of individual bacilli was not so well-marked as usual. On the two occasions when the organism was discovered in the sample of milk, growth on the tellurite was exceptionally heavy.

**Virulence tests.**—Cultures of the bacilli isolated from the farmer's wife, from the evacuee carrier and from the first milk sample submitted were sent to Prof. J. W. McLeod at the department of bacteriology of Leeds University, who kindly carried out virulence tests. He reported all three cultures to be typical gravis strains and to be virulent.

#### DISCUSSION

Several features of this outbreak are of interest. The consistent failure in two of the laboratories concerned to identify diphtheria bacilli by Löffler's medium from the July series of cases is unusual. While it is generally admitted that a tellurite medium gives a much higher percentage of positive results in diphtheria contacts and carriers, it is also agreed that in clinical diphtheria there is not so much to choose between the two media. Goldsworthy and Wilson (1942) point out that the mode of preparation of Löffler's medium is an important factor in its efficacy in the diagnosis especially of gravis strains, and show that the best results are obtained by using serum which has been sterilised by filtration and subjected to the minimum amount of heat necessary for inspissation. It seems improbable that this is sufficient to explain the negative results at Pocklington, as no alteration was made in the technique of preparing the Löffler slopes between April, when positive results on this medium were obtained, and July, when they were uniformly negative. Again, the organisms could be recognised in the July series when typical colonies on the tellurite medium were subcultured on Löffler slopes.

From a few experiments carried out since the outbreak it would appear that when diphtheria bacilli are introduced into raw milk kept at room temperature the number present remains about constant up to 4-6 hours, but thereafter gradually diminishes so that at the end of 24 hours the organisms can usually not be demonstrated; too few observations have so far been made to justify any general conclusions on the ability of diphtheria bacilli to multiply in milk. If our preliminary findings are confirmed they would probably explain the low incidence of diphtheria among consumers of the mixed milk as compared with the high incidence in those supplied direct by the farmer.

Other factors may have been involved. Dilution of the milk must be taken into account; the farmer's daily 10 gallons of milk was added to about 50 gallons from other sources. It is estimated too that 80-90% of the school-children in the district had at that time been subjected to diphtheria immunisation and this was probably a factor in preventing a greater incidence. It has already been pointed out, however, that of the 7 cases developing between July 10 and 16 only 1 was of school age. It seems to us that dilution together with a gradual diminution in the number of diphtheria bacilli in the milk were the important factors in limiting the outbreak, so that in all cases where the milk was not consumed in considerable quantities soon after its delivery the numbers of diphtheria bacilli administered would be very small.

The difficulty of isolating diphtheria bacilli from milk in pre-tellurite days has been stressed (MRC report 1923). A further instance where *C. diphtheriae* intermedius was isolated from milk on a tellurite medium has been brought to our notice (Fry 1941). It seems therefore that the isolation of diphtheria bacilli from milk is

considerably simplified by the use of a medium containing tellurite.

There seems to be little doubt that in this outbreak diphtheria bacilli gained access to the milk from the throat of the farmer's wife while she was straining the milk. The spasmodic cough from which she suffered probably facilitated the infection of the milk. The importance of ensuring as far as possible that those engaged in the handling of raw milk are not vectors of infectious disease is obvious.

#### SUMMARY

A small outbreak of diphtheria in a town in East Yorkshire was traced to a milk-supply. *C. diphtheriae* gravis was isolated from the milk on two occasions.

The wife of the farmer was found to be a throat carrier of *C. diphtheriae* gravis, and it seemed clear that she infected the milk while straining it.

The isolation of diphtheria bacilli from all cases and carriers and from the milk-supply was made on a tellurite-containing medium. Results on Löffler's medium were uniformly negative at two laboratories.

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## Special Articles

### GENERAL MEDICAL COUNCIL

A SPECIAL session of the council opened on Feb. 17, with Mr. H. L. EASON, the president, in the chair, was chiefly devoted to disciplinary cases.

#### Charges against Medical Practitioners

The council considered the cases of *Alan Gray*, MB Durh, who had been convicted of being drunk in charge of a motor vehicle, and of *Francis Percival de Caux*, MRCS, who had been sentenced to five years' penal servitude for procuring an abortion, and erased both names from the register. The name of *Arthur Hilary Clifton Hill*, MRCS, charged with wrongful certification, was not erased.

#### A CERTIFICATE FACILITATING EVASION OF MILITARY SERVICE

The case of *James Jackson Brown*, registered as of 63, Lauriston Road, South Hackney, London, E.9, MRCS (1914), who had been summoned to appear before the Council on the following charge:

That being a registered medical practitioner:—

1. You gave the following certificate in your professional capacity for subsequent use for administrative purposes under the National Service (Armed Forces) Act, 1939:—

9/5/40

I hereby certify that Mr. A. B. of \*\*\* has been a patient under my care for on 2 years. He then had a severe attack of influenza which left him in the Post Encephalitic state.

Herewith Specialist's report.

J. J. BROWN, MRCS, LRCOP LOND.

2. You stated in the said certificate given by you and dated May 9, 1940, that the said A. B. had been a patient under your care for "on" that is to say about, two years before that date, whereas in fact he had not been under your care for any such period, and you had only seen him on one occasion, in May, 1940, when you did not examine him.

3. You did not make any or any proper professional inquiries before you gave the said certificate.

4. The certificate given by you in the case of the said A. B. was untrue, misleading, or improper within the meaning of paragraph 1 of the Warning Notice issued by the General Medical Council dated June, 1933.

5. You gave the said certificate for the purpose of enabling the said A. B., who was to your knowledge a person who might become liable, under the National Service (Armed Forces) Act, 1939, to be called up for service, to evade any liabilities which he might become liable to discharge under or by virtue of the Act.

Charges of conspiracy and of encouraging A. B. to produce apparent disability were withdrawn, as were similar charges relating to another patient, C. D.



The complainants were the Ministry of Labour and National Service, represented by Mr. Gerald Howard, instructed by Messrs. Waterhouse. Respondent was accompanied by Mr. A. A. Pereira, counsel, instructed by Messrs. Le Brasseur & Oakley, on behalf of the London and Counties Medical Protection Society.

After Mr. Howard had opened the case he called and examined A. B., and Mr. Pereira cross-examined. A. B. could remember very little about his interview with Dr. Brown. He thought he remembered Dr. Brown using a stethoscope on him, taking a specimen of urine and testing a knee-jerk. At his first medical board he had been put in Grade IV, but later had been regraded I. He had met Pell in a city office and Pell had offered to help him to evade military service, but had added that it might cost £250. He was not suffering from any illness at the time; he had acted before Dr. Brown.

Dr. Brown, giving evidence on his own behalf, said that he was a British subject. His surgery and all his records had been destroyed by an air-raid in October, 1940. Pell's parents had been his patients. He had not recognised A. B. but had accepted Pell's statement that he had treated him for influenza two years before. Pell had done most of the talking. Respondent had insisted on a second opinion, and four days later had been shown a specialist's certificate confirming his own diagnosis. He had then issued a certificate. He was not perfectly acquainted with English and his certificate might appear misleading for that reason. He had subsequently refused to have anything to do with patients brought to him by Mr. Pell.

Counsel spoke, and the President announced that the council had found proved the charges as set forth above, and had directed the Registrar to erase Dr. Brown's name.

#### DESERTION FROM THE ARMY

The case of *Andrew Dorset Harper*, registered as of Five Ways, Torquay, MB, Lpool (1924), FRCS (1933), who had been summoned to appear before the council on the following charge:

That being a registered medical practitioner and a captain in the Royal Army Medical Corps you when on active service deserted His Majesty's Service, in that you, at Crookham, near Aldershot, on April 12, 1942, after having been warned to proceed overseas, with intent to avoid so proceeding, absented yourself without leave from the 1st Depot and Training Establishment, Royal Army Medical Corps, until April 22, 1942, of which offence you were found guilty by a general court-martial held at Crookham on June 5, 1942, and were sentenced to be cashiered and to be imprisoned without hard labour for eighty-four days, the finding and sentence being subsequently duly confirmed. And that in relation to the facts so alleged you have been guilty of infamous conduct in a professional respect.

Mr. Harper appeared, accompanied by Mr. A. A. Pereira, counsel, instructed by Messrs. Le Brasseur & Oakley, on behalf of the London and Counties Medical Protection Society. Mr. F. P. Winterbotham, solicitor to the council, explained that Mr. Harper had been gazetted to the RAMC on the outbreak of war as a surgeon specialist, with the rank of major, but in September, 1941, had been downgraded to captain. He had taken no steps about this change until March, 1942, when he had written to the War Office objecting that the drop in his pay made him unable to meet certain financial liabilities. At about this time he was detailed to go overseas with a draft and reported at Crookham depot on April 7. The War Office had not replied, and to assist him the assistant adjutant rang them up and ascertained that the letter had been misdirected. It was dictated over the telephone and given to Mr. Harper. He observed that he must take initiative into his own hands. He interviewed the commandant, who allowed him to attend personally at the War Office. On return he packed his kit and left the depot in a taxi-cab, giving the orderly corporal a letter for the commandant, in which he said that he had reached no solution of his problem and had no alternative but to take the initiative in solving his own financial difficulties, and would stay at his home until the authorities reposted him under conditions of pay which would enable him to solve them. On April 22 he was arrested at Torquay.

Mr. Harper, giving evidence, said he was 41 years old. He had a large practice at Torquay, partly general and partly as a consultant and operating surgeon. As surgeon specialist in the Army he had held appointments

in various parts of the country. At one unit his commanding officer formed the opinion he had applied for too much leave. On one occasion this CO recalled him from leave after twelve hours under the impression that Mr. Harper had left two days before his pass entitled him to go. The pass itself exposed the CO's error, but he made an adverse report on Mr. Harper. This was withdrawn after interviews with the authorities. Mr. Harper also had trouble with his surgical chief, who expressed dissatisfaction at his work, disagreed with his technical views, and made another adverse report on him. Mr. Harper protested, and reserved his right of appeal under the Army Act. The general atmosphere at that station was one of undue watchfulness and suspicion in clinical matters within his domain. He was untactfully interfered with, and this worried him considerably, for he was not accustomed to a "barrage of unfounded criticism coming from the blue." He was posted to Bude as a captain to do general duty, and at that time sent in his appeal. It was dismissed about the end of January, 1942. He thought it reasonable to wait before taking action about his downgrading, but his order to proceed on draft came, and once he left the country he would not have been able to take up the matter again. He was very much worried by the shortness of the time and by his financial position, for he had lost about £300 a year and could not see how to pay his income-tax and mortgage interest. In refusing to go abroad he acted with his eyes open. He conducted his own defence before the court-martial. He served 42 days in Winchester gaol and was released for good conduct. He then returned to Torquay, and had resumed his practice there. He was now, he said, well aware of how wrong his action had been, and he tendered the deepest regrets. His judgment had been influenced by his anxiety.

The council decided not to erase Mr. Harper's name.

The council then spent a long period in camera discussing its evidence before the Inter-Departmental Committee on medical schools, procedure in penal cases, and other domestic business.

#### MEMORANDUM ON SCABIES

FURTHER investigations into the part clothing and bedding play in the spread of scabies have led the Ministry of Health to amend the edition of their memorandum on scabies issued last June. They ask for the following paragraph to be substituted for the last paragraph in the section on methods of spread and prevention on p. 3 of the memorandum:—

Recent investigations have shown that whilst articles of clothing and bedding may play some part in the spread of the disease the importance of these as a means of dissemination has been much over-estimated: and that with the standard methods of treatment (benzyl benzoate emulsion or sulphur ointment) routine disinfection of clothing is unnecessary, as the layer of medicament which covers the body after treatment is usually sufficient to kill all mites on the clothing. Moreover, in view of the small reinfestation or relapse rate which has occurred when disinfection has been abandoned, it is simpler to repeat treatment in such cases rather than to expend the amount of manpower and material required for routine disinfection in all cases. Emphasis should rather be laid on the follow-up and treatment of the family contacts and other close contacts of the original case, including, for instance, children of other families who are playmates with an infected child. It is not necessary, therefore, to insist on disinfection as a routine procedure, though it may be justified on occasion, as for instance when there is a high incidence of scabies amongst people living in overcrowded conditions and compelled to use communal bedding and clothing. The parasites are killed comparatively easily and by very moderate temperatures, and ironing with an ordinary hot iron is quite effective for clothing or blankets.

**MEDICAL CASUALTIES.**—The following casualties have lately been announced:

*Missing*—Lieutenant W. Bremner Highet, FRCS, RAMC.

*Wounded or injured*—T/Surgeon Lieutenant G. R. Walker, RCNVR.

## Letters to the Editor

### NURSING REFORM

SIR,—Now that the Rushcliffe committee have made their report there seems to be a danger that both the nursing profession and the public may believe that the last word has been said on nursing reform. This is not the case. The committee's terms of reference included, at first, the drawing up of agreed scales of salaries and emoluments; later, hours of work, holidays and superannuation rights were included.

The report states (§ 11b) that "the number of trained nurses qualifying at the present time is inadequate to satisfy the large and growing demands for their services . . . we regard it as a matter of the first importance that, notwithstanding the many other demands on woman power at the present time, an increased flow of suitable student nurses into hospitals should be both encouraged and effected." The improved scale of salaries is to be welcomed, but it is doubtful whether this scale, which represents but a small advance on that already found in some municipal services, will encourage and effect an increased flow of student nurses into hospitals. The 96-hour fortnight, the other recommended reform, has already been declared impracticable under present conditions in many quarters.

Wages and hours are the traditional concern of trade-unions. Yet the staunchest supporters of the Rushcliffe report often decry the attempt to organise nurses on trade-union lines. In my experience organised nurses are asking for far more fundamental reforms than those recommended in the report: no less than the reorganisation of the profession in order to bring its educational standards and living conditions into line with those obtaining among other groups of professional women. It is clear that many desirable reforms are impracticable until there are many more trained nurses available; but if a complete scheme for reorganisation were to be drawn up at once, some reforms put into practice now and the remainder assured for the near future, girls starting their training now would have the promise of greatly improved conditions four years hence on qualification. A few reforms immediately possible are: living in to be optional; nurses' homes to be run on informal hostel lines by a lay warden; reduced restriction in off-duty times; no marriage bar; part-time work to be found for the married woman with home ties; lectures to be given in duty periods and to be closely connected with the nurses' ward work; freedom of organisation to be allowed and self-government to be encouraged. Future progress would aim at emphasising the "student" in the term "student nurse"; this would gradually become possible, since with more trained staff available hospitals would be increasingly staffed by trained nurses and domestics, not probationers combining the two offices.

A moderate increase in salaries and reduction of hours are not going to double and treble the entry into the nursing profession which an adequate health service will need in the future. More radical reforms are needed; these should be faced now, wherever possible instituted immediately, or where that is not possible assured for the earliest possible future date.

Sedbergh, Yorks.

PATRIA GAIRDNER.

### DARWIN AND PSYCHOTHERAPY

SIR,—Some of the pleasure found in writing on the health of Charles Darwin arose from the belief that one could neglect all but the original literature. This notion, although pleasant and I believe profitable, was illusory for the subject has attracted much medical authorship. Sir Buckston Browne has recently published (*Nature* 1943, 151, 14) a short article entitled Darwin's Health in which he refers to a diary now in the possession of the British Association for the Advancement of Science. This is a health diary kept by Charles Darwin from 1849 to 1854 and is written on thirty-four pages of unruled foolscap. Sir Walter Langdon-Brown, with encyclopædic memory, told me that an American named Kempf had published a previous analytical study. This I have now read (*Psychoanal. Rev.* 1918, 5, 151). It is a study for the expert and is based on the theory of mother-fixation; it dives beneath

the surface of Darwin's letters and brings up some innocent-looking guns and pistols as sexual symbols. Kempf makes reference to two further articles: one by W. W. Johnson (*Amer. Anthropol.* 1901, vol. 3) who concludes that Darwin's illness was "chronic neurasthenia" and another by G. M. Gould in his *Biographic Clinics* attributing his ill health to "eye-strain."

Sir Arthur Keith has pointed out an error in my article which deserves public correction. Sir Buckston Browne, in his enlightened generosity, presented Darwin's home, Down House, to the British Association for the Advancement of Science as a national memorial to Charles Darwin. The farm and laboratories which he built for the Royal College of Surgeons are also at Downe and on land adjacent to Down House.

Derby.

DOUGLAS HUBBLE.

### DISTRIBUTION OF EXPENSIVE REMEDIES

SIR,—We have read Doctor Don's letter with great interest and quite appreciate his point of view. On the other hand, under existing conditions, burns on a large scale are extremely common and are resulting in serious mortality. Research work on burns is being pursued vigorously in many directions, and we feel that it is justifiable to recommend the use of substances which may now not be too readily available, provided that their use has value in curing burns and in reducing the mortality from them.

Wakefield.

R. M. HEGGIE,  
E. M. ABBOTT.

### GLOVES OR NOT?

SIR,—Your leader of Feb. 13 recalls to my mind a visit I paid some two years after the last war to Prof. Carl Gauss of Freiburg, in order to learn about twilight sleep from him. I watched him perform several major operations. He never wore rubber gloves; instead he put on two pairs of thin white sterilised cotton gloves. If the outer pair got much soiled in the course of the operation he would slip them off and still have a clean pair underneath to carry on with. While rubber is so scarce, our surgeons might resort to this method.

London, S.W.1.

C. HORWITZ.

### HUMOUR AND MENTAL DEFECT

SIR,—Your peripatetic correspondent asks "can the presence or absence of any special sense of humour be taken as evidence of mental capacity or mental defect?" I have consulted Hazlitt, and perhaps the prognosis is not so grave as it appears at first sight. According to this authority it is a question of nationality. In his *Essay on Merry England* he says, "I flatter myself that we are almost the only people who understand nonsense." In these days of paper shortage I have refrained from further quotations, but I commend the whole essay to him. In support of Hazlitt's claim we have the everlasting enjoyment by the English of the works of Lewis Carroll, and above all of Edward Lear.

Have.

J. P. SPENCER WALKER.

### MEDICAL ANONYMITY AND THE RADIO

SIR,—Your correspondent Enquirer is "startled" that my name should have been announced over the radio at the end of a broadcast discussion on state-organised medicine, and its publication in the *Radio Times* (with which I had nothing to do). It is not easy to see why he should be troubled by this when he admits that "perhaps it is in the public interest that the origin of widely disseminated statements, opinion and advice shall be known so as to be better appraised." I can assure whoever hides beneath the pseudonym Enquirer that it is in the public interest, and precisely why I insisted that if I put forth views over the radio they should not be anonymous. With regard to the insinuation that the occasion was used as a means for advertisement, I may point out that it is not profitable to advocate opinions which are contrary (so I am told) to the large majority view. In any case the profession has a tribunal in whose hands the question of advertisement or publicity may be safely left.

My answer to the insinuation is that which Henry Ford is alleged to have given, and with the same contempt, when asked about "Culture"—"I haven't got it, and I don't want it."

London, W.1.

ALECK BOURNE.

## Obituary

## HARRY LAMBERT LACK

M D LOND, F R C S

As we announced last week, Mr. Lambert Lack died on Feb. 14 at the age of 75. He was one of the most distinguished exponents of laryngology in this country and one of its pioneers.

He was educated at King's College, London, and at King's College Hospital, where he carried off most of the possible prizes. From a house appointment at King's he went to the Children's Hospital, Paddington Green, and the Throat Hospital, Golden Square, as resident medical officer, and he joined the staff of both these hospitals after taking his surgical fellowship in 1893.



Elliot &amp; Fry

The Jacksonian prize of the Royal College of Surgeons was awarded to him in 1899 for an essay on the pathology, diagnosis, and treatment of inflammatory affections of the nose and its accessory sinuses and air-cells. His work on the nasal sinuses, begun thus early in his career, revealed a critical mind, highly developed powers of observation and a sound knowledge of pathology. He was elected throat surgeon to the London Hospital, and in 1906 produced *Diseases of the Nose and Accessory Sinuses*, dedicated to his old teacher Watson Cheyne.

This book put him in the front rank of his specialty—a position he retained all his life. Not a little of its material was derived from his own investigations, and many of the conclusions are as valid today as they were 37 years ago. The chapter on nasal obstruction, with its ingenious views on the resulting deformity of the nasal septum, mouth and teeth, shows an unusual capacity for reasoning, and has been the basis of much subsequent discussion on a complex problem.

Lack was also particularly interested in the nature and causation of nasal polypi, and carefully examined their pathology, including the condition of the bone in the region of their origin. He devised an operation for their removal which involved the partial eradication of the ethmoid air-cells, a ring curette being the instrument chiefly employed. This operation was difficult to perform thoroughly and with safety, but in the hands of its originator gave excellent results. Among many other subjects he studied was congenital laryngeal stridor, and he accurately described the form of larynx associated with this condition. He personally carried out many bacteriological investigations into fibrinous rhinitis and discussed its relation to diphtheria. A paper on operations for cancer of the vocal cord suggested a new manner of approach with removal of a portion of the thyroid cartilage, and this technique was adopted, with modifications, by other surgeons. He was a careful and skilful operator; though very loth to adopt drastic measures where conservative treatment offered a good chance, he could be very radical when occasion demanded.

In view of his training and wide clinical experience, it is not surprising that in cases presenting difficulty in diagnosis his opinion was often sought by other laryngologists. One of them, who had a long professional association with Lack as clinical assistant, registrar and junior colleague, writes that he owes much to this intimate relationship, which was always profitable and delightful. "He was at all times kind and considerate, and he was much beloved by his colleagues, the nursing staff, and his patients."

At home, he was passionately fond of the country and the life to be found in field, wood and garden. He had an exceptional knowledge of antique furniture, on which many sought his advice. He read widely, and as his memory was remarkable his mind became a storehouse of information. In his wife, a daughter of Colonel McNeill Rind, he had an ideal companion. She survives him with a daughter and three sons, one of whom, Christopher, is serving in the RAMC. His eldest son is one of the world's authorities on wild birds.

Sir Charlton Briscoe writes: "Lambert Lack entered King's College as a student in his 17th year, shortly before the retirement of Lister. He was house surgeon and pathological assistant to Watson Cheyne. He realised the influence which these two had on his scientific outlook and success.

"He was born in Norfolk, and his choice of a profession was influenced largely by his uncle, a well-known practitioner in that county who attained to a great age. He was brought up on his father's farm and attributed his power of clinical observation to that early environment and training. He remained faithful to the Eastern counties, and spent many holidays, there, and after retirement much time with his sons bird-watching in the neighbourhood of Thetford. He was always good-tempered and unhurried, and never put out when things did not go exactly as they should. But his greatest characteristic was a certain slow deliberation, from which he reached a decision on which he was absolutely certain and from which he could not be moved. This obtained both in clinical and mundane matters—in a diagnosis or in judging the genuineness of a piece of antique furniture. Early on in his career he made up his mind to retire at a comparatively early age, and when that time arrived retire he did, in spite of the protests of his many friends. In his prime he was a keen cyclist and later a golfer, but after giving up practice his activities consisted mainly in gardening and bird-watching, though he entered into the pursuits of his children like an elder brother. After fifteen years of retirement to most he must be a reputation, but to those who knew him in the old days an abiding memory of a great-hearted friend."

## GEOFFREY CHARLES PURSLOW

M B BIRM

Dr. G. C. Purslow has died at sea as a result of enemy action. He was the son of Lieutenant George Purslow, who was killed in the last war, and of Mrs. D. G. Gwynne of Cheddleton Heath, near Leek.

Geoffrey was educated at Adams School, Newport, where he was head boy for two years. He left with a Kitchener scholarship to study medicine at Birmingham, where his uncle, Dr. C. E. Purslow, was consulting obstetrical and gynaecological surgeon to the Queen's Hospital. He showed great promise as an oarsman, and in 1939 was a member of the junior four of the Birmingham Rowing Club. A fellow member of the Midland Sailing Club writes:



James Boon &amp; Son

"Geoffrey's keen sense of fun and sportsmanship were apparent in all he undertook. Tall, dark and debonair, he was a general favourite, and his attractive personality and capacity for leadership made him a stalwart member of the team." Purslow graduated MB in 1940 and took his English conjoint qualification the following year. He was serving as a medical officer with the Cunard White Star Line when his ship was lost. He saw his patients safely into a lifeboat and was later rescued from the sea himself by another lifeboat. He worked among its occupants for some days until he died. No further details are yet available. He was 26 years of age.

## Appointments

GOODWILL, SIBYL, MRCS, DPH: temp. asst. MO for Islington.

HINTON, W. S., MRCS: examining factory surgeon for Mitcheldean, Glos.

INGLES, J. S., MB EDIN.: examining factory surgeon for Worcester.

*Colonial Medical Service.*—The following appointments are announced:—

FRANKLIN, G. C., MB CAMB: MO, Gold Coast;

HUTCHINSON, M. P., MRCS: MO, Sierra Leone;

MACNAMARA, F. N., MB CAMB: MO, Nigeria;

MACNAMARA, O. D., MB CAMB: MO, Nigeria;

MILNE, F. A., MRCS: MO, Northern Rhodesia;

POOLE, L. G., MB LPOOL: MO, Fiji; and

SPRINGETT, V. G., MRCS: MO, Nigeria.

## Notes and News

## BOOKS FOR THE CONNOISSEUR

Now, when old books cannot be bought from abroad, a catalogue (*L'art ancien*: catalogue 28. Zürich) of books by pioneers of medicine and natural science makes the mouth water. This list covers all sciences from renaissance times, including several interesting medical items. There are unfamiliar continental editions of English classics: a Dutch edition of Lower on the heart for £12 and Stephen Hales's *Hæmostatics* in French for £4. Fabricius, Harvey's master at Padua, appears from a Lyons press, and there is a German edition of Cesalpino who (they say in Italy) discovered the circulation. A rare edition of Rösslin's *Woman's Book* is offered for 300 Swiss francs (£18) bound up with two equally rare tracts by Pictor on popular hygiene, dating from 1565-66. Among several early herbals are some fifteenth-century editions of the *Gart der Gesundheit* and a Fuchs, whose name is familiar today through the fuchsia. There is a German translation of Sir Thomas Browne's *Vulgar Errors*, and a series of the rare Geneva editions of Boyle. There are Dutch printings of Needham on embryology and of Newton's *Principia*. A number of books by Glauber (of Glauber-salts fame), a Galileo and some Faradays, or a fine copy of the butterfly plates engraved by the great Czech engraver Wenceslas Hollar who worked in England in Charles I's reign, might appeal to different tastes. Among more modern classics are a copy of Billroth's *Surgical Clinic* of 1869-70 and an early neurological work of Flourens. Altogether it is an engaging catalogue, containing few great prizes but much to interest and attract the amateur of old books.

## Eugenic Aspects of Family Allowances

In his Galton lecture to the Eugenics Society on Feb. 16, at which Lord Horder presided, Sir William Beveridge referred to the dysgenic fact that the birth-rate is higher among the poor than among the prosperous. According to R. A. Fisher the explanation was not that prosperity caused infertility, but that infertility caused social promotion and prosperity. Children's allowances would help to equalise conditions between small and large families and would thus diminish the social promotion of the infertile. But the flat subsistence rates proposed in his report did not, from the eugenic standpoint, go far enough. They would need to be supplemented by a scheme of children's allowances in each of the professions and occupations demanding a test of ability from its entrants (e.g., medicine, law, teaching, Civil Service and accountancy). These schemes must offer far more than bare subsistence, and their cost would have to be met by contributions within the occupation. An additional means of removing the premium on infertility was the maintenance and extension of income-tax rebates for children.

## Royal Society of Medicine

A general meeting of the fellows of this society will be held at 5 PM on Tuesday, March 2. On March 3, at 2.30 PM, Sir Arthur MacNalty will speak to the section of history of medicine on the official medical history of the war. The section of surgery will meet at the same hour when the following short papers will be read: Dr. P. L. Mollison, revised principles of blood transfusion; Mr. F. Ronald Edwards, a form of bovine serum suitable for a plasma substitute in the treatment of shock; Mr. J. D. Ferguson, suprapubic cystotomy; Dr. Howard Ives, lumbar sympathetic procaine injections in peripheral vascular disease. On March 5, at 10.30 AM, at the section of otology, Captain E. P. Fowler, USAMC, will speak on audiogram analysis and interpretation and the fitting of hearing-aids with special reference to Service requirements. Other speakers will include Lieut.-Colonel Myles Formby, Mr. T. E. Cawthorne, and Air-Commodore E. D. D. Dickson. The section of laryngology will meet at 2.15 PM on the same day, when Prof. Alexander Fleming and Mr. E. D. D. Davis will open a discussion on the prevention of acute pyogenic infections of the nose and throat. The section of anaesthetics will also meet on March 5, at 2.30 PM, when Dr. John Gillies will read a paper on the time factor in surgical operations.

## Medical Honours

The King has awarded the following honours to medical officers in recognition of gallant and distinguished services in the Middle East during the period May to October, 1942:

**CB**—Brigadier A. J. Orenstein, CMG, CBE, MRCP, S. African Forces.

**KBE**—Major-General P. S. Tomlinson, CB, DSO, MRCP, KHP, late RAMC.

**CBE**—Major-General D. C. Monro, FRCSE, late RAMC. Brigadier (T) Edward Phillips, MB DURH, late RAMC; Colonel T. D. MacG. Stout, FRCS, NZ Military Forces.

**OBE**—Major (T/Lieut.-Colonel) H. S. Allen, FRCS, RAMC; Colonel (A) Douglas Bluett, MB DUBL., RAMC; Major (T/Lieut.-Colonel) M. R. Burke, MB LOND., RAMC; Major (T/Lieut.-Colonel) G. A. H. Buttle, MRCS, RAMC; Colonel (T) Norman Cameron, MB GLASC., RAMC; Lieut.-Colonel Jagdish Chandra, MB PUNJAB, IMS; Major (T/Lieut.-Colonel) R. K. Debenham, FRCS, RAMC; Colonel (T) A. T. B. Dickson, MB GLASC., RAMC; Lieut.-Colonel W. E. R. Dimond, CIE, LRCP, IMS; Major (T/Lieut.-Colonel) C. B. Levick, FRCP, RAMC; Colonel (T) James Morrison, MC, MB ABERD., RAMC; Major A. E. Porritt, FRCS, RAMC.

**MBE**—Captain (T/Major) A. H. R. Champion, FRCS, RAMC; Captain Brian de Burca, MB, NUI, IMS; Captain (T/Major) J. W. A. Dennis, MB ST. AND., RAMC; Captain (T/Major) E. B. Hacking, MB CAMB., RAMC; Captain (T/Major) S. W. Hobday, RAMC; Captain (T/Major) R. J. Keller, MB EDIN., RAMC; Captain (T/Major) W. H. Purves, MB MANC., RAMC; Captain (T/Major) John Revans, MRCS, IMS; Captain (T/Major) H. L. W. Sixsmith, LMSSA, RAMC; Captain (T/Major) E. E. Spring, RAMC; Captain (T/Major) B. C. Tate, FRCP, RAMC.

**MC**—Captain (T/Major) C. H. George, LMS N SCOTIA, RAMC; Captain (T/Major) M. S. Williamson, MB DURH., RAMC; Captain B. A. Brown, BM OXF., RAMC; Captain William Darby, MB LOND., RAMC; Captain V. F. Siqueira, MB, IMS; Captain Sukhdev Kapila, IMS.

The following awards have lately been made to medical officers:

**DSC**—Prob. T/Surgeon Lieutenant A. E. De La T. Mallett, MB CAMB., RNVR.

**MC**—Captain W. H. Campbell, MB, Australian Military Forces; Captain M. H. K. Haggie, MB CAMB., RAMC; Lieutenant C. G. Rob, FRCS, RAMC.

## Medical Society of London

A meeting of this society will be held at 11, Chandos Street, W.1, on Monday, March 1, at 4.30 PM, when Surgeon Rear-Admiral C. P. G. Wakeley, Surgeon Lieut.-Commander W. G. Gill, and Prof. G. R. Cameron will open a discussion on the effects of underwater explosion.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

## Births, Marriages and Deaths

## BIRTHS

**BLACKBURN**.—On Feb. 16, the wife of Major Guy Blackburn, FRCS, RAMC—a son.

**COOPER**.—On Feb. 18, in London, the wife of Dr. Peter Cooper—a son.

**DAVIES-JONES**.—On Feb. 15, at Leicester, the wife of Dr. Cyril Davies-Jones—a son.

**FITZGERALD STEEDE**.—On Feb. 12, the wife of Major F. D. FitzGerald Steede, RAMC—a daughter.

**FURNIVALL**.—On Feb. 17, at Church Crookham, Hants, the wife of Lieut.-Colonel L. T. Furnivall, RAMC—a daughter.

**GRAVESON**.—On Feb. 8, in Manchester, Dr. Joyce Graveson (née Scott), wife of Dr. Stanley Graveson—a son.

**HAWKINS**.—On Feb. 16, at Bristol, the wife of Dr. Leslie Hawkins—a son.

**HYSLOP**.—On Feb. 10, at Settle, the wife of Dr. David Hyslop—a daughter.

**KINGSLEY**.—On Feb. 19, at Burton Latimer, Northants, the wife of Dr. A. P. Kingsley—a son.

**WATTS**.—On Feb. 16, at Chigwell, the wife of Major Harold Price Watts, RAMC—a son.

## MARRIAGES

**BREMNER-CAMMOCK**.—On Feb. 12, at Sheffield, Alan Elmslie Bremner, MB, to Mary Cammock, MB.

**LOCH-ROBBINS**.—On Jan. 30, at Baltimore, USA, Walter E. Loch to Mary Hyde Robbins, MB, of East Grinstead.

## DEATHS

**ANSTEY-CHAVE**.—On Feb. 19, at Redhill, Thomas Anstey-Chave, MB LOND., FRCSE.

**FERGUS**.—On Feb. 18, in Glasgow, John Freeland Fergus, MD GLASC., FRFPs, aged 77.

**HARGER**.—On Feb. 16, Frank Arnold Harger, MRCS, of Waltham Abbey, Essex, aged 78.

**LAOK**.—On Feb. 14, Harry Lambert Laok, MD LOND., FRCS, of Marlborough Place, London, NW8.

**ROOKSTRO**.—On Feb. 15, Frank Braine Rookstro, MRCS, BD LOND., aged 73.

**SPARK**.—On Feb. 18, at Newquay, Percy Charles Spark, MRCS, of Dulwich, aged 72.

**STRETTON**.—On Feb. 14, at Kidderminster, John Lionel Stretton, MRCS, aged 82.

**THORNTON**.—On Feb. 18, at Castleberg, Northern Ireland, Kenneth Roy Thornton, MB GLASC., late captain RAMC.

## UNRECOGNISED CONGENITAL SYPHILIS

DAVID NABARRO, MD LOND, FRCP

LATE DIRECTOR OF THE PATHOLOGY DEPARTMENT OF THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET; PATHOLOGIST, EMS

At long last, thanks to the persistent policy of the British Social Hygiene Council and to the efforts of Sir Wilson Jameson, the ban on the free ventilation of the venereal diseases problem by radio and in the lay press has been lifted. In the recent debates in both Houses of Parliament and in all the recent correspondence there is one aspect of the subject which has been almost overlooked because it is not widely known even among members of our profession—namely, unrecognised congenital syphilis, early and late.

Much of the congenital syphilis seen today is different from that seen 50 or even 25 years ago. It is quite exceptional—or it was until the outbreak of the present war—to see a frank case of the infantile disease with rash, snuffles, laryngitis and “old man” appearance which still figures in the textbooks. Instead there may be only an evanescent rash, possibly accompanied by slight snuffles and usually attributed to catarrh or adenoids, a condition which in the absence of a blood test on mother and child will lead to some simple diagnosis, but generally not to one of syphilis. Sometimes the only symptom may be a failure to thrive. This change in the clinical manifestations of congenital syphilis is, I think, largely due to the attenuation of the spirochæte consequent upon the partial treatment of the parents. The belief is prevalent in the profession, and most students are being taught, that it is today a rare disease. Even many pædiatricians hold this view and consequently teach it.

An interesting illustration of this came to my notice some time ago when talking to a pathologist about my experience of congenital syphilis at Great Ormond Street. She recalled how when she was a student there some years before she was asked by the physician to examine an infant, and when she had carefully gone into the symptoms and signs and was asked what she thought it might be, her reply was that the only disease she could make it fit in with was congenital syphilis. “Congenital fiddlesticks” exclaimed the physician, “Why do you women always think of syphilis?” A subsequent blood test proved that the woman’s surmise was correct.

Why did the women students at Great Ormond Street “always think of syphilis?” Because it was part of their training at the particular hospital from which this student hailed. The hospital has a well-directed VD clinic for women and children which doubtless the students are all encouraged to attend and there is also an efficient antenatal clinic where they see the beneficial results of treatment of infected expectant mothers. Men students, on the other hand, are not taught much about congenital syphilis “as it is too rare a disease to spend much time upon” and their attendance at VD clinics is short or non-existent. During the 23 years that the VD clinic at the Children’s Hospital, Great Ormond Street, was under my care many cases came to my notice where congenital syphilis had been overlooked—sometimes for years—when the diagnosis from the teeth, nerve lesions or mental condition should have suggested the possibility or probability of the disease, and prompted the performance of a blood or a spinal fluid test or both. Sometimes on the other hand congenital syphilis is diagnosed on insufficient grounds and when it is not present. The following family well illustrates both these aspects of the diagnosis.

An infant 5 weeks old was admitted to the special LCC unit under my care with the diagnosis of congenital syphilis, based on the history of “a rash and wasting” and the fact that the mother had a positive blood test. On admission of the child to the unit there was no sign of a syphilitic rash, the X-ray pictures of the long bones showed no changes and nine blood tests from 5 weeks to 7 years of age as well as a spinal fluid test have all been negative. There is, therefore, little or no evidence that the child has ever suffered from congenital syphilis.

The family history is interesting: the baby’s grandfather died, aged 57 years, in a public assistance institution from “progressive muscular atrophy” which in all probability was due to general paralysis. He had been an inmate for 4 years

but no blood or spinal fluid test had been carried out. His daughter, the mother of my patient, was a feeble-minded girl who at the age of 25 years was seduced and became pregnant in consequence. Shortly afterwards she was admitted to an institution for the feeble-minded and although her blood a month after admission gave a positive Wassermann reaction, she had no treatment throughout her pregnancy and has had very little since. When her infant was admitted to my ward, I wrote to the medical superintendent of the institution asking for fuller information about the mother. The reply came “that she was a feeble-minded girl with a mental age of about 7 years, poorly educated, simple and childish. She had irregular, unequal and inactive pupils and the knee-jerks were exaggerated.” One would have thought that these symptoms and signs together with the positive Wassermann reaction would be sufficient evidence of congenital syphilis, yet the letter ended with the sentence “There is no evidence of congenital syphilis.” I replied that I thought it was probably a case of congenital neurosyphilis and asked if a spinal test could be done. One attempt to do this proved unsuccessful and it was “deemed undesirable to make another attempt.”

Some years later I saw the patient in the institution when the diagnosis was fairly obvious from her teeth alone. From her case-sheet in which the above correspondence was epitomised, I learned that a subsequent assistant medical officer had diagnosed the teeth and made a note to that effect, also that later still another medical officer had made a note saying “This is an interesting case of congenital neurosyphilis and should have the spinal fluid examined.” I further discovered in the notes that before admission she had been examined by two experts at headquarters, both of whom apparently concentrated on her backward mental condition and failed to recognise that the mental defect was due to congenital syphilis; if it had been treated even at that time the patient’s prospects might have improved. Now she is doomed to a lifelong stay in an institution.

In syphilis, as in tuberculosis, *the family is the unit to be investigated*. As soon as a case of syphilis is discovered all the members of the family should be examined clinically and serologically. For many years I have been doing this with but moderate success so far as the fathers are concerned but with more success in getting the other children to attend. Dr. W. D. Nicol, of Horton Mental Hospital, for several years has been examining the families of all the general paralytics admitted to that hospital. This should become a universal practice, for many latent cases of congenital syphilis would be discovered in that way. Moreover, it is not sufficiently appreciated that congenital syphilitics may go for as long as 25, 30 or even 35 years before developing interstitial keratitis, congenital GPI or congenital tabes; possibly, too, some of them may develop cardiovascular disease at even a later age, the WR having in the meantime become negative. For several years I have been encountering young adults born during or shortly after the last war who were latent congenital syphilitics. Their fathers doubtless received some antisiphilitic treatment—sufficient perhaps to render them only mildly infective, so that the child born shortly after showed no recognisable signs of the disease in infancy and possibly not even until adolescence or early adult age. Then they may develop congenital GPI which, as in a case I saw recently, may be diagnosed as encephalitis lethargica. If the patient is a woman she may have a congenitally syphilitic baby by a healthy husband; I have seen several instances of the kind, and to my knowledge several cases of the latent form of the disease have been discovered accidentally among young persons who have volunteered as blood donors.

## INCIDENCE OF CONGENITAL SYPHILIS

It is impossible to give even an approximate figure for the number of patients suffering from congenital syphilis. At the Imperial Conference of the British Social Hygiene Council held in 1930, Colonel L. W. Harrison<sup>1</sup> said:—

“We calculate that of the approximately 25,000 stillbirths in this country per year, 4000 are due to syphilis. That alone should not be. But the 4000 stillbirths are an index of the considerable number who survive birth and later become a prey to such manifestations of syphilis as eye disease, nerve disease and so forth, which convert a promising youngster

1. Harrison, L. W. *Hilth & Empire*, 1930, 5, 169.

from an economic asset into an economic burden. Such cases should not occur, but they will continue to do so until we convince those that matter that there is much more syphilis in women than is disclosed in returns from VD treatment centres or, for that matter, is acknowledged by practitioners."

He estimated also that of the 700,000 women who became pregnant every year no fewer than 16,000—and probably many more—should be under treatment for syphilis throughout their pregnancies; but nothing approaching that number is treated at the centres, which indicates a large hole in the net of the venereal-disease prevention scheme.

With the decline in the incidence of adult syphilis since the last war down to the year 1940, the incidence of congenital syphilis has also fallen. Thus during the six-year period 1917–22 I saw at Great Ormond Street 322 new cases (an average of 53 a year) of whom 58 died under the age of two years; whereas during the six-year period 1933–38 I saw 123 new cases at Great Ormond Street and 73 more at two other institutions, a total of 196 (or 32 per annum), of whom 31 died under two years of age. These figures are evidence of a considerable decline in the incidence of the disease. But they are still far too high, and with the serious increase in the number of new cases of venereal disease in adults reported during the past two years there is bound to be a corresponding increase in the number of congenital syphilitics unless adequate precautions are taken.

These precautions are comparatively simple: we must test the blood of all expectant mothers and treat as early as possible in pregnancy those who react positively. In a recent paper Major S. M. Laird<sup>2</sup> has shown how by so doing the incidence of congenital syphilis in Sweden has been reduced almost to extinction; preventive treatment is also carried out in the United States; even in Java, where health consciousness is only just awakening, since 1936 all the Indonesian and Chinese expectant mothers attending the antenatal clinic in Batavia have their bloods tested and the positive reactors are all treated. On March 3, 1942, the day that Batavia was evacuated, I received from Dr. Loe Ping Kian of that city a copy of his MD thesis on syphilis and pregnancy in Chinese and Indonesian women. He found 7.5% of the Chinese and 6.1% of the Indonesian mothers syphilitic, yet by treating them during gestation 203 pregnancies resulted in 181 living children, of whom only 8 were syphilitic, and the mothers of these had not attended regularly for adequate treatment. If this can be done in a relatively primitive community surely we ought to do it here.

It is all the more incumbent upon us to prevent congenital syphilis because it is impossible to be certain of a cure unless adequate treatment is started early—within the first three months of life and certainly not later than the sixth month. Unfortunately the treatment often given even in our public institutions is restricted to some form of mercury, and if arsphenamine preparations are employed they are often given in totally inadequate doses. Even though one may find the WR negative for ten or more years after approved treatment and though no obvious later symptoms are manifested, one can never be sure that cardiovascular lesions arising say in the fourth or fifth decade of life may not be the result of congenital syphilis. Syphilis may be a life-long disease; A. S. Warthin was able to demonstrate spirochaetes in the heart and other organs of patients who were considered to have been thoroughly treated and cured, and who had not shown any symptoms for years before their death.

Those who still doubt the gravity of our shortcoming I would recommend to read the oration delivered in 1917 to the Medical Society of London by Sir William Osler.<sup>3</sup> The VD clinics had just started to function in this country.

He pointed out that a "killing transmission in the great infections like tuberculosis is very rare. In syphilis it stands out less as a biological peculiarity than as a fact of supreme importance in the national health. The spirochaete may kill the child *in utero*, a few days after birth, or within the first two years of life, or the blighted survivor may be subject to innumerable maladies." He referred to the number of syphilitic stillbirths, which he estimated at 20,000 for the year

1915, and the syphilitic deaths among infants under one year, which he estimated at 15,000–20,000. "So widespread are the manifestations of the spirochaete in the body," said Osler, "that there is truth in the paradox I was in the habit of telling my students. Study one disease, study syphilis thoroughly and you take a knowledge of all others on the way—general medicine, nearly all surgery, and certainly all the specialities. But I see an incredulous look on some faces, and I hear the whispered comment—'tis heard often enough! 'Where is all this syphilis! It does not come my way.' Yes it does. The syphilis we see, but do not recognise, everywhere awaits diagnosis, so protean are its manifestations."

From my experience these words of Osler uttered in 1917 are as applicable today, in so far as congenital syphilis is concerned, as they were then.

The nation is eager for health knowledge, the medical profession must give it them; and we can with full assurance tell them how congenital syphilis is to be prevented. When we do enlighten them upon the subject it will not be long before they demand that steps be taken to protect the coming generation. If and when we do so, then indeed—and within a generation—will congenital syphilis become a "very rare" disease.

## PSITTACOSIS (ORNITHOSIS) VIRUS IN ENGLISH PIGEONS

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THE virus of psittacosis has been found to cause disease in pigeons in South Africa (Coles 1940) and in the United States (Pinkerton and Swank 1940). It has also been recovered from apparently healthy pigeons in many American lofts. At least 5 cases of psittacosis infection have been reported in human beings having contact with sick pigeons in America, and probably larger numbers of mild cases have been unrecognised (Meyer 1942). Lately, the virus of meningopneumonitis has been shown to be very like, if not identical with, pigeon strains of psittacosis (Pinkerton and Moragues 1942); it is hardly surprising that no history of contact with diseased birds has been forthcoming in cases of human pneumonia due to this virus, since a man to man chain of infection is possible. Because members of this group of viruses attack birds of several different orders, Meyer has suggested the term "ornithosis" in place of "psittacosis." There is no evidence that virus in pigeons has infected human beings in Britain; nevertheless it seemed that the virus should be looked for over here, especially in view of the wide use of pigeons in the Services.

### METHODS

Since it is reported that sera of infected pigeons may fail to fix complement with psittacosis antigens, we thought it best to try to recover virus from English birds rather than to rely on serological tests. American work has shown that pigeon-virus, unlike most parrot strains, infects mice irregularly when injected intraperitoneally; intracerebral and intranasal inoculations are however satisfactory.

We obtained batches of 6 or more domestic pigeons from several sources. The birds were killed and pieces of liver, spleen and kidney from individual birds were removed. Roughly 10% suspensions of these pooled organs were made by grinding with powdered 'Pyrex' glass and nutrient broth. Supernatant fluids after light centrifugation were tested for sterility on blood agar slopes and inoculated into anaesthetised mice. The suspension from each pigeon was given to each of 3 or 4 mice intracerebrally (0.02 c.cm.) and to each of 3 or 4 mice intranasally (0.05 c.cm.). In order to diminish risk of infection of those handling the virus, all intranasal inoculations were carried out in the special inoculation box, described by van den Ende (1943), in which a draught carries all potentially infected air away from the experimenter through a chimney the walls of which are kept at red heat by a muffle furnace. Other precautions included the use of masks, special gowns, rubber gloves and an isolation room for animals; no evident laboratory infections developed.

2. Laird, S. M. *Brit. J. ven. Dis.* 1942, 18, 84.  
3. Osler, W. *Trans. Med. Soc. Lond.* 1917, 40, 290.

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Bacteria, especially salmonella, were often present in the organs of pigeons. At times these interfered with isolation of virus, but more often one intracerebral passage through mice rendered the material bacteriologically sterile and virus was recovered.

**Intranasal tests.**—Intranasally-inoculated mice were killed after 7 days, whether looking ill or not. Whether or not lesions were present, 10% lung suspensions in broth were made, cultivated and used for intranasal passage to more mice. Not more than one such "blind" passage was made with material which produced no lesions. Presence of virus was indicated by scattered reddish-grey nodules in the lungs of inoculated mice. Passage from such lungs raised the virulence of the virus, after about 3 passages, to a point at which it killed mice in 4-7 days with complete pulmonary consolidation. Such lungs were commonly bacteriologically sterile. Psittacosis virus was identified as described below.

**Intracerebral tests.**—Intracerebrally inoculated mice which showed no symptoms were in some instances killed after 7 days, their brains being removed for blind passage. It was found more profitable, however, to wait for the development of symptoms for a fortnight or longer, since blind passage rarely revealed virus which did not show its presence in the mice receiving the original pigeon material. In some instances virus was obtained by waiting for a fortnight, while the passage from brains of healthy-looking mice killed after a week yielded nothing. In the presence of psittacosis infection, mice looked rough and ill, their backs were arched and they had difficulty in regaining their balance when thrown on to their backs; a few had convulsions. From brains of sick mice further intracerebral passage readily reproduced the same picture in the absence of cultivable bacteria. Infective brains also caused characteristic lung lesions when inoculated intranasally while virus-containing lungs produced typical meningitic symptoms on intracerebral injection. In a small number of intraperitoneal inoculations we failed to produce any characteristic picture.

#### IDENTIFICATION OF THE VIRUS

**Impression preparations** from meninges or cut surfaces of lungs were dried in air and stained by Giemsa, Castaneda and Machiavello stains. Each of these revealed the elementary bodies of the virus (Levinthal-Coles-Lillie or LCL bodies) as described by many workers. Machiavello's stain gave in our hands the most satisfactory pictures and later was used alone. Clusters of small round bodies were seen, chiefly intracellularly; they were usually stained bright red, but often red-staining and blue-staining bodies were intermingled. Lung impressions usually showed far more virus bodies than did those from brain.

**Histological sections** showed the meningeal and pulmonary lesions of psittacosis as described by other workers. A mononuclear reaction was evident at first, but later polymorphs abounded. In some sections of solid lungs, Giemsa staining revealed clusters of virus bodies in cells of bronchiolar epithelium.

**Filtration.**—10% suspensions of infected lungs or brains in broth were filtered through paper and asbestos pulp and then through 'Gradocol' collodion membranes. While 0.7 $\mu$  filtrates revealed the presence of virus by intranasal or intracerebral inoculation, filtrates through gradocol membranes of average pore-diameter of 0.31 $\mu$  and 0.27 $\mu$  yielded none. Though titrations were not carried out, the results are those that would be expected for psittacosis virus, and indicate that one of the larger viruses is concerned.

**Serological tests.**—Consolidated mouse lungs were sent to Prof. S. P. Bedson, who kindly carried out complement fixation tests according to the technique he has described (Bedson 1935, 1937). He informed us that fresh and steamed preparations from 2 of the 3 mouse lungs we gave him completely fixed 2 MHD of complement in the presence of a human convalescent serum known to react with psittacosis antigen of parrot origin. There was no fixation with a known negative human serum. Fixation was for 4 hours at room temperature and the positive serum was active at a dilution of 1:32, the highest tested.

#### RESULTS

1. **Pigeons from a London dealer.**—Organ suspensions from each of 6 healthy pigeons were inoculated intranasally and intracerebrally into groups of 3 mice. No

lesions were produced by intranasal inoculation even after one blind passage. Emulsions from 2 of the 6 pigeons produced deaths in intracerebrally inoculated mice, but these were shown to be due to bacterial infection. Passages from other brains in the series also caused fatalities from the same cause. *Salmonella typhi mairium* was isolated, but was probably picked up from the mouse stock. In spite of the trouble from salmonellas, we established that 4 of the 6 pigeons yielded no virus. Further supplies of pigeons from this source could not be obtained.

2. **Pigeons from a farm in Berkshire.**—The 6 pigeons from this source were of a stock coming from the USA some years ago. They were kept in lofts with an outdoor flight of 16 ft. x 10 ft. 6 in. x 10 ft. Some abnormal mortality had recently been noted amongst squabs. The birds we examined were healthy, but their spleens were rather large—1-2 cm. in their longest diameter. Virus was recovered from each of the 5 transmission series (4 strains from single pigeons, 1 from a pool of the organs of 2 pigeons). In 3 of the 5 series, lesions were produced in the lungs of the first lot of mice inoculated; in the 2 others lesions appeared after one passage. Intracerebral inoculation produced symptoms in the first lot of mice in 4 out of 5 trials. Thereafter serial passage was easy. This was the source of the virus whose identity was confirmed serologically by Prof. Bedson.

3. **Pigeons recently arrived from the USA.**—A group of 9 birds was examined; 1 was dead on arrival and the others were rather thin and unhealthy-looking; another had died during transport to the laboratory. Spleens were enlarged (1-2 cm.) in most of these. Virus was recovered from 6 of the 9. Lung lesions were produced in 5 series of intranasally-inoculated mice, all in the first "generation." These were shown by passage and morphological examination to be due in 4 instances to psittacosis virus. When we inoculated mice intracerebrally 4 pigeons yielded virus. Failure to recover virus from some birds was often due to trouble from bacterial contamination. When small quantities of virus was present, all was sometimes lost by filtration; one could not therefore rely on filters to clean-up virus in early passages.

4. **Pigeons flying loose, trapped in Westminster.**—Greater difficulty was encountered in establishing virus in mice from these pigeons than with other strains. The 14 pigeons examined were healthy-looking and their spleens were notably smaller than those from Berkshire. Virus was recovered from one pigeon by intracerebral inoculation of mice; it proved filtrable, killed mice intracerebrally and produced typical lung lesions when given intranasally; morphologically typical virus bodies were found intracellularly in smears of infected lungs. The virus was, however, of lower virulence than other strains; it commonly took up to 2 weeks to kill mice after intracerebral injection and the virulence did not increase after four passages. From 5 other pigeons we obtained organ suspensions which killed mice in 3-23 days when inoculated intracerebrally in the absence of cultivable bacteria, but we did not succeed in establishing virus strains by passage.

#### DISCUSSION

Our ready recovery of psittacosis suggests that the virus is probably widespread in English pigeons. No evidence exists to show whether it also occurs in domestic fowls over here as it apparently does in America. We must assume that the virus in pigeons constitutes a risk to human beings, though probably a very slight one. Atypical pneumonias in pigeon-fanciers have not been described in Britain, but on the other hand it is unlikely that anyone has looked for them. American experience suggests that overt psittacosis in pigeons is much more likely if the birds are kept under cramped or unhygienic conditions, but that the hazard to man is probably negligible unless the birds are themselves ill.

A question of major interest remains to be decided: has ornithosis been for centuries endemic throughout a large part of the bird kingdom, or is it a disease primarily of the parrot family but now extending its zoological range to include other birds and perhaps mammals? The available evidence suggests that the former alternative is far the more probable: the virus seems to be endemic not only in psittacine birds, but in fulmar petrels (Haagen and Mauer 1938) and in pigeons—birds

of very different families and habits. It has also been isolated from finches and other small passerine birds, though it is not stated whether these had been in captivity, in possible contact with parrots (Haagen and Mauer 1939). On the other hand, Eddie and Francis (1942) found evidence of its occurrence in domestic poultry of several kinds in Michigan, but not in related wild birds. The possibility that the virus is extending its host-range should be excluded by further study, in view of possible future menace to poultry and to man himself.

## SUMMARY

Psittacosis virus was recovered from apparently normal pigeons obtained from two sources in Southern England, as well as in pigeons recently arrived from America. Experiments with pigeons from another English source gave inconclusive results.

We wish to thank all those who assisted us by providing us with pigeons.

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## ANALGESIC VALUE OF PETHIDINE BY MOUTH

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IN June, 1939, Eisleb and Schaumann described a new analgesic and spasmolytic drug, which they named 'Dolantin.' Numerous reports have since been published, mostly from Germany, claiming outstanding success with this drug in the relief of almost every type of pain, but particularly in pain associated with spasm. Dolantin, or pethidine as it has been named in Britain, is effective when given by the mouth and of low toxicity, and there is no evidence that tolerance may develop—a combination of properties which suggested that it might be useful in the treatment of war casualties, especially in circumstances where immediate medical attention might not be available.

A clinical trial on the lines indicated was accordingly organised by the war wounds committee of the Medical Research Council, and the present report is primarily concerned with the results of several separate investigations designed to discover as quickly as possible the value of the oral administration of pethidine in the relief of pain due to trauma.

Pethidine is the hydrochloride of the ethyl ester of 1-methyl-4-phenyl-piperidine-4-carboxylic acid and was discovered by Eisleb and Schaumann in the course of a search for compounds having the properties of atropine. It is claimed that it will antagonise the effect of acetylcholine and of histamine on the gut, and that it has a depressant effect on smooth muscle (Eisleb and Schaumann 1939, Duguid and Heathcote 1940, Schaumann 1940), but this generalisation is doubted by Gruber and his colleagues (1941) who go as far as to state that the drug shows no promise of value as a spasmolytic agent on the intact smooth muscle of the stomach, pylorus, small intestine, uterus and bladder. There seems to be general agreement however that the drug has a definite analgesic action, which is easily demonstrable and constant. It is relatively non-toxic, though euphoria, dizziness, nausea and vomiting may follow its administration.

Pethidine may be given by the mouth, by the rectum or by the intravenous, intramuscular or subcutaneous routes. When given by the mouth, its effect appears in 15–20 minutes and lasts for 5–6 hours. Parenteral administration is said to be more rapid and more effective, and the therapeutic results obtained by most of the German investigators seem to have been spectacular. Only a limited number of the articles which have been

published on pethidine are accessible in this country, and in only a few of these are details given us of the results obtained (Althoff 1939, Rosenthal 1939, Schäfer 1939). These claims are summarised in table I, and they suggest that pethidine is indeed a valuable drug. Good results have been described in a variety of conditions, such as renal and gall-stone colic (Schäfer 1939, Jessen 1940, Dietrich 1939, Schaumann 1940), urethritis and cystitis (Schäfer 1939), dysmenorrhœa (Schaumann 1940), obstetrics (Benthin 1940, 1942, Fuchs 1941,

TABLE I—RELIEF OF PAIN BY PARENTERAL ADMINISTRATION OF PETHIDINE

Author	Type of pain	Cases	Dosage (mg.) and route	Relief of pain			Toxic effects
				Complete	Doubtful	None	
Althoff	With spasm Pain only	47	100	39	3	5	2 cases
		44	subcut.	37	3	4	
Rosenthal	Postop.	500	100 intra- musc.	66%	..	..	None of signi- ficance
Schäfer	Renal colic	12	100 intraven.	11	..	1	..
	Gallstone colic	6	100 intraven.	5	..	1	..
	Postop.	160	100 intra- musc.	90%	..	..	5
	Fractures	100	Mixed	Good results			

Sonnek 1941), neuritis (Dietrich 1939, Ranzenhofer 1940), migraine (Dietrich 1939), hiccup (Jessen 1941), post-operative pain (Schäfer 1939, Ranzenhofer 1940, Schaumann 1940), fractures (Schäfer 1939), arthritis (Keeser 1941), asthma (Althoff 1939), pneumonia and pleurisy (Althoff 1939, Ranzenhofer 1940), whooping-cough and bronchitis (Jessen 1940, Ranzenhofer 1940, Sprockhoff 1941), angular pain (Jessen 1940, Heydner 1940), morphine addiction (Rosenthal 1939).

Some authors go as far as to suggest that pethidine may replace morphine, but the general opinion appears to be that when given parenterally it is usually slightly inferior to morphine, except perhaps in renal and gall-stone colic and in some cases of neuralgic pain. Detailed results of the oral administration of pethidine are not available in the Continental literature, but the impression is given that it is a useful analgesic when taken by the mouth, although not as effective as when administered by injection. It was the lack of accurate evidence as to its activity by the mouth which suggested that further trials should be made on the lines described below.

## CLINICAL TRIALS

The effects of pethidine when given by the mouth in doses of 100 mg., 50 mg. and 25 mg. have been observed in 335 patients who were suffering from pain, and the results are set out in tables II, III and IV. The observations were made by the medical and nursing staffs in 8 hospitals. A large number of persons collected this information, and in some wards there was a bias against what was considered to be an experiment, while in others the drug was tested with enthusiasm. It is not surprising therefore that there were differences of opinion as to its value, but the number of observations is sufficiently large to warrant some conclusions.

Of 335 patients suffering from pain, 236 obtained complete or partial relief by the oral administration of pethidine in the doses indicated (table II). In 203 of these (group A) a further analysis of results was possible (table III). Of the patients with "severe" pain, complete relief was obtained in 55% and partial relief in 20%; while of those with "moderate" pain, complete relief was obtained in 61% and partial relief in 12%. In 109 patients a comparison with tab. codeinæ co. (NWF) was made (table IV). The usual dosage of tab. codeinæ co. compared with the given dose of pethidine was two tablets (containing acetylsalicylic acid gr. 8, phenacetin gr. 8, codeine phosphate gr.  $\frac{1}{2}$ ). In 21% of the cases pethidine was reported as equal in its effect to the dose of tab. codeinæ co., in 46% it was superior, and in 33% inferior. In neuralgic pain and in pain due to vascular disease pethidine seemed to be particularly effective as



compared with tab. codeinæ co. (table IV). The effect of the drug was usually apparent in between fifteen and thirty minutes, and the duration of the effect was almost invariably more than two hours and usually from four to five hours.

From the data in table II the conclusion might be drawn that a single dose of 50 mg. of pethidine is superior in its effect to one of 100 mg. or to doses of 25 mg. repeated 4-hourly (for six doses). This, however, may be a false impression, since in groups B and D the larger doses were probably given to those with more severe pain. In table III, which relates to cases in which the choice of dosage was random, 100 mg. of pethidine was slightly superior in effect to 50 mg., and 50 mg. was superior to 25 mg. 4-hourly.

In 13 cases, pethidine in the doses mentioned was compared with morphine gr.  $\frac{1}{4}$  or gr.  $\frac{1}{2}$  given by mouth in tablets of similar size and appearance. In every case its effect was less satisfactory than that of morphine. In a few cases pethidine was given also by injection, but no accurate comparison was made of its effects with those of morphine given parenterally, as that was outside the scope of the present inquiry. As might be expected, pethidine by injection appeared to be more effective than pethidine by the mouth.

**Toxic effects.**—In 22 out of 335 patients toxic effects were noticed from pethidine, but in no case were these serious. In 8 there was vomiting; in 4, nausea; in 9, giddiness; and in 1, "hangover." It is claimed that the gastric disturbances can be avoided if the drug is given after meals and if exercise is avoided (Schäfer 1939, Rosenthal 1939). Simultaneous administration of the sulphonamides is said to increase the toxicity of pethidine (Oelkers and Wanowius 1942).

**Tolerance and addiction.**—In none of the references quoted was tolerance described, nor was it observed in any of our cases. In one patient with obliterative vascular disease of the legs, 50 mg. of pethidine continued to relieve severe pain over a period of three months, and no withdrawal symptoms were observed when the drug was stopped. There is however some danger of addiction; and though it appears to be slight, the drug is supplied in Germany on special prescription only. At least 8 cases of pethidine addiction have been described (Amark 1942, von Brücke 1940, Kucher 1940, Schwarke 1941, Gorda 1941), but this danger seems to be vastly less than in the case of morphine. In cases of morphine addiction substitution of pethidine partially satisfies the craving for the drug, but when the pethidine is withdrawn a definite but mild abstinence syndrome occurs, which is of short duration (Himmelsbach 1942). For these reasons, the value of pethidine in the treatment of drug addiction is doubtful (von Brücke 1940).

TABLE II—RELIEF OF PAIN BY ORAL ADMINISTRATION OF PETHIDINE IN 335 PATIENTS

Group	100 mg.			50 mg.			25 mg. 4-hourly for six doses			Total
	Partial or complete relief	No relief	Toxic effects	Partial or complete relief	No relief	Toxic effects	Partial or complete relief	No relief	Toxic effects	
A	62	18	8	68	25	2	20	10	2	203
B	2	11	7	9	2	2	..	..	..	24
C	3	3	0	1	2	0	..	..	..	9
D	2	7	0	6	2	0	2	1	0	20
E	..	..	..	25	6	1	12	4	..	47
F	13	0	0	8	4	0	3	4	0	32
Total	82	39	15	117	41	5	37	19	2	335

Groups: A= cases from St. Bartholomew's Hospital, London, and sector III; B=from St. Mary's Hospital, London, and sector VI; C=from University College Hospital, London, and sector IV; D=from British Postgraduate Medical School, London; E=from Birmingham Accident Hospital and Rehabilitation Centre; F=department of pharmacology, Sheffield University and Royal Infirmary, Sheffield.

TABLE III—RELIEF OF PAIN ACCORDING TO ITS SEVERITY AND TO THE DOSAGE OF PETHIDINE

Dose (mg.)	Severe pain			Moderate pain			Total
	Complete relief	Partial relief	No relief	Complete relief	Partial relief	No relief	
100	27	5	11	25	5	7	80
50	22	12	10	31	3	15	93
25*	2	2	2	11	5	8	30
Total	51	19	23	67	13	30	203

\* 4-hourly for six doses.

TABLE IV—EFFICACY OF PETHIDINE COMPARED WITH TAB. CODEINÆ CO. (NWF)

Type of pain	Pethidine			Total
	Superior	Equal	Inferior	
Traumatic	10	9	14	33
Neuralgic	13	3	2	18
Arthritic and fibrositic	7	7	9	23
Vascular	9	2	4	15
Miscellaneous	11	2	7	20
Total	50	23	36	109

#### SUMMARY

Pethidine when given by the mouth to 335 patients proved to be of therapeutic value as an analgesic. In 46% of 109 cases it was clearly superior to a mixture of acetylsalicylic acid, phenacetin and codeine (tab. codeinæ co. NWF), in 21% equal in effects and in 33% inferior. In 13 patients it proved less effective than morphine gr.  $\frac{1}{4}$  or gr.  $\frac{1}{2}$  by mouth.

Toxic symptoms from pethidine by mouth were uncommon and never serious. There was no evidence that tolerance to the drug might develop, but a slight danger of addiction has been reported.

Pethidine given by injection to a few cases seemed to be more effective than pethidine by the mouth, as might be expected.

This investigation was undertaken on behalf of the war wounds committee of the Medical Research Council by Mr. W. Gissane, Prof. H. P. Himsforth, Dr. J. McMichael, Prof. G. W. Pickering, Prof. R. V. Christie and Prof. E. J. Wayne, who wish to thank the staffs of the hospitals concerned for their co-operation, and Roche Products Ltd. for abstracts of Continental literature on pethidine.

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## EFFECT OF PETHIDINE ON PAIN IN NEUROLOGICAL CASES

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PETHIDINE, under the name of 'Dolantin,' was introduced in Germany in 1939 as an analgesic comparable with morphine but possessing in addition a powerful spasmolytic action. It was recommended particularly in renal and biliary colic and for gastro-intestinal pain. Chemically, pethidine is the hydrochloride of the ethyl ester of methyl-phenyl-piperidine carboxylic acid.

Pethidine became available for clinical trial in this country in 1941 and a small quantity was placed at our disposal through the war wounds committee of the Medical Research Council. We gave it to twelve subjects selected as having severe pain arising from diverse types of neurological conditions. For the sake of convenience, the different types of pain have been classed in three groups:—

- A. *Pain of peripheral origin*  
Case 1, radial neuritis with fibrositis.  
Case 2, brachial neuritis.  
Case 3, supraorbital neuralgia.  
Case 4, trigeminal neuralgia.  
Case 5, sciatica.  
Case 6, sciatica.
- B. *Pain of central origin*  
Case 7, thalamic syndrome.  
Case 8, painful phantom limb.  
Case 9, tabetic crisis.
- C. *Alleviation of pain during and after operation*  
Case 10, gasserian ganglion injection for tic douloureux.  
Case 11, lumbar puncture headache.  
Case 12, encephalographic headache.

### METHOD

Pethidine has been given by the intravenous, subcutaneous and oral routes. The dosage employed has varied between 50 and 100 mg. The intravenous injections were given slowly, over a period of 2-4 minutes. The effect has been gauged from the patients' own comments and by clinical observations. In addition, whenever it was considered necessary, repeated blood-pressure readings and pulse- and respiration-rates were recorded.

In the first three cases a number of the constituents of the blood were estimated before and an hour after the intravenous administration of 100 mg. of pethidine; but since no changes were noted no further estimations were made. The substances estimated were blood-sugar, plasma bicarbonate, inorganic phosphate and chloride and serum sodium, potassium, calcium and magnesium.

The effects of pethidine are illustrated in a representative case-history from each group.

### GROUP A.—PAIN OF PERIPHERAL ORIGIN

CASE 4.—A man, aged 65, admitted under the care of Dr. E. Arnold Carmichael, complaining of severe spasmodic pain in the distribution of the first and second division of the right trigeminal nerve. The pain was accompanied by spasm. A diagnosis of tic douloureux was made. Pethidine, 100 mg., was given intravenously, 100 mg. subcutaneously and 50 mg. orally on separate occasions. The response to morphine gr.  $\frac{1}{4}$  was also noted. Within 4-7 minutes of the intravenous injection of pethidine the frequency of the spasms and the intensity of the pain diminished. Within 11 minutes the pain had become considerably less, and after an hour the spasms and pain were further reduced, though they could still be initiated by touching certain areas on the affected side. After this, the patient slept well for the rest of the night and had "the first good night for ages." He awoke 10 hours after the injection with a full return of symptoms. Pethidine, 50 mg., given orally, within an hour, relieved the pain considerably, but during the next 3 hours the pain gradually returned until, 7 hours later, it had reached its original level. After 100 mg. of pethidine had been given subcutaneously, the pain began to ease within 10 minutes and was much less within 25 minutes. For the rest of the day the patient slept and dozed, but some 10 hours after the

injection the pain had returned in its full severity. Within an hour of his receiving morphine gr.  $\frac{1}{4}$  subcutaneously the pain was diminished; 3 hours later the pain was still diminished, but he said, "It's not so good as the other stuff." No adverse features, subjective or objective, were noticed with any of these injections, apart from complaints of sleepiness.

### GROUP B.—PAIN OF CENTRAL ORIGIN

CASE 7.—A man, aged 52, who had previously been admitted in March, 1940, under Dr. Gordon Holmes, as a residual right-sided hemiplegia. This patient suffered constant pain and there was gross over-reaction to noxious stimuli in an area embracing the right half of the trunk and right arm. Stimulation by rubbing with the fingers on the right forearm, or attempted movements of the right shoulder, precipitated severe pain. Blood-pressure varied between 250 and 220 mm. Hg systolic and 170-140 mm. Hg diastolic. A diagnosis of vascular hemiplegia with thalamic syndrome was made. The patient's response on two occasions to 100 mg. of pethidine intravenously and, on one occasion, to 50 mg. subcutaneously, was noted. Morphine gr.  $\frac{1}{4}$  and sterile saline subcutaneously were also given on separate occasions. On both occasions when pethidine was given intravenously pain was lessened within 5-7 minutes and very considerably diminished within about 30 minutes. Pain began to return after 2 or 3 hours, and after 24 hours it was again at its original level. When 50 mg. of pethidine was given subcutaneously, the pain lessened after 2 hours and 1 hour later the relief was considerable. Pain commenced to return 6 hours after the injection. Within 20 minutes of a dose of morphine gr.  $\frac{1}{4}$  subcutaneously the pain diminished, and within an hour it was much less. Pain continued at this level, before a return to its full severity, for at least 7 hours after the morphine injection. The subcutaneous injection of saline was given in view of some objectionable reactions to both the pethidine and the morphine. The response to this injection was essentially negative. The patient's pain was not normally relieved to any appreciable extent by analgesics such as aspirin, phenacetin, tab. codeinae co. (NWF), phenazone or gelsemium. On both occasions when he was given pethidine (100 mg. intravenously over a period of 3 minutes), giddiness, faintness, nausea, a feeling of heat, thirst and a moderately severe headache were noted. He appeared anxious, pale and perspiring. The blood-pressure fell to 185-200 mm. Hg systolic and the pulse-rate rose on both occasions, gradually returning to normal. All these features were noted, though to a less extent, when 50 mg. was given subcutaneously. Similar objectionable feelings were noted by the patient after morphine gr.  $\frac{1}{4}$ , though there were no objective findings.

### GROUP C.—PAIN PRECIPITATED BY OPERATION

CASE 12.—A girl, aged 12, admitted under the care of Dr. Gordon Holmes. She had previously been operated upon for a right temporal abscess, and was under treatment for epilepsy and severe headache. These headaches were treated with 50 mg. of pethidine orally; 66 mg. of pethidine was given intravenously over a period of 2 minutes while she was being radiographed after the introduction of air for an encephalogram. The patient had, at this time, a severe generalised headache. Three minutes after the injection the headache was somewhat relieved and she had stopped crying. Ten minutes after the injection a dramatic change had occurred. The patient was entirely free from headache and would allow her head to be flexed and extended without complaint. She remained in this condition until the end of the operation and for a further hour and 20 minutes, though lying still and looking pale. She slept well all night and did not complain of headache until 6 AM, when it was severe. No adverse side-effects were noted. Morphine gr.  $\frac{1}{4}$  and atropine gr. 1/100 were given as premedication for a second encephalogram. During the operation the patient complained of very severe headache and vomited. The headache continued with increasing severity after the child was returned to bed until 6 hours later, when she received a further gr.  $\frac{1}{4}$  of morphine. This was at 7 PM and afterwards she slept fitfully until 6 AM when she awoke complaining of severe headache.

### DISCUSSION

In ten of the twelve cases pethidine was given intravenously: in eight, 100 mg. was given; in one, 66 mg.; and in one, 50 mg. One patient also received, on a separate occasion, 150 mg. of pethidine intravenously. Four patients were given the drug subcutaneously; the

dose in three of these was 100 mg., and in one, 50 mg. Four also received pethidine orally; in three the dose was 50 mg., and in one, 100 mg. Whenever the drug was used intravenously the injection was given slowly, taking 2-4 minutes. In all cases, with the exception of case 8, by whatever route pethidine was employed, some degree of relief from pain resulted. The shortest duration of this relief followed an intravenous injection of 100 mg. of pethidine (case 1); relief lasted only 36 minutes. On the other hand, relief for 30 hours followed 100 mg. subcutaneously in case 3. The average duration of relief was between 6-8 hours, and this relief was on a number of occasions accompanied by sleep; however, this sleep may not have been due to any soporific effect of the drug but simply to relief from pain which had previously been sufficiently severe to interfere with sleep. The relief from pain after intravenous injection usually commenced within 10 minutes.

The pain response to pethidine was excellent in eight of these twelve cases. These patients received complete relief from severe pain for a number of hours. In two cases the results were very striking. In one of these cases—a child of 12 (case 12)—the patient had developed a very severe headache immediately after the introduction of air during an encephalography. The headache was rapidly relieved by 66 mg. of pethidine intravenously; the remainder of the procedure was carried through without discomfort and the child subsequently slept.

In three of the twelve cases the relief was considerable although the pain was not entirely abolished and the duration of relief was not beyond 4 hours. The only patient who did not obtain any appreciable relief (case 8) was a highly emotional subject who had been accustomed to considerable amounts of opium and rather resented being given a different drug.

Adverse side-effects—which ranged from transient giddiness to pallor, faintness, sweating, blurring of vision, nausea, tremulousness and anxiety—were noted in seven of the ten cases in which pethidine was employed intravenously. Though objectionable, these features were transitory in all but two (cases 2 and 11). In case 2, after 100 mg. intravenously, giddiness and blurring of vision lasting 35 minutes were complained of. In case 11, a girl of 15, 50 mg. was given, but she seemed rather disturbed by the accompanying effects; these disappeared in a few minutes but "giddiness" returned for a few minutes, 10 minutes later; in this case the side-effects lasted a total of 15 minutes.

It has been possible to compare the relief gained with pethidine with that following morphine gr.  $\frac{1}{4}$  in seven cases. With morphine all received considerable relief, but it was less definite and of a shorter duration than that following pethidine. Tab. codeinæ co. (NWF) and other similar analgesics gave much the same relief as pethidine given orally in 50 mg. doses, but the period of relief was shorter.

#### SUMMARY

In twelve neurological cases pethidine was found to have effects on pain comparable with, and in some instances superior to, those of morphine.

When given intravenously it sometimes produced objectionable side-effects ranging from transient giddiness lasting a few minutes to giddiness, pallor, faintness, sweating and nausea persisting about half an hour.

We wish to thank the staff of the National Hospital for permission to treat the cases under their care, and particularly Dr. E. Arnold Carmichael, director of the neurological research unit.

The work was undertaken as part of a clinical investigation of pethidine arranged by the war wounds committee of the Medical Research Council.

**BUCKSTON BROWNE PRIZE.**—The council of the Harveian Society of London have awarded this prize to Dr. Ernst Jokl, of Johannesburg, for his essay on the evaluation of methods of physical training and the best schemes for general application.

**BRITISH PHARMACOPŒIA.**—BP 1932 has been out of print for some time owing to the destruction of copies by enemy action. A new issue of 2600 copies is now on sale and orders should be sent to Messrs. Constable, 10, Orange Street, London, W.C.2 (21s. 9d. post free).

## FAT-EMBOLISM AFTER COMPOUND FRACTURE OF TIBIA

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A TALL, muscular soldier, aged 26, was admitted to hospital on July 27, 1942, about three hours after a motor-cycle crash in which he had sustained a compound fracture of the right tibia and a few minor abrasions. He had been given morphine, gr.  $\frac{1}{4}$ , hypodermically shortly before admission and been sent to hospital in an ambulance with the leg bandaged and fixed on a back splint. He was slightly shocked. Two hours later, after premedication with morphine, gr.  $\frac{1}{6}$ , and hyoscine, gr.  $\frac{1}{100}$ , he was taken to the theatre and anaesthetised: 'Pentothal Sodium' intravenously, 3 g.; he was resistant to the first 2 g. Two lacerated skin wounds of the calf were excised together, each was about  $1\frac{1}{2}$  in. long overlying the anterior border of the lower third of the tibia. The underlying fracture was found to be roughly transverse with forward angulation, serrated but not comminuted. There was little muscle damage and no undue hæmorrhage. The wound was excised, cleansed with small quantities of flavine solution and hydrogen peroxide, and dusted with sulphanilamide powder; the fracture was accurately reduced and the wound closed with interrupted silkworm sutures. The leg was then encased in plaster from toes to upper third of thigh.

The patient reacted well and next day his general condition was excellent until about 9 PM (26 hours after operation), when he was observed by a nurse suddenly to throw his arms about and to roll his head from side to side. When seen a few minutes later he was slightly cyanosed, bathed in perspiration and semi-conscious, though still able to answer questions slowly and indistinctly but rationally. Temperature  $100^{\circ}$  F, pulse-rate 120, respirations 32 per min.; the corresponding figures 3 hours before had been  $98.6^{\circ}$  F., 104 and 20. There was no paresis in limbs or face, the pupils were central, of moderate size and reacted to light; the abdominal reflexes were absent, tendon reflexes in the arms and left leg were present and not exaggerated, plantar stimulation gave an extensor-flexor response. By 11 PM he was quite unconscious and had been incontinent of urine and faeces. The temperature had risen to  $102.8^{\circ}$  F. the pulse-rate to 136, and respirations to 38. Blood-pressure 125/80 mm. Hg. Seven small petechial spots were seen for the first time over the point of the right shoulder and anterior part of the neck. Fine crepitations were audible over both lungs, especially in front. The pupils were as before; there was now a positive Babinski sign on the left side. On lumbar puncture the cerebrospinal fluid was clear and not under increased pressure; compression of the jugular veins increased the rate of flow. The fluid contained 1 cell per c.mm., protein 30 mg. per 100 c.cm. and no excess of globulin. At 12.30 AM on the 29th he was more cyanosed, the pupils were larger but still reacted to light; the fundi appeared normal. One observer suggested, at this time that there was some spasticity of the left arm but this was doubtful and not subsequently detected.

Oxygen had been given through a BLB mask from shortly after the onset of symptoms; treatment otherwise had consisted of the single lumbar puncture, and injection intravenously of 30 c.cm. of 25% glucose, neither of which measures had produced any obvious effect. Oxygen administration was continued but his condition deteriorated, and by 9 AM he was very cyanosed, respiration was laboured and there was much frothing at the nose and mouth; the pupils were now widely dilated and fixed. A catheter specimen of urine showed specific gravity of 1002; acid; albumin present; no sugar or acetone; many fat globules; some white blood-cells and epithelial cells; urates. Unfortunately liquid paraffin had been used as the catheter lubricant but after extraction of the fat the biochemist reported that much of it was of animal origin and had not been derived from the lubricant. The patient died from asphyxia at 1.20 PM on July 29.

**Autopsy on July 31.**—The body was that of a tall strongly built young man; a few petechial hæmorrhages present. Heart enlarged and dilated; a few subendocardial hæmorrhages present on the posterior wall of the left ventricle. Numerous small subpleural hæmorrhages present over the lungs, both of which were congested and œdematous. Liver,

spleen and kidneys pale but otherwise normal. Considerable congestion of the meninges and brain substance. Right leg: old hæmorrhage at the site of fracture; fragments in good alignment; no thrombus in popliteal or femoral veins.

Histologically the organs showed considerable post-mortem change but frozen sections stained by hæmalum and Sudan III showed small fat globules in the vessels of the lungs and brain and in many of the renal glomeruli.

I wish to thank Dr. W. J. Richard and Mr. A. M. Clark for permission to publish this case, and Dr. Alice J. Marshall for the autopsy report.

## RESTORATION OF FUNCTION IN THE BURNT HAND

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BURNS are inevitable in modern warfare, and are nearly always the direct result of exposure to flames. Whether the burns result from aircraft accident, gun flash, or incendiary bombs, the exposed parts of the body will suffer most, and parts protected by clothing may escape injury altogether.

For the hands, leather gloves undoubtedly afford the best protection. They should be of the gauntlet type in order to give adequate protection to the wrist, and it is important that they should be free from holes through which serious burns can occur. Leather is a good heat insulator and not harmful when heated. Gloves made of wool or silk worn separately, or used as linings for leather gloves, tend to melt when heated and adhere to the burnt part. Fireproof gloves are far too heavy and stiff to be worn in routine work.

With modern methods of treatment in the Royal Air Force a high percentage of flying personnel who have received severe burns have been able to return to full flying duties. Observations made during treatment of large numbers in an RAF burns unit and elsewhere and the conclusions drawn therefrom form the material on which this paper is based. The principles advocated in RAF burns units are equally applicable to civilian burns; they are not necessarily claimed as original. The return to full function of the burnt hand should be the aim in treatment.

The first principle, preached but often not practised, is the maintenance of a "basic position." This position is so chosen that, given the minimum ultimate range of movement, such movement will be operating at the maximum advantage for function. The basic position of rest for the hand is as follows:

Wrist: slight dorsiflexion.

Fingers: mid-flexion at all joints.

Apposition: the thumb is in apposition with the tip of index finger.

Long axis of fingers in flexion pointing towards lower end of radius (fig. 1).

The interphalangeal rather than the metacarpophalangeal joints are the common site of the damage.

In 10% of a large series of cases with burns of the hand, tendons and joints were destroyed in three or more digits. If in such cases the basic position of rest is maintained, the limited ultimate range of movement possible will permit the man to carry out the simpler essential actions of everyday life, and in many cases he can return to full flying duties.

A common malposition is to place the hand first in full extension; it soon drops at the wrist, and the weight is then taken by the fingers, which become hyperextended at the metacarpophalangeal joints. In this position the normal action of interossei and lumbricals is upset and the latter become extensors of these joints. The metacarpophalangeal joints become subluxated, and later permanent joint changes render this position irreversible. At the same time the hyperextension increases the pull of the long and short flexors of the fingers and the interphalangeal joints become acutely flexed, and a "claw-hand" is the inevitable result (fig. 2). Probably organisation of the exudate in the small muscles of the hand encourages their contraction and makes the final posture worse. Cases in which the hands have become thus deformed after burns received during the first year of the war are not uncommon. This condition is a

disaster and no surgical procedure has yet been described which can render such a hand useful.

If a burnt hand is nursed in the outstretched position, and allowed to develop such a posture, the owner becomes incapable of feeding or dressing himself or even writing. Man's greatest asset—apposition of thumb and finger—is thus denied him. Such a result is due not so much to the injury itself but to improper treatment.

### MAINTENANCE OF POSITION

The basic position can be maintained either by effective splinting or by means of plaster, used as a single slab or for total enclosure of the hand. In practice, a light metal splint has advantages over plaster, and a splint made of aluminium is so light as to be hardly noticeable by the patient. It is malleable for minor adjustments, and can be boiled and used repeatedly; and it does not soak up discharges and become soft and heavy as a plaster cast may do (fig. 3).

The splint is made from a plaster cast taken from an "average hand." The bulge for the thenar eminence allows the thumb to come into apposition with the tip of the forefinger. The splint projects beyond the finger tips to give them protection; this is desirable because the finger tips are very sensitive during the early stages of healing. The hand is maintained in position on the splint by elastic crêpe bandages. In severe cases, the hand distorted by injury and œdema is gradually coaxed into the correct position over a period of 48 hours by periodic adjustment of the bandages. A few layers of gauze provide sufficient padding for these splints. In milder cases the hand "fits the splint" immediately, and the support and protection given is a great comfort to the patient.

The metal splint is an essential accessory to the saline bath treatment, or may be used in place of plaster if the "closed" method of treatment is adopted. In the latter case splint and dressings are left in position as long as necessary, as in the Winnett Orr treatment of compound fractures.

The splint is used in acute burns from the beginning of treatment. In the later stages it is only used during the rest periods and at night, in order to control the position of the hand during sleep. It has also been used with success to maintain position and fixation, after the application of grafts, both to the dorsum of hands and to the fingers.

*Separation of the fingers.*—It is of great importance that during the early treatment of the burnt hand some form of dressing be used to separate the fingers. 'Vaseline'-impregnated netting of the tullegras type has been found most effective. Without such care, rapid growth of granulations across the adjacent surfaces of burnt fingers will lead to their early fusion. Special care should be taken to limit this tendency where it is most likely to occur—in the finger webs. Any such fusion diminishes function, and though much can be done later in the field of plastic surgery to improve hands with fusion of the fingers, prevention is better than cure.

*Elevation of the hand.*—A burn which destroys only the skin pro-

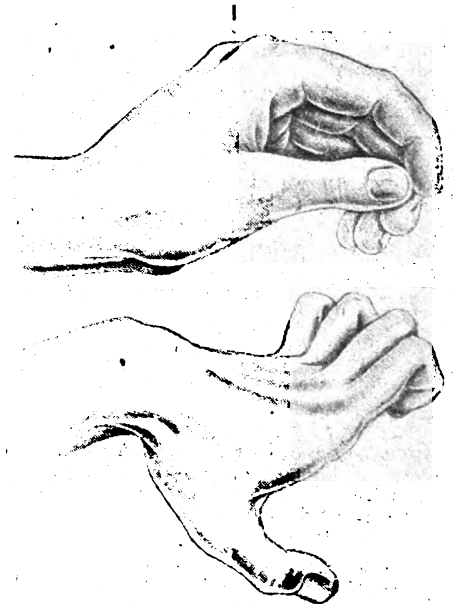


Fig. 1—Basic position of rest. Fig. 2—Claw-hand.

duces an inflammatory and oedematous reaction in the deeper structures, and this reaction is augmented by infection which is inevitable with skin destruction. The exudate distends tendons and joints, and its organisation permanently reduces movement in those parts. Elevation of the hand lessens the exudate effectively by diminishing its production and later by hastening its absorption. In a hand not previously elevated this posture will cause visible improvement within 48 hours, and the comfort of the patient is materially increased within 6 hours. Elevation of any unhealed hand will reduce the amount of exudate from the surface, and this is of proved value during skin-grafting; elevation during the "take period" has led to a greater percentage of satisfactory results. A strong tape looped round the hook of the splint and suspended from a beam over the bed is a satisfactory support. When plaster is used, a loop of tape may be incorporated in the plaster itself. In either case the patient is comfortable because the weight is distributed over the whole hand and arm.

MOVEMENT

Active movement in the early treatment of a burnt hand may increase the inflammatory and oedematous reaction and reduce the available range of movement. On the other hand there is a stage, depending on the depth of the burn, after which movement is of great value in reducing this swelling by improving the lymphatic and venous return of the part. Whenever the hand is not being moved it should be well elevated to prevent the reaccumulation of the fluid. Immobilisation continued too long in milder burns will, from disuse, delay the return to full function. Movement of the burnt hand should be encouraged as soon as swelling has been controlled by elevation, and this movement may be safely continued unless the patient develops: pain; an increase in the swelling; or any subsequent stiffness.

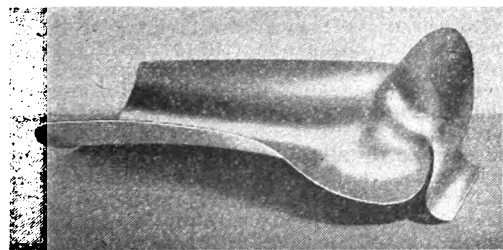


Fig. 3—Aluminium splint designed to maintain basic position. Complete length 1 1/2 in. Length of trough for forearm 8 in.

With second degree burns movement may be allowed within a day or two of the injury. At first such movement should be limited; if there is no reaction it should be progressively increased each day. With such burns final healing and return to full movement and function should coincide. In third degree burns where the full skin thickness is destroyed the subjacent disturbance in joints and tendons is great and movement should be strictly limited for a period depending on the extent of the damage; in the severest cases where the whole dorsum of hand and fingers is burnt to this depth, 2 weeks' initial rest is advised. If the burn is complicated by loss of tendons and exposure of joints, 3-4 weeks' complete and continuous rest with the hand well splinted in the optimum position is advised. To attempt immediate movement in such a case is painful and not only increases swelling but also increases subsequent stiffness. A hand which retains mobility of the joints but suffers loss of extensor tendons is a particular problem. Once taken out of the splint the unopposed flexor muscles lead to complete flexion of the

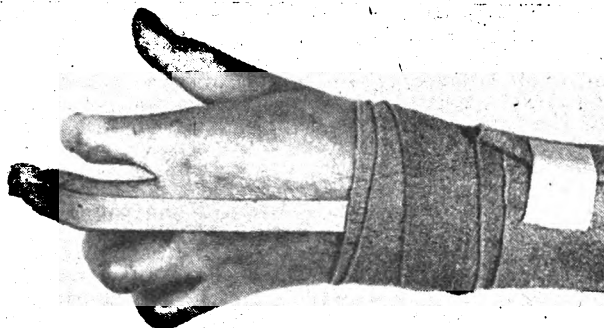


Fig. 4—Clock-spring substitute for extensor tendons.

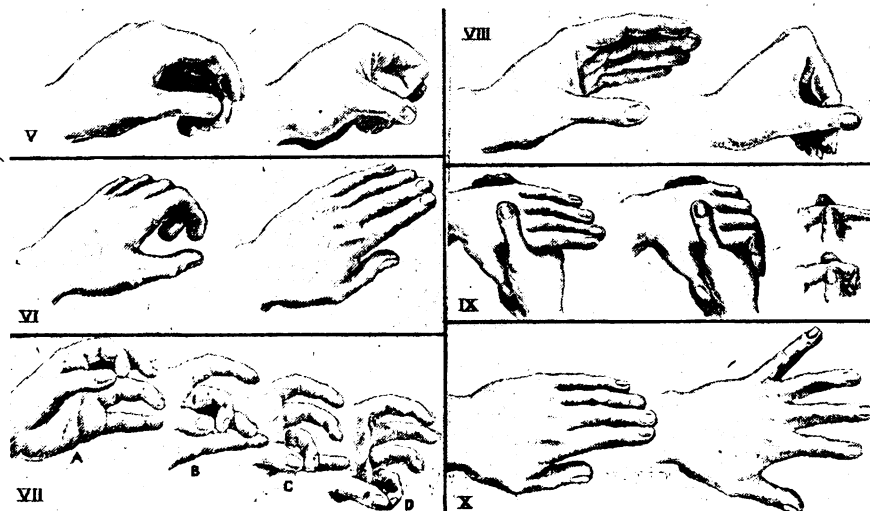
affected digits. Continuous care must be taken to prevent this.

When the hand is healed a weak clock spring may be adapted as a substitute for the extensor tendons and used as a temporary exerciser until surgical repair can be attempted. The spring should be well padded and anchored at one end to the dorsum of the hand, and at the other lightly fixed to the terminal phalanx by a loop of soft leather. The spring must not be allowed to produce hyperextension at the metacarpophalangeal joints (see fig. 4). When finger-joint cavities are actually exposed fibrous fusion should be allowed with the joints in the optimum position; if this is obtained it is surprising how useful a severely burnt hand may become. Far too many patients who had sustained burns during the first year of the war have finger-joints fused in full extension and hands which are therefore functionally useless.

Partial or complete destruction of sebaceous glands by burning leads to a drying up of the healed skin. Much of the normal flexibility can be lost through this, and finger movement may be much reduced. A lubricant such as lanoline is of great value, and many second degree burns, and all those of third degree whether they have healed alone or by grafting, require such lubrication. Recently a "semi-vanishing" cream has been used with success, being less sticky than lanoline and more lasting in effect; it is made by emulsifying 'Lanette Wax SX' (Ronsheim) with water and soft paraffin. The formula is as follows:

Lanette wax SX	..	..	..	2 oz.
Yellow soft paraffin	..	..	..	2 oz.
Water	..	..	..	4 oz.

Active and passive movements.—All movements of the burnt hand should be active; passive movements should never be allowed. The organisation of exudate within joints and surrounding tendons which results from the



Figs. 5-10—Six essential movements: flexion, extension, apposition of fingers, flexion of metacarpophalangeal joints, flexion of distal joints, and abduction of fingers.

rapid breakdown of adhesions by passive movements can only serve to limit further the ultimate movements of the burnt hand. Even more damaging is the effect of manipulation under anaesthesia, to improve position. The end-result is far worse and nothing is ever gained. If treatment is carried out correctly from the beginning, and the basic position has been maintained, there is no need to improve position, and movement gained slowly from this basic position is never lost. The initial freedom following manipulation is short lived.

For the best results, co-operation of the patient and nursing staff is important. Patients should be taught to understand something of the value of position and of early movement, and it should be explained to them how much their progress depends on their own efforts. A scheme of essential movements has proved a valuable guide (figs. 5-10). The interest of the patient is maintained as he goes through his daily exercises and watches his own progress. During the course of treatment the surgeon should be satisfied with any improvement, however small, rather than attempt too much and produce a reaction.

#### SUMMARY

A basic position for the treatment of burns of the hands is slight dorsiflexion at the wrist, mid-flexion at all finger joints and apposition of index and thumb.

A metal splint is used to maintain this position.

The digits should be separated by suitable dressings and the hand should be elevated.

Early active movements as soon as swelling has been reduced by elevation are the rule in successful treatment.

Full co-operation of the patient and nursing staff is essential.

A system of hand exercises helps to keep the patient interested in his progress.

I wish to thank the Director-General of Medical Services and the Officer Commanding a RAF hospital for facilities in doing this work, and Mr. A. H. McIndoe for help and encouragement.

### TREATMENT OF LYMPHOGRANULOMA INGUINALE WITH ANTHIOMALINE

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BRITISH WEST AFRICA

A TOTAL of 220 cases of lymphogranuloma inguinale were diagnosed and treated during 18 months among both British and African troops in West Africa. The large majority had some form of pathological confirmation of the clinical diagnosis, either in the form of Frei's intradermal test, or gland and primary lesion biopsy with histological section. In the earlier European cases a Dmelcos chancreoid vaccine test was carried out as a control to the Frei reaction, a negative reading being required for the diagnosis of lymphogranuloma inguinale to be maintained. Owing to lack of supplies this control could not be used throughout the series.

The lesions seen and treated were almost entirely the result of exposure to infection from native women in the tropics. With 3 exceptions all were genital and inguinal in situation, and were less extensive than in the female, where vulva and vagina may be involved, or the whole pelvis, as in the genito-ano-rectal syndrome, or there may be esthiomene, with elephantoid changes in the vulva. Cases of rectal involvement with stricture formation, which may occur in either sex, were not seen in this series.

The problems which were much in evidence in dealing with soldiers on active service were, first, the accurate diagnosis of the disease, a much more difficult problem during early days in the tropics than later; secondly, determining a course of treatment which would be efficient and quick and would not require a long stay in hospital, thereby conserving man-power and hospital beds for casualties; thirdly, avoidance of relapses, and associated with this the question of reinfection, immunity and prophylaxis.

#### CLINICAL PICTURE

The early stage of the disease consists of a small herpetiform ulcer, papule, vesicle or pustule, often described by the patient as a "pimple," on the glans

penis, coronal sulcus, prepuce, body of the penis or even inside the meatal orifice or urethra. This lesion may be single or multiple and more often than not is missed completely, as it is small, painless and transitory.

In this series a history of primary lesions was obtained in 15 cases and the lesion itself was actually seen on 79 occasions; 12 of this total were in Europeans and the remaining 82 in Africans. In the European patients the primary lesion was situated most often on the prepuce or glans penis, but in the Africans, where circumcision was the rule, the coronal sulcus and body of the penis were the usual sites. Multiple ulcers occurred in 21 of these cases. Opportunities were taken to perform biopsies on some of these ulcers, and the histological appearances were carefully studied. In 17 instances evidence of a recently healed primary lesion was seen as a faint scar or small area of depigmentation. Of the European patients, 26 out of 33 were uncircumcised. This agrees with Hanschell (1938) who had only 2 cases in circumcised men out of 130. He suggests that the delicate, easily penetrable, soft moist surface of the glans in the man with a protective prepuce, and the smegma, form an ideal ground for infection and cultivation of the virus; but over 85% of the African cases occurred in circumcised men, so another factor must be sought. This is more likely to be repeated infection from the female, some minor abrasion of the relatively horny glans penis or penile skin occurring during intercourse allowing infection to take place in much the same manner as the syphilitic spirochæte gains entrance to the body.

In some of the earlier cases urethroscopy was performed to establish the presence of any intra-urethral lesion. Romanis and Mitchener (1941) mention the occurrence of the primary lesion as a papule in the urethra, but in these cases, and in controls free from any venereal infection, urethroscopy merely showed congestion within normal limits.

The primary lesion usually appears in 3-5 days after exposure to infection, and disappears within 8 days, though cases have been reported in which the primary lesion persisted for 14-21 days after its appearance. In this series, where history of a definite penile ulcer was obtained, the onset was usually within a week of exposure to infection, and the duration was 5-21 days. In the 52 cases in which an ulcer was actually present during observation and treatment, exposure to infection had occurred from 5 days to 7 weeks previously, and the ulcer had been present for 3-24 days. The actual "bubo" appeared in 1-12 weeks after exposure to infection. Many difficulties were encountered in obtaining the history from the African patients, and even then the accuracy of their statements could not always be guaranteed.

The "bubo" or gland swelling in the groin usually makes itself felt as well as apparent 3-6 weeks after the primary lesion; occasionally as long as 8-12 weeks. At this stage the genitalia, as a rule, show little or no signs of the primary lesion. In a European there may be a faint scar of a recently healed ulcer, and in the African a small area of depigmentation may be found in the region of the coronary sulcus or prepuce indicating the probable site of the primary lesion.

The gland enlargement alone was sufficient for the case to be presented to the medical officer, but among Africans, whether from Sierra Leone, Gold Coast or Nigeria, pain was the commonest presenting symptom. To these patients the loss of pain was tantamount to cure. Occasionally the glandular enlargement is painless, being discovered at routine examinations, or presenting solely as a groin swelling. In such cases spontaneous resolution was likely to occur, even without local or general treatment. The oblique group of inguinal glands is the one most commonly involved, but in some cases the vertical group and even the femoral glands also show enlargement, and in 5 cases these were the main group affected. It is also common to find one main gland enlarged, surrounded by several smaller ones, or such a gland lying at the base of a sinus or fistula. Excision of this "principal or feeding" gland has been suggested as a form of treatment, particularly if lying at the base of a sinus.

In both European and African patients there was bilateral glandular involvement in approximately 30%. In cases of unilateral glandular enlargement there was a

slight preponderance for the right side. Three cases in this series had involvement of the cervical glands, and this was bilateral in one instance. Confirmation by biopsy was carried out in these 3 cases in addition to the Frei test. Generalised glandular enlargement did not occur among these cases, but several patients showed massive involvement of inguinal or iliac glands, with masses extending upwards and outwards from the internal angle of the groin to the mid-iliac crest level, and along the spermatic cord. On several occasions during operations for inguinal herniæ glandular masses along the spermatic cord were found and removed, and microscopic section showed them to be lymphogranuloma inguinale, in spite of there being no clinical evidence of this disease at the time of operation. Two such cases on further investigation proved to be Frei-positive, but beyond radical cure of the hernia no other treatment was effected or required and no other gland involvement seen.

The condition may present itself in other ways, particularly with a severe general reaction or constitutional disturbance, simulating the early stages of typhoid fever, or where the deep internal iliac and lumbar glands are extensively involved as an acute abdominal disorder such as appendicitis. The mass may even extend up to the perinephric region, simulating perinephric abscess. The accompanying constitutional disturbance is usually much more in evidence in European than African patients. General malaise, raised pulse-rate, constipation, headache and pyrexia—a temperature as high as 103.5° F. was noted in one case—and rigors and vomiting were seen (2 cases), and anæmia (2 cases), slight jaundice and neck-rigidity were all observed. Joint pains and effusions were seen in some cases and splenic enlargement in one case. Erythematous skin rashes, conjunctivitis, phlebitis, pneumonitis and even meningitis have been described but were not seen in this series. One patient developed pleurisy while undergoing treatment, but this was regarded as incidental.

#### CLASSIFICATION OF TROPICAL BUBO

The glandular enlargement, except in the relatively few cases undergoing spontaneous resolution, is progressive, beginning with slightly enlarged, mildly tender, elastic, discrete, single or multiple glands, and ending with large grape-like masses, and even with suppuration and fistula formation. As Stammers and Law (1941) suggest, it is convenient to enumerate four stages, at any of which the patient may present himself for treatment.

**Stage 1.**—A firm solitary gland, usually tender, but not necessarily spontaneously painful. This gland is not attached to skin or deep tissues, and there is no alteration in the overlying skin. The genitalia may show evidence of recent or healed ulceration.

**Stage 2.**—The stage of periglandular inflammation. Glandular enlargement is more definite and more widespread, and periglandular infiltration more apparent. The gland or glands become adherent to skin and deeper tissues and coalesce, resulting in a matted mass which may extend above Poupart's ligament into the iliac and even lumbar areas or the pelvis. Nearly all the evidence of a primary penile lesion has usually disappeared by the end of this stage.

**Stage 3.**—Suppuration with softening of the gland mass is the essential feature of this stage. This process begins in multiple small foci throughout the mass, somewhat resembling caseation, and sometimes produces a clear, sticky, yellowish fluid, which can easily be aspirated. On other occasions the aspirated material is almost caseous, or frankly purulent and bloodstained, and unless secondary infection has occurred ordinary culture always proves sterile. In some cases the cavity is unilocular and the whole of the fluid or semifluid contents can easily be withdrawn, but in others there are multiple loculi of varying size rendering aspiration more difficult and less satisfactory.

**Stage 4.**—The process of suppuration has progressed farther, with skin ulceration and fistula formation. Multiple fistulæ are likely to form, and superimposed secondary infection may make these sinuses slow to heal, as well as aggravating the general toxic effects.

#### PATHOLOGY

The causal agent is an ultramicroscopic filtrable virus, the existence of which was first established by Hellerström and Wassen (1930), and finally confirmed by

Findlay in 1932. Tamura has cultivated this virus using Tyrode's solution, and Findlay has described large and small forms, indicating that a developmental cycle occurs.

The virus can be transmitted to monkeys and mice by intracerebral injection of material from "buboes," giving rise to a meningo-encephalitis. In monkeys also, injection into the prepuce of material aspirated from infected human lymph-glands, or gland emulsion itself, produces enlargement of the inguinal lymph-nodes. In guinea-pigs, intraglandular injection of lymphogranuloma material produces inguinal gland enlargement. The disease has more widespread manifestations than those of the genitalia and draining lymph-glands. Blood-protein estimations in this series could not be carried out owing to lack of facilities.

Histologically, the primary lesion shows infiltration of the perivascular lymph spaces of the dermis by plasma cells, mononuclear leucocytes, large vesicular nucleated reticulo-endothelial system cells, and a few polymorphs. Ulceration occurs as the result of granular and hydropic degeneration in the epithelial cells. The blood-vessels show "cuffing" and endothelial proliferation and dilatation. The lymph spaces also show endothelial proliferation and dilatation. The histological appearance of the glandular enlargement varies according to the stage attained. In the first stage there is considerable "stuffing" of the follicles with lymphocytes, mononuclear cells, and a few giant cells, with an increase in the fibrous interconnective tissue. In the second stage focal necrosis occurs at multiple sites throughout the gland with the production of what appear to be numerous small abscesses in the gland substance. Increase in the periglandular connective tissue and fibrosis with adherence and matting are also apparent, with an increase in the surrounding vascular connexion. The third stage shows an extension of this process of necrosis, with the formation of more definite and larger single or multiple abscess cavities containing yellowish glutinous fluid, caseous-like material or pus, which on ordinary culture proves sterile. In the fourth stage the process has advanced to involvement of surrounding and superficial tissues, including skin, with ulceration, fistula formation and fibrotic scarring. Healing occurs with the production of fibrous tissue and the consequent obliteration of the necrotic areas and cavitation, though considerable scarring and tethering may result.

#### DIAGNOSIS

In a tropical climate a patient presenting himself with a swelling in one or both groins must be carefully examined for lymphogranuloma inguinale. The primary genital lesion is differentiated from the ulcers of soft sore, hard chancre and yaws by its small herpetiform appearance, the clean-cut edges with little surrounding induration, and a reddened zone round it, and the base formed by pale watery granulations. This ulcer is painless, and heals quickly and spontaneously. Microscopic examination, using dark-ground illumination, of scrapings from such ulcers shows the absence of spirochaetes, and this provides a certain method of differentiation from the early syphilitic chancre. This examination was performed in all cases in this series presenting at this stage. The healed lymphogranuloma ulcer leaves very slight or no trace, as compared to the faint scar of a chancre and the more marked scar of a chancroid.

Syphilitic glands are more discrete, smaller and painless, whereas in lymphogranuloma, pain and periadenitis are more prominent. In the glandular enlargements associated with chancroid pain is even more severe, and suppuration is more frank and localised with greater tendency to fistula formation. In 31 cases in this series lymphogranuloma inguinale accompanied other venereal infections. Treatment of these conditions had no effect on the "bubo." In nearly all cases considered to be lymphogranuloma a routine Kahn test was performed and a urethral smear examined microscopically to ascertain the presence or absence of any secondary infection.

Frei's intradermal test was extensively used. The antigen was prepared from excised glands or aspirated material from Frei-positive cases. This skin reaction is most definite after 24-48 hours, and persists for 5-10 days. It consists of redness and even vesicle formation, with induration or nodule formation, which is particu-

larly helpful in recognising the positive reaction in native patients. This nodule is known as "Fischer's knotchen," and persists for at least 2 days. Some authorities regard it as essential for a positive reading. The test was positive in cases of mixed infection, but in several instances where the infection was thought to be double on clinical grounds, but eventually proved to be syphilis, gonorrhoea or chancroid, the Frei test was negative. Such cases were excluded from this series. In 45 negative or non-tested cases where clinical evidence of lymphogranuloma inguinale was strong, and tests excluded other venereal infections, the diagnosis was maintained and often confirmed subsequently by biopsy. The histology of both glands and primary lesions was only studied in specimens from Frei-positive cases in the first place, and then, when necessary, comparisons could be made with sections from Frei negative or doubtful cases.

The test is carried out by injecting 0.1 c.cm. of the antigen intradermally in the forearm, together with controls on the opposite side, using normal saline and/or Dmelcos chancroid vaccine. If 0.1 c.cm. of the antigen fails to give a reaction, on some occasions the injection of 0.3 c.cm. may produce a positive result, and this was so in the cases in this series marked "weak" or "doubtful positive" in the case-report. The allergic state develops in 2-4 weeks after the appearance of the "bubo." In this series, the Frei test was positive in 61% of the cases, and doubtfully positive in a further 16%, making a total of 75% positive results. The test was negative in 15% of the cases, and in the whole series 17 cases did not have this test done owing to lack of antigen.

There were no facilities for carrying out additional confirmatory tests such as the guinea-pig intradermal test, the intracerebral test in mice, complement-fixation or agglutination, nor was the injection of Frei antigen intravenously attempted. The isolation of the virus by intracerebral injection of monkeys or mice, which is an absolute method of diagnosis, was not carried out.

A more recent test, termed the "vesicular test" by Ottolina (1941), consists of intracutaneous injection of 0.3 c.cm. of cerebrospinal fluid from a previously proved case. The cerebrospinal fluid is concentrated in vacuo from 10 c.cm. to 2 c.cm. before injection, and in positive cases at the end of 24 hours an ovoid vesicle forms, becomes umbilicated by the end of 48 hours and disappears within 3 more days. This test was carried out in 20 cases; 10 of these were strongly Frei-positive and the other 10 were doubtfully positive or negative. Only one positive vesicular reaction was obtained, and that was in a previously Frei-negative case.

#### TREATMENT

In some cases there is spontaneous resolution of the buboes. Brandt (1941) draws attention to this fact, pointing out that the bubo affects the healing of lesions in other parts of the body, witness the healing of the genital ulcer as soon as, or shortly after, the bubo appears. Naturally many of these cases never present themselves, and the two factors which make treatment necessary are the size and progress of the bubo and pain. Every endeavour must be made to prevent the development of fistulae and consequent secondary infection, which is bound to prolong the time of recovery and necessitate full hospitalisation.

Since the disease is not merely a localised genital-glandular lesion, it seems that something more than merely local treatment is required. I therefore changed from purely surgical measures to the use of the chemotherapeutic agent 'Anthiomaline' (lithium antimony thiomalate), an organic compound containing 16% antimony. This was administered intramuscularly in most instances, but in the later part of the series intravenously. Injections were carried out 2 or 3 times weekly, beginning with a dose of 0.5 c.cm., and increasing by 0.5 c.cm. up to 2 c.cm. for a maximum of 20 injections, which should be equivalent to 0.2 g. of antimony metal.

When anthiomaline was not available, sodium antimony tartrate was injected intravenously as a freshly prepared 1% solution in distilled water, sterilised by boiling, the first injection being 1.5 c.cm., and subsequent injections being increased by 1.5 c.cm. up to a maximum of 6 c.cm. given twice weekly. The larger doses for injection purposes were made up to 10 c.cm. with distilled water or normal glucose saline. This produced a

metallic taste in the mouth and some discomfort or pain along the vein during the actual injection which rapidly passed off; injection never resulted in venous thrombosis.

For experimental and observation purposes, the patients with few exceptions were kept in hospital, but they were not confined to bed, and during the whole course of treatment they were on ward and hospital fatigues and light duties. Three European cases were treated successfully while carrying out normal duties, and these were all fourth-stage cases with fistulae and ulceration. A total of 137 cases were treated by chemotherapy, 13 European and 124 African. In the European, the general constitutional upset from the disease appears to be greater than in the native, but this did not hinder the adoption of this treatment.

The average number of injections required over the whole series of cases was ten, and the average time during which this treatment was carried out, and cure effected, was a little over 3 weeks (see table). Experience proved that it is advisable to administer a course of 8 or more injections, even if the gland swelling has subsided on a smaller dose. Exacerbation or recurrence of the bubo may occur if treatment is discontinued too early. Where pain was prominent relief was obtained with two or three injections, often dramatically. These antimony compounds appear to prevent the progress of the lesion from the second and third stages into the more chronic and difficult fourth stage.

No ill effects were noticed. Observation was kept for such complications as pyrexia, rigors, coughing, nausea and vomiting, jaundice, albuminuria, gastro-intestinal upsets and fits; but even with intravenous administration, mild pyrexia 2-6 hours after the injection was the only complication noticed. Pyrexia was more common after intravenous sodium antimony tartrate, and with this compound it is essential to avoid leakage outside the vein, as this will cause considerable pain at the site of injection.

*Comparison with sulphanilamide.*—It has been claimed that the only treatment for lymphogranuloma inguinale is sulphanilamide in massive doses. For the purpose of comparison a series of cases was so treated, using 50-100 g. of sulphanilamide as a course of treatment. The sulphanilamide was administered by mouth in tablet form as follows: 2 g. 4-hourly for 48 hours, followed by 1 g. 4-hourly for 72 hours and finally 1 g. 8-hourly for 48 hours. After 5-7 days' rest this course was repeated.

These patients had to be confined to bed for the whole period of treatment and careful observation had to be kept for such complications as fever, headache, giddiness, anorexia, nausea, joint pains and dermatitis. Headache and nausea were quite common, but these symptoms interfered with the course of treatment in only 3 cases. White-cell counts were carried out before beginning treatment, after 48 g., and finally after 96 g., as a precaution against the occurrence of granulocytopenia or agranulocytosis, the polymorph count not being allowed to fall below 2000 leucocytes per c.mm.

First-stage cases responded quickly to this treatment, but not more rapidly than to the antimony therapy, and many of them would have subsided spontaneously. Early second-stage cases resolved satisfactorily, but in this and the later stages resolution was never so complete, a more definite induration persisting in the inguinal regions. Pain usually subsided by the end of the first week of treatment, but again this is not so dramatic as with the antimony compounds, and no doubt complete rest was also a factor. Third-stage cases appear to soften more extensively, and form larger abscess cavities, requiring three or four aspirations of quantities of fluid or pus up to 40 c.cm.

A total of 45 cases were subjected to this massive sulphanilamide therapy, and previously 5 cases had been treated with smaller doses (see table). No real advantage could be claimed for this line of treatment, and the disadvantages are evident—the necessity for hospitalisation and confinement to bed with consequent loss of man power during war conditions, the dangers of toxic complications, and the incompleteness of resolution of the gland swelling and induration which may be conducive to recurrence or relapse. In the short space of 6 weeks 3 cases relapsed and required a further course of treatment.



## CASE ANALYSIS

No. of cases	Primary lesion	Av. time for appearance of bubo (weeks)	Frei test	Treatment	
				Method	Av. duration (days)
<b>Stage 1</b>					
European	7	6	5 +	Gland excision 3 Anthiomaline 2 Sulphanilamide 2	21 21 21
African	22	6	15 + 2 - 5 ND	Gland excision 1 Anthiomaline 14 Sod. ant. tart. 2 Sulphanilamide 3 Sulphapyridine 2	42 17 21 28 14
<b>Stage 2</b>					
European	13	7	11 + 2 -	Gland excision 4 Anthiomaline 2 Sulphanilamide 7	35 21 28
African	90	6	70 + 15 - 5 ND	Gland excision 1 Anthiomaline 37 Sod. ant. tart. 17 Sulphanilamide 25 Sulphapyridine 10	50 21 25 28 14
<b>Stage 3</b>					
European	10	10	9 + 1 -	Gland excision 3 Anthiomaline 6 Sulphanilamide 1	38 30 28
African	42	6	29 + 8 - 5 ND	Anthiomaline 28 Sulphanilamide 8 Sulphapyridine 6	25 28 21
<b>Stage 4</b>					
European	3	6	3 +	Anthiomaline 3	30
African	33	8	28 + 3 - 2 ND	Anthiomaline 23 Sod. ant. tart. 3 Sulphanilamide 5 Sulphapyridine 2	28 21 28 21

+ , positive ; - , negative ; ND, not done.

**Other therapeutic measures.**—Treatment of the primary lesion is mainly a matter of prevention of secondary infection. This stage heals spontaneously in the normal course of events, but in many of these cases healing had been delayed owing to superimposed infection, which responded to such applications as saline or eusol compresses, sulphanilamide dusting powder, or any mild antiseptic dressing, the main object being cleanliness. Local treatment for the buboes was deemed advisable in cases where pain was severe, or fourth-stage cases with ulceration and fistulae and secondary infection. For pain, some form of local heat seemed to be most efficacious, such applications as warm hypertonic saline compresses, boracic fomentations, and kaolin poultices were used. In a few instances cold compresses were tried, but did not appear to be so effective. Many African patients showed signs of hypovitaminosis, and healing, particularly in the fourth stage, seemed to be encouraged by administration of cod-liver oil, 'Marmite' and ascorbic acid, together with calcium lactate and glucose.

The first European cases which presented themselves for treatment were subjected to gland excision. In the first stage such a line of treatment is effective, the wound healing by first intention and the patient being discharged from hospital in 2-3 weeks. But only the local fraction of the disease is treated, and skilled surgery and surgical judgment are necessary to avoid such complications as infection, sinus formation and subsequent oedema of the lower limbs, or changes akin to elephantiasis. Comparatively few cases seem to present themselves in this early stage, the percentage in this series being only 13.5, whereas the percentages for second-, third- and fourth-stage cases stand at 46.5, 23 and 17, where excision of a gland or glands is not a simple procedure. There is an extensive matted mass of glands, surrounded by numerous blood-vessels, with small or even moderately large pus-containing cavities, which lessen the chances of healing by first intention, and make the likelihood of sinus formation much greater.

To compare chemotherapy with surgical excision, in one African case the mass of second-stage glands was removed from the right groin, and glands on the left side treated by intravenous anthiomaline injections. The specimen of glands consisted of a matted mass with a central cavity which contained sterile pus, together with

peripheral glands, still discrete but enlarged, the whole mass being surrounded by numerous blood-vessels embedded in fibrous tissue. Block dissection was carried out, and the wound healed by first intention, the stitches being removed on the eighth day, but subsequently the scar became keloid in part; whereas during the same period the left inguinal glands subsided without any complications whatever.

Where softening had occurred aspiration was carried out, using full aseptic technique, taking care to seal the puncture hole at the end of the operation; otherwise infection and sinus formation are likely to ensue. If necessary this aspiration can be repeated on one or more occasions; 20 cases in the whole series required aspiration, in 5 this had to be repeated once, and in 2 further cases had to be done a third time. On two occasions the aspirated fluid was serous, sticky and yellowish, but in the remainder the gland contents were seropurulent, caseous or frank pus, which was usually bloodstained. The aspirated material, as well as glands excised from positive cases, may be used for making up fresh supplies of antigen for diagnostic purposes. Incision and drainage is a dangerous line of treatment, as sinus formation results and makes healing slow.

No other methods of treatment were attempted in this series. Hanschell (1938) has reported fairly good results from the production of an artificial pyrexia by TAB vaccine, and Manson-Bahr (1936, 1941) mentions the use of pyrifin in this connexion, but both these authorities admit the necessity for surgical intervention in at least 15% of the cases, and the time taken for such a course of treatment is 4-6 weeks.

Other workers have treated the glands by scraping and packing the cavity with iodoform gauze, or bismuth iodoform paraffin paste, or by the use of a seton, but all these methods are open to the dangers of secondary infection and sinus formation. Intravenous administration of antigen has also been used as therapy, but in this series barely sufficient was available for diagnosis, far less for treatment.

**Relapse.**—Twelve patients are noted as relapsing. This raised the question of immunity, which, as with other virus infections, is considered to be lasting. Several of these cases were observed on both first and second admissions. The Frei test remained positive, and therefore does not seem to be affected by treatment. The glandular swelling recurred in 4-12 weeks after subsidence of all symptoms and signs, and on each occasion another course of anthiomaline produced a satisfactory result.

It was possible to follow up relatively few of these cases, but all showed that the process of resolution continued after the end of treatment, and in European patients by the end of 3-6 months there was scarcely any evidence of residual induration or sinus formation in the inguinal regions. The African patients usually have a more definite induration, but no bulge or swelling is to be noted, and no pain even on deep palpation or firm pressure.

## SUMMARY

A series of 220 cases of lymphogranuloma inguinale is reported, 33 in Europeans and 187 in Africans, all being previously fit soldiers serving in West Africa.

The primary lesion is small, painless and transitory, and is often overlooked; it may accompany other venereal infections.

The "bubo" is described clinically and pathologically in four progressive stages, each of which readily merges into the succeeding stage.

The value of the Frei test in diagnosis is confirmed.

The use of organic antimony compounds as chemotherapeutic agents is described and advocated. The results compared favourably with other methods, including sulphanilamide therapy and surgical excision.

My thanks are due to Colonel K. A. M. Tomory for reading the draft text; to Colonel L. A. Harwood, officer commanding General Hospital, RAMC, where this series of cases was observed and treated; to Lieut.-Colonel F. A. R. Stammers, officer in charge Surgical Division, Lieut.-Colonel M. B. MacGraith, and Captain J. H. H. Keall, for their cooperation; and to Captain P. J. M. England and the orderlies of the Special Treatment Ward.

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## GYNÆCOMASTIA

J. S. RICHARDSON, M D CAMB, M R C P

LATELY MEDICAL REGISTRAR AT ST. THOMAS'S HOSPITAL

DEPOSITION of fatty tissue in the pectoral regions in a man does not justify the diagnosis of gynæcomastia. A female contour to the breast is far from unusual in obese males, especially in those cases that suffer from a pituitary dystrophy or eunuchoidism. True gynæcomastia is rare; proliferation of glandular tissue with a well-marked areola about the nipple should be present for its diagnosis.

Development of the breasts is under the influence of the ovarian hormones, estrone and progesterone, and these in their turn are controlled by the hypophysis. Nelson (1936) considers that the normal male owes his lack of mammary development to a deficiency of the ovarian hormones; but against this he admits that oestrogenic substances are found in the urine of males. There is some experimental evidence that the male sex hormone may also have an action on the breasts. Castration can prevent the normal increase in mammary tissue in male rats at puberty (McEuen et al. 1936). This effect may be due to the withdrawal of the well-known oestrogenic and progestin activity of testosterone and not to a lack of the male sex hormone. When one considers the aetiology of a case of gynæcomastia, some definite pathological conditions of the endocrine glands must be considered, notably testicular lesions and tumours of the adrenal cortex.

*Testicular lesions.*—In a review of recorded cases Kriss (1930) found that disease of the testicles was by far the commonest cause of gynæcomastia. Lesions of one or both testes can produce the enlargement, and the breasts themselves can be bilaterally or unilaterally involved. Atrophy—simple or after epididymitis, orchitis or trauma—is most often present, and suggests that a lack of male sex hormone is an important factor. Carcinoma (Bergeret et al. 1931), teratoma of the testes (Jordans 1923), or a teratoma elsewhere (Elzas 1923) have been reported; and Kriss (1930) found 4 cases with renal hypernephroma. There are several instances where chorionepithelioma was causative (Schultze 1930, Jordans 1923, Symeonidis 1934), and in them there was a positive Aschheim-Zondek reaction in the urine. These cases with tumour formation appear to be due to an abnormal endocrine stimulation rather than to deficiency of the male sex hormone.

*Adrenal cortical tumours.*—Tumours of the adrenal cortex are only rarely associated with gynæcomastia. There are, however, a few reported cases where a tumour has led to definite feminisation of the male, forming a counterpart to the virilism found in the adrenogenital syndrome in women (Bittorf 1919, Parkes Weber 1926, Holl 1930, Lissner 1936). The cause of breast hypertrophy in these cases is obscure and does not seem to be an excess of cortin. In fact in some adrenalectomised animals, notably the rat, cortin will not maintain lactation unless large doses are used. Brownell and his colleagues (1933) found, however, that if they failed to remove a fraction of fatty substance in the preparation of cortin, lactation as well as life was preserved after adrenalectomy. They regarded their results as an indication of the presence of a new hormone which they named cortilactin. An attractive theory would be that excess of cortilactin was responsible for the gynæcomastia in these cases; but it would not explain the atrophy of the breasts which often accompanies virilism in the female with a similar type of tumour. Substances with an action like that of male sex hormone have been found in large quantities in the urine of patients with adrenal cortical tumours (Burrows et al. 1937, Butler and Marrian

1937, Callow 1938). The substances, as well as being androgenic are also oestrogenic (Deanesly and Parkes 1937). It seems possible that large quantities of them, produced by the tumour, may act on susceptible tissue in either sex and lead to the sexual abnormalities that are found in the various forms of the adrenogenital syndrome.

When other conditions known to be associated with gynæcomastia, such as Graves's disease (Starr 1935), have been considered, there remain a number, of which the following case is an example, where no causative factor can be found.

## CASE-RECORD

A boy, aged 14 years, was admitted to St. Thomas's Hospital on Feb. 2, 1939, for investigation of his bilateral gynæcomastia. He was the only child of healthy parents and there was no history of breast abnormalities or endocrine disorders in the family. As a child he had always been well except for the usual childish complaints, which included pertussis, chicken-pox and a mild attack of mumps, without orchitis, at the age of 7 years. There was no history of trauma to the testicles at any time.

The enlargement of the breasts had first been noticed two years before; they had gradually increased in size, quite painlessly and without secretion from the nipples. When this enlargement began his pubic hair also started to grow and the external genitalia increased in size with the onset of a normal but somewhat early puberty. He was a normal boy apart from his breasts, playing all the usual games at school and being well up to average in his work. His bowels acted normally, micturition was normal and he never had headaches or noticed any abnormalities of his eyesight. He weighed 10 st. 1½ lb.; height, 5 ft. 1½ in.; height from floor to pubis, 32 in.; chest (at nipples), 36 in.; hips, 36 in.

His body contour was not considered feminine in type though tending towards obesity. There were no striæ atrophicae or localised depositions of fat. The breasts had the appearance of those of a young adult female. On palpation they were firm and a little nodular; there was no tenderness and no fluid could be expressed from the nipples. The areola was large and pale pink, with a few dilated venules at the periphery, but the nipples were poorly developed. The genitalia were well developed. The penis was large and there was a normal growth of pubic hair. The testicles were normal and descended. No suggestion of nodularity or increase or decrease in size was found. The prostate was easily palpable, soft, and did not appear to be enlarged. The abdomen contained no palpable organs or masses. The teeth were good and no abnormality was found in any of the systems. Blood-pressure 120/80 mm. Hg. Urine contained no abnormal constituents.

X-ray examination of abdomen showed no calcified area and no evidence of an adrenal tumour; the skull showed a normal sella turcica and no abnormality of the cranial vault. After perirenal insufflation with air a radiogram showed the air to be surrounding both kidneys and adrenal glands, which were normal in outline and size. No abnormal shadows were seen. Basal metabolic rate: -2% on patient's age (Du Bois); +2% on patient's height and weight (Du Bois). Oxygen consumption 261 c.c.m. per min. Urinary 17-ketosteroids: 9 mg. in 24 hours (normal for age). Urinary oestrogens: under 100 units in 24 hours (normal for age). Aschheim-Zondek reaction, negative.

This boy was normal apart from his breasts, and there was nothing else to lead one to suspect an endocrine disorder. The presence of normally developed genitalia and secondary sex organs indicated that the testicles were producing male sex hormone in the normal manner, and this development began at the same time as had the gynæcomastia. It is possible that abnormal amounts of oestrin were produced by his testes at puberty which resulted in the condition of the breasts; or the primary fault may have been in the breast tissues themselves, which reacted excessively to a normal endocrine stimulation.

The use of endocrine therapy in gynæcomastia is largely empirical, but recent work has shown that testosterone is worthy of a trial (Bronstein 1939, Wernicke 1939, Hoffman 1939). Our case was given 125 mg. of testosterone propionate without any alteration in the size of his breasts, but unfortunately it was not possible at that time to continue the treatment.

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## SUMMARY

A case of gynæcomastia, in which no other pathological condition was found, is described in a boy of 14 years.

It is suggested that the gynæcomastia was due either to excessive production of œstrin by the testes at puberty or to an abnormally vigorous response on the part of the breasts to normal endocrine stimulation.

I wish to thank Dr. H. Gardiner-Hill, physician to St. Thomas's Hospital, for permission to publish this case, and for his help; and Mr. F. Ll. Warren, of the Royal Cancer (Free) Hospital, for estimating the sex hormones in the urine.

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## CEREBRAL CORTICAL LESION AND FITS IN WERNICKE'S ENCEPHALOPATHY

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 INFIRMARY

INTEREST in Wernicke's encephalopathy has been revived in this country by Campbell's publications with Biggart<sup>1</sup> and Ritchie Russell.<sup>2</sup> The clinical findings are divided by these authors into two groups: disturbances of consciousness and higher cerebral function; and focal signs resulting from lesions in the brain-stem and hypothalamus, including ocular palsies, abnormal respiratory rhythm, and drowsiness.

Wernicke's encephalopathy may occur in chronic alcoholism but may also terminate other toxic and wasting diseases associated with gastro-intestinal disturbance; gastric carcinoma accounted for 5 of the 20 cases recorded by Campbell and Russell. It was suggested in both the papers quoted that Wernicke's encephalopathy might be caused by a conditioned vitamin-B<sub>1</sub> deficiency. Campbell and Russell noted that cortical lesions were uncommon: they were present in only 2 of the 20 cases. Epileptiform convulsions occurred in one case with a cortical lesion but not in any other case of their series. The following case is described because cortical lesions and convulsions are uncommon in Wernicke's encephalopathy.

## CASE-HISTORY

A man aged 54 complained of deafness in the left ear, diplopia, and vomiting for 10 days before his admission to hospital. For 3 months he had suffered from epigastric discomfort, dyspnoea, and vertigo. On examination he was confused and uncoöperative; respirations were deep and rapid; mucous membranes pale. Blood-pressure 130/75 mm. Hg. Chest: bronchitis only. Central nervous system: Pupils small and equal, reacting normally; slight weakness of both external recti; lateral and vertical nystagmus; 8th nerves could not be investigated; tendon reflexes normal in upper limbs, but absent in lower limbs; plantar reflexes normal; sensation could not be investigated. Blood-urea, 49 mg. per 100 c.cm. Blood-count: red cells 3,250,000;

1. Campbell, A. C. P. and Biggart, J. H. *J. Path. Bact.* 1939, 48, 245.  
 2. Campbell, A. C. P. and Russell, W. R. *Quart. J. Med.* 1941, 10, 41.

Hb. 36%; white cells 5600; differential count normal. Urine, a trace of albumin.

*Progress.*—450 ml. of stored blood was given with some improvement. An epileptiform convulsion lasting about 15 min. occurred on the third and another on the fourth day after admission. Death in coma on the seventh day after admission.

At autopsy he was found to have a scirrhous cancer of pylorus causing partial occlusion; no metastases found. The heart weighed 370 g., slight coronary atheroma. Lungs, bronchitis only. Brain: minute punctate hæmorrhages in corpora mamillaria; columns of fornix, juxtaventricular areas of thalami, peri-aqueductal grey matter, and floor of 4th ventricle; no hæmorrhages in colliculi or optic nerves.

On cutting the brain in  $\frac{1}{4}$  in. serial slices an area of punctate hæmorrhages was found in the grey matter of the right prefrontal convolution towards the vertex. The lesion did not extend beyond one  $\frac{1}{4}$  in. slice, and involved only  $\frac{1}{4}$  in. of cortex.

The histological findings correspond with those often described in this condition. Irregular dilatation and engorgement of capillaries were associated with hæmorrhages of varying size; these changes were strikingly demonstrated by Pickworth's benzidine stain. Hyperplasia of capillary endothelium was often seen. In addition there were numerous gitter cells, in many of which fat could be demonstrated. Astrocytic proliferation was present. In contrast with these changes evidence of neuronal damage was notably slight. No peripheral nerves were examined.

## SUMMARY

A man suffering from cancer of the stomach died with Wernicke's encephalopathy. During the illness epileptiform convulsions were twice observed, and at autopsy a Wernicke's lesion was found in the cerebral cortex. Cortical lesions and convulsions are both uncommon in Wernicke's encephalopathy.

## TRACHEOBRONCHIAL CYST

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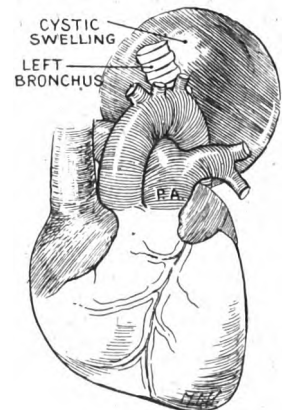
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 LAND ROYAL INFIRMARY

THE patient was a girl and an only child with no family history of disease. Her birth was normal and birth-weight 7 lb. 1 oz. She was breast-fed for the first 6 weeks, and thereafter on a proprietary food. Development was normal until she was 5 weeks old when she was admitted to a hospital with a severe cough, cyanosis and shortness of breath. She was diagnosed as having atelectasis of the left lung. A haziness was seen on X-ray examination, but after 4 weeks in hospital this had almost gone and she was discharged in fair health.

On July 28, 1942, she was admitted to the Children's Hospital at the age of 7 months, having apparently been well until 5 weeks before. At this time she started wheezing and coughing, and was inclined to vomit her feeds; she became short of breath. The signs in the chest were those of chronic bronchitis; temperature normal. The "asthmatic" condition progressed in spite of medical treatment, and on July 31 there was some stridor. After a few days of improvement she became worse, with evidence of consolidation of the left lung. She died on Aug. 26.

*Autopsy.*—A normally developed female child for her age with a well-marked Harrison's sulcus. The right lung was acutely congested and the left lung consolidated. Behind the bifurcation of the trachea and



The cyst as seen at autopsy.

adherent to the left bronchus and base of the heart was a thin-walled cyst slightly larger than a pigeon's egg (see figure). It contained clear jelly-like material and on microscopy was found to be a tracheobronchial cyst lined with ciliated epithelium.

We wish to thank Dr. A. A. Nicol for permission to use the clinical notes.

## Reviews of Books

### Recent Advances in Anæsthesia and Analgesia

(4th ed.) C. LANGTON HEWER, MB Lond., DA. London: J. and A. Churchill. Pp. 341. 18s.

SINCE it was first published in 1932 this has developed into one of the most useful books of reference on anæsthetics now in print. In his new edition Dr. Langton Hewer has retained what has stood the test of time and has included new methods which merit further trial. He has the knack of condensing the substance of an article into a pithy paragraph adding the reference so that the reader can seek more detailed information; over 1000 references are given at the end of the 25 chapters. Two obvious mistakes each depend on the slip of a decimal point. On p. 239 the dose of bromethol recommended is 1 g. per kg. body-weight instead of 0.1 g.; and on p. 318 the pressure at which the valve of the Oxford inflator should be set is incorrectly given as 4.5 instead of 45 mm. Hg. In future editions some of the pictures might be made to tell their tale better, and it is doubtful if the out-of-date method illustrated on p. 242 ever represented an advance. For primary cardiac failure and for overdose of avertin 10% carbon dioxide in oxygen is advised, but no mention is made of the views of Waters on this subject. Dr. Hewer considers the administration of CO<sub>2</sub> mixture in asphyxia neonatorum "a most valuable treatment," and despite the work of Co Tui he would countenance its use in spinal anæsthesia—though with great caution. He gives a reference to support the contention "that ether should preferably be avoided altogether in the badly shocked or toxic patient"; some anæsthetists have not found the patient liable to succumb to this drug provided it is expertly administered. But these are trifling criticisms of a book which is sound, up to date and stimulating.

### Nursing Life and Discipline

SHEILA M. BEVINGTON, PhD, welfare adviser, Vickers-Armstrong, Newcastle-on-Tyne. London: H. K. Lewis. Pp. 89. 7s. 6d.

Dr. Bevington has made a study, based on over 500 interviews, of current practice in hospital discipline of nurses, and of the ways in which that practice affects the nurse's life. She visited five hospitals, all recognised training schools for nurses, and—with the permission of the matrons—has held confidential interviews with members of the staffs. Those interviewed attended voluntarily and remained anonymous. She had also compared the advances made in nursing discipline in recent years with changes in the discipline of schools and prisons and in industry. She comes to the clear conclusion that standards of discipline in the nursing profession have lagged behind advances made elsewhere. Our conception of discipline, as she points out, has changed fundamentally during the last two centuries. It no longer implies retributive justice, or even deference, but rather educative reform, the aim being to foster self-discipline rather than to enforce obedience from without. Her interviews showed that in nursing the old retributive principle still holds, and that there is little attempt to encourage in the nurse a responsible and independent spirit. Thus in one hospital unpunctuality of students at meals was punished by loss of late leave; in another the home sister was permitted to enter their bedrooms at any hour unannounced or immediately after knocking, and to switch off their light after curfew hour. The advantages of non-residence were enthusiastically recounted by trained staff in two hospitals which allowed it; and even the poor accommodation offered by local boarding houses was preferred (because of the greater privacy and freedom) to residence in hospital. Her survey covers

many other aspects of nursing life—the effects of physical strain on use made of leisure, the manner in which rebukes are offered, the hours of lectures, the heavy responsibility for care of the sick coupled with teaching which falls on the ward sister, the quality of meals and the hours at which they are served, the care of the nurse's health, accommodation and regulations in the nurses' home, hours of work, and staff relations. The comments she collected are analysed numerically and this method throws a remarkably vivid light on causes of dissatisfaction in nursing today. The book is able, thorough and timely; it should give hospital authorities a clear insight into the origins of the shortage of nurses and indicate some of the remedies. To hasten these Dr. Bevington advocates the foundation of a Society for Nursing Reform.

### From Thirty Years with Freud

THEODOR REIK. London: Hogarth Press. Pp. 214. 12s. 6d.

IT is disappointing that Dr. Reik has not been able to provide a fuller picture of the remarkable man whose character and genius have commanded the respect even of those who could not accept his observations and doctrine. The vignettes which are offered in the book confirm the impression of dignity, tolerance and moral courage gained from other sources. There are some characteristic utterances reported here (as when he said, on hearing that his books had been solemnly put in the Berlin bonfire by the Nazis along with those of Heine and others, "At least they burn in the best of company") and some heartening indications that even the founder of psycho-analysis could not carry into daily life the detachment and patience with psychopathy required for clinical work: "you are also quite right in your assumption that I do not really like Dostoyevsky, despite all my admiration for his power and nobility. That comes from the fact that my patience with pathological natures is completely exhausted in my daily work. In art and life I am intolerant towards them. That is a personal trait, not binding on others." Besides the personal recollections of Freud and the discussion of some of his writings (especially those in which he examines our society and culture), Dr. Reik includes some scattered essays of his own on psycho-analytical subjects. The book, though it is not the biography which, it may be hoped, one of Freud's intimates will write, is interesting—not merely to psycho-analysts.

### Textbook of Medicine

(6th ed.) Editor: J. J. CONYBEARE, DM Oxf, FRCP. Edinburgh: E. and S. Livingstone. Pp. 1146. 28s.

IT is two years since the last edition of this good small textbook appeared. The size remains about the same, fulfilling the original intention of providing the essentials, but not a synopsis, of medicine. The book includes a long chapter on psychological medicine; it is good to see this subject generously treated instead of being dismissed cursorily in a page or two, or isolated in special books. A section on the legal aspects of mental illness and the scheme for the examination of psychological patients will be especially useful to students. Neurology remains in the expert hands of Dr. F. M. R. Walshe and like Dr. Conybeare's own exposition of diseases of the alimentary tract is a model of accurate teaching. The chapters on tropical diseases have been rewritten by Wing-Commander F. E. Lipscomb and include all the more important examples; this section would benefit from more illustrations, as would also the section on blood diseases. The few illustrations given are a little uneven. Of the 30 X-ray plates some are excellent, others—for example, the one of the rare congenital cystic disease of the lungs—seem out of place in a small book. A radiogram of pneumoconiosis would be more useful. Indeed the section on respiratory diseases is perhaps the least happy in the book; but this branch of medicine is notoriously difficult to teach. Blood-groups, blood-transfusions, the use of stored blood, transfusion and desiccation of plasma and serum are given a good showing, and there are new sections on electroencephalography and scleroderma, and fresh matter on polynneuritis, diabetes, and the sulphonamides.

# THE LANCET

LONDON: SATURDAY, MARCH 6, 1943

## HOUSEHOLD HELP SERVICE

Mr. BEVIN is turning over in his mind the possibility of setting up a service of domestic help on the lines of the present service of district nursing. Its object would be to enable families to tide over those domestic crises which result from maternity and illness. Such crises are familiar to every practitioner. A girl works at a factory, office or school, and lives with her parents or widowed mother; if the mother becomes ill, the girl is faced with the dilemma of neglecting the patient or her job. In such a situation, the "household help" would rescue the sick from neglect or would prevent avoidable absence from work. Similar crises arise when those living in lodgings fall ill, or when the single-handed landlady is herself struck down. Minor illness in old people—and even in younger ones—living alone is yet another cause of domestic upset. Even more, it sometimes leads to serious physical mishap. The fractured femur of the feverish old person struggling to the gas-ring or the closet is not a clinical rarity. Lastly, there are our "non-gainfully occupied" housewives with young children for whom childbirth or illness means not only suffering but domestic chaos. Often the practitioner hears the refusal to contemplate a necessary operation for fibroids or prolapse, based on the impossibility of getting anyone to look after the children. Even illness outside the family sometimes precipitates a domestic crisis, as when it leaves untended children whose parents are both working. That, in brief outline, is the qualitative picture which Mr. BEVIN faces. If he wishes to estimate the size of the problem before embarking on its solution, a social survey will provide him with the answer.

Something of course has already been done. Before the war, most of the London boroughs ran home-help services. If a hospital almoner, for example, wished to get home help for a convalescent patient or a mother leaving hospital with her baby, she could get in touch with the appropriate health department or health visitor who would do the rest. Payment was based on means assessment, with a maximum of something like 30s. a fortnight—the usual period for home help. The Minister of Labour will have to decide whether to base his service on the voluntary societies, the local authorities, or the labour exchanges. Against the first, it will probably be urged that they are weakest in the poorest areas, where the needs will be greatest. In favour of the local authorities it will be said that they already employ health visitors and have had experience in running home helps; but their varying efficiency, and their lack of contact with the public in rural areas may weigh against them.

If the service was centred on labour exchanges, a uniform national coverage could be guaranteed, the complete potential pool of home helpers would be ready to hand, and a further humanising link between the labour exchange and the general public would be established. As a corollary, it would seem essential that each exchange should have a trained welfare officer in charge of the home-help service, to assess need, to sift out bogus claims, and to visit homes.

In choosing her home helps she would have to remember the fear of "the other woman" which sometimes still keeps the sick wife on her feet. We should look to her to assess social and medical need—let us hope the practitioner will be spared another certificate. The prime criterion must be confinement to bed; and once the doctor has given his orders it does not take a medical expert to see that they are being carried out.

## PROTECTION OF LAND-WORKERS AGAINST TETANUS

IN peace-time tetanus is almost an occupational disease, with farmers and gardeners the principal victims. The tetanus bacillus lives in the intestine of many domestic animals, and the spores when shed remain viable in the soil for many years. When the farmer stabs his foot with a fork the spores are carried into the wound, and if conditions are suitable for their germination tetanus ensues after an incubation period varying from 3 to 21 days. With increased activity on the land, involving many relatively inexperienced workers, the risk of accidental wounds is greater, and comment has already been made in the lay press about an increase of tetanus associated with the ploughing-up campaign. Even if such an increase is unproven, it would be well to protect the land-army against this hideous and highly fatal infection.

There is a choice of two methods of immunisation—passive and active. Passive immunity is obtained by giving the patient, as soon as possible after the accident, a prophylactic dose of tetanus antitoxin, which will afford protection for two or three weeks. Too often, however, the wound seems too trivial for medical attention, or the doctor, if called, may be averse from giving an injection of a foreign serum for an injury which 99 times out of a 100 will heal without incident. (There is now, as a matter of fact, almost no risk from such an injection, for tetanus antitoxin has been so concentrated and refined that serum-sickness rarely follows its use.) The alternative course is to immunise all land-workers actively with tetanus toxoid, as practised in the Forces and recommended in these columns<sup>1</sup> for Civil Defence personnel during the blitz. Two 1 c.cm. doses of toxoid are given by intramuscular injection at an interval of 6–12 weeks—toxoid, unlike serum, does not sensitise the recipient against subsequent doses—and any reaction, either local or general, is negligible. The resulting immunity remains fairly high for at least two years, but should be reinforced by a renewal dose of 1 c.cm. of toxoid once a year.

Active immunisation is a most valuable safeguard, but does not absolve us from further action where the risk of tetanus in a wound is obvious. The effect of toxoid is not so much to raise the antitoxin content of the blood as to set up a shadow factory which will produce antitoxin when need arises. Unfortunately in cases of massive infection enough toxin to cause clinical tetanus may be produced before the shadow factory comes into full operation, and during this interval it is wise to protect the patient passively with one or more doses of antitoxin. Alternatively the shadow factory can be stimulated into more rapid production by a dose of toxoid, which is more powerfully antigenic than natural toxin. The lesson to be

1. *Lancet*, 1940, II, 457.

drawn from Army experience<sup>2</sup> and animal experiment<sup>3</sup> is that any protected land-worker who suffers a deep or extensive soil-infected wound should have that wound surgically excised and should be given a dose of tetanus antitoxin or a further injection of toxoid. It is not at present possible to say which of these is preferable for the additional protection of severely injured persons who have previously been immunised, but as the British Forces use antitoxin and the French, American and Canadian Forces use toxoid, we may someday get an answer.

### HYPERTROPHY OF MALE BREAST

IN endocrinology the study of rare pathological conditions has often added to knowledge of normal processes, and eventually no doubt normal lactation and glandular enlargement of the male breast will fit into an orderly hormonal pattern. At present all is disorder.

Development and function of the female breast is controlled by at least two glands—the ovary, through its oestrogenic and progestational hormones, and the anterior pituitary both indirectly through its control of ovarian function and directly by a galactopoietic action. It seems probable that oestrogens stimulate the development of the units and progestational hormones the growth of the alveoli. Oestrogens in small quantities stimulate milk secretion as well, at any rate in virgin goats and heifers,<sup>4</sup> but in large doses they depress the galactopoietic activity of the pituitary and suppress lactation. The rôle of the pituitary is confused by the fact that an extract capable of initiating lactation will also cause growth of a pigeon's crop-gland, a discovery which for years led physiologists astray, for the two functions do not run parallel. FOLLEY'S<sup>5</sup> suggestion that the word prolactin should in future be used only for the crop-gland factor will, it may be feared, continue the confusion for those whose minds tend to work in etymological channels.

It would seem, then, that the failure of males to suckle their young may be explained by lack of oestrogens and progesterone in quantities sufficient to build up their mammary ducts and alveoli. This hypothesis is supported by the occurrence of breast development, and even "witch's milk," in infants recently subjected to the maternal hormones, and by occasional embarrassing epidemics of gynæcomastia in stilboestrol factories. Unfortunately it does not cover all the facts. Male rats, for instance, suffer a normal increase in mammary tissue at puberty, and this change can be prevented by castration,<sup>6</sup> which suggests that androgenic hormones also may be involved. Further, according to KRISS,<sup>7</sup> neoplasm of the testicles (carcinoma or teratoma) is the commonest cause of gynæcomastia. A teratoma elsewhere, a hypernephroma or a chorionepithelioma<sup>8</sup> may also be responsible; and to make the problem yet more difficult, cases of atrophy of the testicles have also been associated with increased mammary development.<sup>9</sup> Less commonly, adrenal cortical tissues

have been apparently to blame; and here we are on firmer ground, for the combined androgenic, oestrogenic and progestational activities of cortical extracts make almost anything possible. BROWNELL<sup>10</sup> has succeeded in maintaining lactation as well as life in adrenalectomised animals by means of a cortical extract. Desoxycorticosterone acetate causes gynæcomastia in mice.<sup>11</sup> Gynæcomastia has been observed in Addison's disease treated with 'Eschatin'<sup>12</sup> and with desoxycorticosterone.<sup>13</sup>

In our present issue RICHARDSON describes a case of gynæcomastia in which no other endocrine abnormality could be demonstrated. That such cases occur is well known, but their details are seldom if ever published. It is important to the study of lactation that all patients with abnormalities of the breast should be as fully investigated as Richardson's patient, and should be followed carefully through the years.

### TROPICAL NUTRITIONAL ANÆMIA

IN India WILLS, NAPIER and others have demonstrated nutritional anæmias arising from deficiency of "extrinsic factor" or iron or both. Most of their observations were made in pregnant women, but "tropical nutritional anæmia" may affect either sex at any age, and even before the war was also seen in temperate countries like Greece. Reports from TROWELL in Uganda, published in these columns<sup>14</sup> and elsewhere,<sup>15</sup> are noteworthy because he has studied a large group of these cases by a really modern technique. Like others before him, he finds that he is dealing with a double deficiency of extrinsic factor and iron; the former produces a macrocytic orthochromic anæmia, the latter a microcytic hypochromic anæmia. The blood-picture presents a combination of the two and he proposes the name "dimorphic anæmia." This is, he thinks, the commonest anæmia of tropical and subtropical climates—"the less well-fed parts of the world"—where hardly any case shows deficiency of only a single factor, and true pernicious anæmia is extremely rare.

Hæmatology in the tropics is made more difficult by the prevalence of diseases that cause anæmia by blood-destruction, and possibly by interference with erythropoiesis; malaria, hookworm, bilharzia, and the dysenteries are the commonest. Where evidence of infection or infestation is found, it is all too easy to put down the anæmia as "secondary," and to give a course of antiparasitic treatment as a first step; but this often has disappointing results, and when anæmia persists it is often treated in too haphazard a manner. TROWELL contends that, in Uganda at any rate, it is better to think of the patient as having nutritional anæmia, complicated by an infection or infestation (e.g., malaria or hookworm). The right approach in his opinion is first to ascertain the type of deficiency; secondly to find out what diseases are accentuating the deficiency and destroying blood-cells; and thirdly to look out for other serious diseases that might cause anæmia. He now bases his classification on examination of the blood-smear, the bone-marrow from

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9. Klinefelter, H. F., Reifenstein, E. C. and Albright, F. *J. clin. Endocrinol.* 1942, 2, 615.

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11. Heuverswyn, J. van, Folley, S. J. and Gardner, W. U. *Ibid.* 1939, 41, 389.  
12. Edwards, R. A., Shimkin, M. B. and Shaver, J. S. *J. Amer. med. Ass.* 1938, 111, 412.  
13. Lawrence, R. D. *Brit. med. J.* 1943, i, 12.  
14. Trowell, H. C. *Lancet*, 1943, i, 43.  
15. Trowell, H. C. *Trans. R. Soc. Trop. med. Hyg.* 1942, 36, 151.

sternal puncture, and—via estimates of hæmoglobin and mean corpuscular volume—the mean corpuscular hæmoglobin concentration. This combination is the best at present available<sup>16</sup>; it avoids the fallacies arising from reliance on the colour-index, and makes other estimations, especially that of mean cell diameter, unnecessary. In classifying the results of sternal puncture TROWELL uses the classification proposed by ISRAËLS,<sup>17</sup> modified to meet his special conditions.

In this East African series the commonest abnormality was a macrocytic hypochromic anæmia with a mixed megaloblastic and normoblastic reaction in the marrow; next commonest were the macrocytic orthochromic and normocytic hypochromic types; pure microcytic hypochromic anæmia was seen only very rarely. In other words, most cases showed mixed deficiency of extrinsic factor and iron, with varying predominance of one or the other; they have "dimorphic anæmia." Where megaloblasts were found in the marrow smear, liver extracts were always needed in treatment, whatever the final blood-picture. Treatment of the anæmia<sup>15</sup> was by liver and iron, and in Uganda, as elsewhere, the purified extracts used for pernicious anæmia have proved unsuitable except in

16. *Lancet*, 1942, II, 337. 17. Israëls, M. C. G. *Ibid.*, 1941, II, 207.

## Annotations

### GROWTH OF AN ACCIDENT HOSPITAL

BIRMINGHAM Accident Hospital has now been in full swing for over a year and its second annual report tells how from the beginnings made in 1941 the work has developed despite restrictions on staff and building. Nearly 20,000 new patients have been treated and there were over 90,000 casualty attendances. Inpatients numbered over 2000, some 8000 operations were performed, and more than 2000 patients have passed through the rehabilitation department. Working at high pressure in factories inevitably means more accidents, and the war which has hindered the growth of the hospital has also increased the need for it. When the building programme is completed—some time this year—an appeal will be made to the Central Medical War Committee for three more doctors, for this increase would enable the work of the hospital to be nearly doubled. Over 11% of reportable industrial injuries are classified as septic and the Medical Research Council have been quick to grasp the opportunity offered by the Birmingham clinical material, and they have set up a wound infection unit at the hospital under the direction of Prof. A. A. Miles and with the collaboration of the staff. At present the work consists mainly of a bacteriological survey of the problems of wound infection peculiar to industry, in the patients arriving at the hospital and, with the collaboration of local industrial medical officers, of wounded people in the factories. It includes investigations into the effect of different methods of cleaning, treating and dressing the newly inflicted wound upon the sepsis-rate and the duration of sepsis; into the design of safe dressing routines and outpatient dressing stations; into the incidence of carriers of infecting bacteria among factory workers, patients and hospital personnel, and its relation to sepsis; into the effect of different metals on the subsequent history of the injuries they inflict; and, in collaboration with another MRC worker, Dr. Ethel Florey, into the value of penicillin in the treatment of septic wounds.

It is hoped that industry will soon come to consider the hospital "as a real part of its own medical services"

large and uneconomical doses. Even using the crude extracts, which are more effective, much larger doses are required than in pernicious anæmia, but  $\frac{1}{2}$  lb. liver daily by mouth is both cheap and successful. The yeast extract tried was useful only in doses of 1–2 oz. daily, which was too much for most patients to swallow. Naturally, if any associated infection or infestation is detected, it too must be treated.

TROWELL'S researches are of general application since they show in outline how the problem of nutritional anæmia can be tackled from the hæmatological side. When we reflect that the "less well-fed parts of the world" now include all Europe, most of Asia, large regions of Africa and probably a larger part of the New World than most people suspect, the implications of this work are seen to be wide. Those who are to deal with nutritional anæmia must include in their armoury not only the normal apparatus of blood examination, but also the sternal-puncture needle and if possible the hæmatocrit tube, so that diagnosis may be firm and our limited amounts of liver extracts safeguarded for use where really needed. More work is required from the chemists to detect the factor or factors in liver extract that cure this anæmia. To administer large doses of extracts intended for other use is wasteful.

and the almoners department is proving a dependable bridge between the factory and the bedside. Personal contacts with employers and welfare departments smooth the patient's return to suitable work. Money is a crude measure of appreciation, but the £17,000 which local firms contributed last year to the hospital's income of just under £60,000 suggests that they are beginning to take a proprietary interest in it. The authorities suggest that 2s. per employee per annum would probably be a reasonably profitable investment for most businesses.

In collaboration with the university the hospital has also been giving courses for the certificate in industrial nursing which has been set up and if (or should it be when?) a Nuffield chair of social medicine is established at Birmingham its scope as a teaching hospital would quickly increase.

### RECENT EXPERIENCE OF ENCEPHALOMYELITIS

At the end of the last war acute encephalitis was almost synonymous with encephalitis lethargica, which itself had been known for only two years. A few years later the first cases of postvaccinal encephalitis were observed, and shortly afterwards it was recognised that smallpox, measles and other exanthems are occasionally complicated by encephalitis with a similar pathological picture of perivascular demyelination. Meanwhile epidemic forms of encephalitis, observed in different countries, were found to differ from encephalitis lethargica and from each other and to be caused by different neurotropic viruses—Japanese encephalitis, St. Louis encephalitis, the Western and Eastern forms of equine encephalitis in the United States, and most recently of all Russian encephalitis. At the same time pathologists have been distinguishing varieties of demyelinating encephalitis, the cause of which remains obscure. It seems likely that many of these forms of encephalitis are actually new, or at least have never before occurred in comparable numbers.

This rich efflorescence was the subject of a discussion at the neurological section of the Royal Society of Medicine on Feb. 18. Dr. W. Russell Brain mentioned the supervention of encephalitic lesions in meningococcal infection and scarlet fever, and in infections commonly viscerotropic, such as epidemic hepatitis, glandular fever and mumps. He also described the rare

neurological complications of inoculation with TAB vaccine and tetanus toxoid, and said it had not yet been shown that poliomyelitis follows antidiphtheritic inoculation with significant frequency. He reported an example of a rare form of encephalitis characterised by the presence of eosinophil inclusion bodies in the nuclei of the cortical ganglion cells and presumably caused by a virus. Dr. J. G. Greenfield described the pathological changes in this case and also of three other pathologically distinct forms of encephalitis, an acute encephalitis of the virus type, "influenzal" encephalitis and the acute hæmorrhagic leucoencephalitis of Hurst. Dr. Elizabeth O'Flynn spoke on the clinical features and Dr. Dorothy Russell on the pathology of another case of "inclusion encephalitis," and Dr. Russell added a second case of Hurst's variety. The pathological picture of this is highly distinctive, with punctate hæmorrhages visible to the naked eye in the white matter of the brain, while microscopically, besides the hæmorrhages, there are areas of perivascular necrosis and demyelination and a strikingly diffuse infiltration with polymorphonuclear cells. As Dr. Greenfield pointed out, this form of encephalitis seems to be a link between "acute hæmorrhagic encephalitis" and the demyelinating varieties.

Only a knowledge of ætiology can bring order into the classification of acute encephalitis. At present it seems likely that the pathogenesis of demyelination will involve mechanisms quite distinct from direct infection of the nervous system and in which local tissue anoxia may play an important part. The solution of this riddle may be expected to throw light on disseminated sclerosis and Schilder's disease.

#### SHEPHERD'S PURSE AND HÆMOPHILIA

"BACK to the land" seems to be the motto of those who wish to find substances that will influence the clotting of blood: vitamin K is found in alfalfa, cauliflower, cabbage, and other vegetables; di-coumarin—which decreases the coagulability of the blood—was discovered by a study of spoiled sweet clover. And now shepherd's purse (*Capsella bursa-pastoris*) extract is claimed by Copley and Lalich<sup>1</sup> to increase the clot resistance in hæmophilia. The claim is not quite new; Hegi<sup>2</sup> tells us that herba bursa-pastoris, fresh or dried, was long ago used as a hæmostatic, especially for menorrhagia, and that an infusion or tincture is still in use on the Continent for hæmoptysis and other internal bleedings. The American authors had noted that after bleeding has stopped from a finger-prick it can be restarted by putting a sphygmomanometer cuff round the arm and applying a pressure somewhat lower than systolic. The effect does not last long; in normal subjects, 5 minutes after free bleeding has stopped a pressure of 100 mm. Hg will no longer start bleeding again, and the interpretation put on this finding is that the clot formed in the wound will now stand up to a blood-pressure of this level. The test is carried out with the finger immersed in saline at body-heat so that the blood-vessels shall be fully dilated. In 2 hæmophiliacs, however, it was found that such a pressure continued to dislodge the clot for over an hour after bleeding had ceased. Ordinary bleeding time was about 3 minutes in each patient. Shepherd's purse extract and transfusion of citrated blood were given, and this treatment greatly increased the clot resistance to pressure. It is not clear why these workers adopted combined therapy when they were trying to assess the effects of one substance; it is especially unfortunate that blood transfusions were given, since these are known to influence the coagulability of hæmophilic blood *in vivo*, and no control figures are given to show the effect of blood transfusion alone on clot cessation. To award the palm to bursa-pastoris seems to be somewhat premature and more controlled work is needed

before shepherd's purse joins the select company of clot-influencing plants. Steinberg<sup>3</sup> and Brown<sup>4</sup> in 1939 studied its hæmostatic effects and those of other plants, and stated that oxalic acid was the active agent. Page, Russell, and Rosenthal<sup>5</sup> reported that intravenous injection of oxalic acid produced favourable effects on the blood-coagulation time of hæmophiliacs, but the results lack confirmation. Copley and Lalich's article is useful because it reminds us of these claims made for oxalic acid and suggests a possibly helpful test in hæmophilia.

#### RESEARCH AT THE ROYAL CANCER HOSPITAL.

A SELECTION has now been made from the great variety of clinical, radiological and chemical investigations made at the Royal Cancer Hospital and its associated research institutes in the twelve years before 1940.<sup>5</sup> Collection of related papers from the scattered publications in which they first appeared is always a convenience, and here it has special value because it comes from the fountain-head of most of our present knowledge of carcinogenic chemicals. Two papers summarise the brilliant achievements of Prof. J. W. Cook, Prof. E. L. Kennaway and their colleagues in the synthesis of these substances, and they provide also a complete bibliography up to 1937 of all work even remotely related to this subject. A third paper, originally published in America and not easily accessible here, on the two latest and most rapidly acting of these compounds—the di- and trimethyl substitution products of the 1:2-benzanthracene molecule—has been reprinted in full. Contributions by Prof. W. V. Mayneord and his collaborators are the culmination of at least ten years' work directed to increasing the accuracy of measurement of X-ray dosage within the tissues. The astonishing ability of X rays, on occasion, to cause tumours to melt away completely encourages the search for means of overcoming the factors responsible for uncertainty in the results. The remaining papers on chemotherapy, on the growth-inhibitory action of some carcinogenic compounds and on other pathological effects of these compounds record work which is either still in progress or cannot yet be assessed.

Of the five clinical papers on the rectum, the thyroid, the breast, bronchial carcinoma and multiple meningeal and perineural tumours, perhaps that by Mr. C. A. Joll on Hashimoto's disease (struma lymphatosa, often confused with Riedel's disease, or "ligneous thyroid") is the most useful, since this disease has not yet reached many textbooks.

#### CONVULSIONS ON WITHDRAWAL OF DRUGS

It is well known that convulsions may occur during an attack of delirium tremens following withdrawal of alcohol in a chronic alcoholic. It is not so generally recognised that fits may be a symptom of other drug withdrawals. Three years ago Kalinowsky<sup>6</sup> observed isolated fits in seven patients 4-5 days after the withdrawal of soluble barbitone, which had been regularly administered in rather large dose for one or two years. None of the patients' histories or family histories, nor (so far as they were obtained) their electro-encephalograms, suggested epilepsy, and in no case has there been any recurrence of fits since. Kalinowsky also finds evidence of withdrawal convulsions with chloral and paraldehyde, which are both anticonvulsant drugs, but not with opium or its derivatives, which are of little use in controlling fits. For each drug there is a specific time-interval between withdrawal and the occurrence of the fit, and this interval bears a close relation to the

3. Steinberg, A. and Brown, W. R. *Amer. J. Physiol.* 1939, 126, 638.

4. Page, R. C., Russell, H. K. and Rosenthal, R. L. *Ann. intern. Med.* 1940, 14, 78.

5. Selected papers from the Royal Cancer Hospital (Free) and the Chester Beatty Research Institute, London. Vol. 1. Pp. 484, 168.

6. Kalinowsky, L. N. *Arch. Neurol. Psychiat. Chicago*, 1942, 48, 946.

1. Copley, A. L. and Lalich, J. J. *Amer. J. med. Sci.* 1942, 204, 665.  
2. Hegi, G. *Flora von Mittel-Europa*, Munich, 1919, 4, 366.



rate at which the body gets rid of the drug remaining in the system. Convulsions are seen only after withdrawal in chronic drug-addiction; they never follow acute intoxication.

Kalinowsky has not much to say about the physico-chemical mechanisms involved in the production of fits, but he thinks that the same mechanisms are responsible for the accompanying deliriums observed especially after withdrawal of alcohol and paraldehyde.

### TREATMENT OF ECLAMPSIA

CLASSICAL methods of treating eclampsia are associated with Stroganoff and with the Dublin School and they are well known. Stroganoff<sup>1</sup> has always insisted that the greater the number of convulsions the more likely is the woman to succumb, and that the essential thing is the prevention of fits. Accordingly he advocates deep sedation, keeps his patients extremely quiet and free from disturbance in a darkened room, and administers chloroform for even such trivial procedures as the injection of morphia through a hypodermic needle. The Dublin School method, originated by Tweedy,<sup>2</sup> presupposes the existence of an intestinal toxin and aims at emptying the bowel in order to prevent further absorption of the offending poison. Stroganoff's own figures are remarkable, and though other workers have failed to obtain comparable results by the use of his method he has impressed upon obstetricians the paramount importance of morphia, quiet and conservatism in the treatment of the eclamptic patient.

Cunningham<sup>3</sup> has recently reported a series of 105 cases observed during 1934-41. His treatment combines sedation carried out on Stroganoff lines with the colonic lavage of the Dublin School, and he prefers nitrous oxide to chloroform because of the toxic action of the latter drug on the liver. In every case the amount of œdema, the state of the cardiovascular system, and the condition of the liver and kidneys must be taken into consideration and the treatment modified accordingly. If a patient with a renal lesion develops eclampsia then renal breakdown and post-eclamptic uræmia may develop; a patient with pre-existing cardiovascular trouble is liable to apoplexy or cardiac failure. Patients with severe œdema were dehydrated according to the practice of Arnold and Fay<sup>4</sup>; those with a blood-pressure of over 160 systolic had venesection, 400 c.cm. of blood being withdrawn. Eclamptics who exhibited signs of liver involvement (vomiting, epigastric pain or jaundice) received glucose and calcium gluconate. In the entire series of 105 there were 15 deaths (14.2%). In the first group of 55 cases the mortality-rate was 18.1%; in the second group of 50 cases it was 10%.

Dehydration by the method of Arnold and Fay was tried; that is, 50 c.cm. of 80% glucose was injected intravenously, followed 4 hours later by 2-4 g. of magnesium sulphate in a 20% solution also given intravenously. He found that the blood-pressure tended to rise after the initial injection of glucose, often as much as 10-15 mm. Hg. If the magnesium sulphate was given at the same time as the glucose, however, there was no rise in blood-pressure and fits were controlled more satisfactorily. Cunningham maintains that early administration of magnesium sulphate helped to account for the lower mortality in the second group of his series. His results compare favourably with recent figures published by Diradourian and Ahumada, but still fall short of Stroganoff's achievements.

Cunningham has wisely abandoned the old practice of gastric lavage—a procedure too disturbing to the patient to be justified, and occasionally responsible for a

dangerous degree of shock. Whether colonic lavage with its attendant manipulations is desirable is doubtful but most modern authorities prefer to worry the patient as little as possible. Operative interference during the phase of convulsions should be limited to a low forceps extraction if there is any sign of delay on the perineum. The mouth and upper respiratory passages must be kept free from mucus, a glass mucus extractor attached to a Higginson's syringe serving well for this purpose. Oxygen should always be given when there is cyanosis or laboured breathing.

### SYPHILIS IN YOUNG MEN

IN the United States the Selective Service Act of 1940 provided a unique opportunity of discovering the incidence of syphilis among young men, by requiring a serological test as part of the general examination of every conscript and volunteer. Up to Aug. 31, 1941, over two million tests had been done; of these nearly 1,900,000 were on white or negro men between 21 and 35 inclusive, and Vonderlehr and Usilton<sup>1</sup> of the US Public Health Service have analysed the results. Positives included men with suggestive early lesions found at the clinical examination as well as those with positive or doubtful test results. Even when doubtful results are included the figures for positives are likely to be too low, for Parran and his associates in 1941 found that less than 0.3% of known non-syphilitic bloods gave a positive serological reaction, whereas 10-15% of known syphilitic bloods gave a negative one. The syphilis-rate in the men examined was 45.3 per 1000. The rate rises rapidly with age, owing to the accumulation of uncured cases; at 21-25 it was 30.1, at 26-30 it was 54.4, and at 31-35 it was 83.2 per 1000. The sample was not a fair one of the general population; for instance, it contained a relatively high proportion of younger men because fewer of these have dependants or occupations which would defer their call-up. By using the 1940 census reports, however, it was possible to correct the results for age, residence (urban or rural) and race (white or negro), and though there are other factors which no doubt weighted the figures the corrected rates are reasonably accurate. For the whole male population of the United States between 21 and 35 the calculated incidence was 47.7 per 1000. For negroes the corrected rate was 272 and for white men 23.5 per 1000. The highest rates were found in the south-eastern agricultural states of Mississippi, Florida, South Carolina and Louisiana; the lowest in the northern industrial states. Curiously enough, the corrected rates were slightly higher for rural than for urban areas, the figures being 49.4 and 46.5 per 1000, though when whites and negroes were considered separately each showed a relatively higher rate in towns.

### BREAST OR BOTTLE?

WHEN the conscientious practitioner or child-welfare medical officer is reasoning with an intelligent mother who is considering premature weaning, he must often long for unanswerable figures to prove his contention that the breast-fed baby has a better chance of life than the bottle-fed. In 1934 Grulee<sup>2</sup> of Chicago did produce such figures, but Chicago is a long way off and bottle-feeding has improved since 1934. Grulee analysed the histories of 20,000 infants attending well-baby clinics up to the age of nine months; in the bottle-fed the incidence of infections was twice as great and the death-rate ten times as great as in the breast-fed. This was a striking result, and though other factors—for instance, the probably higher proportion of illegitimate and unwanted children in the bottle-fed group—may have contributed, no-one would

1. Stroganoff, W. *Zbl. Gynäk.* 1901, p. 1309.

2. Tweedy, E. H. *Brit. med. J.* 1911, II, 990.

3. Cunningham, J. F. *Irish J. med. Sci.* 1933, p. 33.

4. Arnold, J. O. and Fay, T. *Surg. Gynec. Obstet.* 1932, 55, 2.

1. Vonderlehr, R. A. and Usilton, L. J. *J. Amer. med. Ass.* 1942, 120, 1369.

2. Grulee, C. G., Sanford, H. N. and Herron, P. H. *Trans. Sect. Pediat. Amer. med. Ass.* 1934, p. 25.

doubt that bottle-feeding was the main one. Now Ebbs and Mulligan<sup>3</sup> have set out to answer two questions raised on ward rounds at the Hospital for Sick Children, Toronto: Are more artificially fed than breast-fed babies admitted to the hospital with infections? Is the chance of survival from an infection greater in the breast-fed than in the bottle-fed? They examined the records of 1500 consecutive cases of infection in babies under a year old, and found that 15.1% were breast-fed, or had been up to eight months, 29.1% had been breast-fed for at least six weeks and then artificially fed up to the time of admission, and the remaining 55.7% had not been breast-fed at all, or had been weaned before six weeks. The corresponding figures at well-baby clinics in Toronto were 35.6, 36.2 and 28.1%, so that the answer to the first question is "Yes," whether the inquirer was meaning relatively to the whole population or absolutely. The infections were respiratory or associated ones in roughly three-quarters of the babies, gastrointestinal in 21%, and miscellaneous in the rest, but only 7.5% of the breast-fed group had gastrointestinal infections. The mortality among the breast-fed was 18.5%, among the mixed feeders 12.1%, and among the artificially fed 16.4%, giving a slight advantage to wholly or almost wholly bottle over wholly breast, and a slightly greater advantage to wholly or mainly breast (14.3%) over wholly or almost wholly bottle. But in this study "other factors" loom large. A practitioner will more readily send a bottle-fed baby to hospital than a breast-fed one—and rightly so—thus complicating the answer to question one. We are not told whether babies admitted on the breast are automatically put on the bottle, or whether every effort is made to continue with breast-feeding, or at least breast-milk feeding; a sudden change of feed in the middle of an infection might account for some of the mortality among the breast-fed. This kind of study, in fact, is not going to provide our convincing answer for the wavering mother. We need a large-scale inquiry covering, like the Chicago one, all the babies attending a group of welfare clinics; or better still one which includes the whole infant population of a town. And the British mother will be more convinced if the figures come from her own country.

### THE UTERINE PACK

BIMANUAL compression, intravenous oxytocic principle and intramuscular ergometrine are the first line of defence against bleeding from an atonic uterus after delivery; but on the rare occasions when they fail no time must be lost in packing the uterine cavity. Anderson and his collaborators in Nebraska draw attention<sup>1</sup> to the advantages of a pack impregnated with sulphanilamide powder. Taking 4½ feet (a length on the meagre side) of 36 in. gauze, they make 16 complete folds so that the final width is about 2½ in.; the pack is then moistened and 10 grammes of sulphanilamide powder is rubbed into the material. A small cotton ball is inserted about 9 in. from the fundal end of the pack with a piece of black thread attached, in such a way that only two layers of gauze will separate the ball from the uterine decidua: this ball provides a handy piece of material for bacteriological investigation on the withdrawal of the pack. A metal tag is attached to the opposite end and the pack is rolled up tag end inwards. It is sterilised by autoclaving at 255° F. for ½ hour under 20 lb. pressure.

The patient is placed in the lithotomy position and anterior and posterior vaginal specula are introduced. (A large tubular speculum would be preferable, since it would shut off the potentially infected vaginal walls, which must contaminate the pack when it is being inserted with two separate retractors.) The anterior and posterior lips of the cervix are grasped and steadied with ring forceps and the pack is inserted with a third long ring forceps. The fundus is steadied with the operator's left

hand and the cavity snugly but not tightly plugged. The patient may afterwards complain of malaise, with fever, and a rigor in some cases, but in the opinion of Anderson and his colleagues this does not necessitate removal of the pack. The 37 sulphanilamide packs they have used were left in situ for an average of 54 hours; most British obstetricians would think 12–24 hours a safer maximum, since by then the packing has done its work and delayed post-partum bleeding after that is unlikely. When the pack is withdrawn a small portion of the cotton ball is cut off, rubbed over a blood-agar plate and transferred to a suitable culture medium for incubation.

In the 37 cases the membranes had been ruptured, on the average, for more than ten hours before tamponade was undertaken, but morbidity (judged by a rise of 2° F. above normal) was only 38%. On removal the packs were odourless; 15 of them were sterile and only 1 yielded a hæmolytic streptococcus. A comparison is made with 27 plain gauze packs (only 2 of which were sterile when removed) and 6 incorporating iodoform, and the evidence, so far as it goes, is in favour of sulphanilamide. A sterile pack impregnated with this substance should be kept prepared in a sterile container in the labour ward and in the accoucheur's drum.

### PHOSPHORUS BURNS

ONCE the phosphorus has been completely removed, a phosphorus burn may be treated like any other burn. But until it is certain that no phosphorus remains in the tissues it is unwise to use oily or greasy applications, which may dissolve phosphorus and thus aid its absorption. In a paper published in our issue of Feb. 13 Dr. Obermer proposed the use of amyl salicylate for the dressing of such burns; and it should perhaps be pointed out that amyl salicylate is a solvent and therefore ought not to be applied until one is certain that all phosphorus has been removed. The advantages which have been claimed for amyl salicylate in burns are that it relieves pain, promotes granulation, and lessens exudate; and its use has been advised for large mustard-gas burns which pour out fluid. Whether it is suitable for phosphorus burns at any stage is doubtful, for the secretary of the burns subcommittee of the Medical Research Council informs us that experimental phosphorus burns treated with amyl salicylate healed more slowly than those treated by other methods.

### LORD LUKE

THE voluntary hospitals, of London especially, have lost a good friend in the death of Lord Luke on Feb. 23. His epitaph may be found in the short history of King Edward's Hospital Fund of which we spoke on p. 275 of our last issue. For 42 years he was associated with the fund as committee man, chairman of the combined appeal and revenue subcommittees, and finally one of the hon. secretaries. After his elevation to the peerage in 1929 he smoothed the way in the Upper-House for the passage of bills authorising voluntary hospitals to collect third-party risks and to take paying patients. Latterly he was a discerning and competent chairman of the Ministry of Health committee on nutrition. If coming generations should forget the name of George Lawson Johnston they will recall the hospital administrator who chose to be remembered by the name of St. Paul's doctor friend and companion.

1. Anderson, H. E., Gardner, H. L., Gunderson, M. F. and Slack, J. M. *Amer. J. Obstet. Gynec.* 1942, 43, 410.

"If you steal from one author, it's plagiarism; if you steal from many, it's research."—Wilson Mizner, quoted by Alva Johnston in the *New Yorker* for Oct. 10, 1942, p. 21.

If you steal from all, it's culture.

3. Ebbs, J. H. and Mulligan, F. *Arch. Dis. Childh.* 1942, 17, 217.

## Special Articles

## MANY ASPECTS OF VENEREAL DISEASE

A CONFERENCE, arranged by the Central Council for Health Education, to discuss health education and the venereal diseases was held at Friends House on Feb. 26 with Dr. CHARLES HILL presiding. The delegates included representatives of local government, of medicine and the Church. These groups, and the individuals who made them, all keenly desired the same end—control of venereal infection. Yet it was instructive to see how they differed in their approach to the problem and so in the means they advocated to achieve success.

## THE GENERAL PROBLEM

Mr. ERNEST BROWN, the Minister of Health, was anxious for his hearers to see things in terms of administrative machinery, and to learn from them any better ways of doing the job. The public still have a prejudice, he said, against the subject being discussed by women—a prejudice that must be broken down. Regulation 33B leaves the voluntary basis of treatment unchanged, and is intended to stop a gap in the treatment services; but it is only one item in the Government programme. The press campaign will continue to lay stress on the principle: "Clean living is the only way to escape infection." Posters will be displayed not only in public conveniences but in the open air. Films will probably be shown in ordinary cinemas telling the dangers of these diseases, and the need for frank discussion. He urged local authorities to take full advantage of posters, leaflets, lectures and films provided by the CCHE; to arrange that reference to venereal diseases should be made in general health talks; and to review treatment facilities in their areas, with a view to seeing that a patient should not have to travel more than ten miles for advice.

The ARCHBISHOP OF CANTERBURY believed that this should be seen primarily as a social, moral and spiritual rather than as a purely medical issue. He pressed for the extension of clinics and development of public propaganda; but he was disquieted by the suggestion lying behind regulation 33B and behind such measures as the provision of prophylactic packets to troops. "If teaching and suggestion are in conflict," he said, "suggestion will win every time." Measures like 33B tend, he felt, to create the suggestion that infectious contacts are being dealt with and that the concern of the Government is to make fornication medically safe. The balance must now be redressed by education. He admitted that the Church had shared with others the tendency to avoid the subject because it was disagreeable. Education must be directed, he believes, towards awakening in people a sense of the sacredness of sex and an understanding of the duty and possibility of chastity. Recreational activities should be provided for both the Forces and the civilians, and inducements to taking too much alcohol should be removed as far as possible. Wide instruction should be given on the dangers of promiscuity and the duty of seeking early treatment.

Baillie VIOLET ROBERTON, ex-convener of public health to Glasgow corporation, spoke of some of the difficulties faced in a large port. Recreational facilities are being provided, and port welfare committees are being set up, but police powers are not yet sufficient to prevent girls being taken on board ships for immoral purposes.

Miss D. MACHNEE, chief almoner at St. Mary's Hospital, Paddington, enumerated the types of patient passing through a large clinic. There are, of course, many professional prostitutes; there are also unprofessional prostitutes, girls who are adding to the wages received for an ordinary job; there are also large numbers of married women infected by their husbands; congenital syphilitics who may have reached adult life before they know they are infected; children who have acquired gonorrhoea from sharing a towel; and some with a primary sore of the lip. She told how young girls reaching London from the country would be met at the station by touts who would offer them jobs as housemaids and take them to brothels. Irresponsible employers of domestic servants do not realise that young people need friends of the other sex, and somewhere to meet them. The almoner has a considerable part to play, Miss

Machnee feels, in rehabilitating girls who have fallen into bad hands; and must be prepared to find them job after job until they finally settle.

In the general discussion which followed, Dr. OTTO MAY pointed out that every case of venereal disease derived directly or indirectly from promiscuity. He thought education should be aimed at encouraging abstinence from irregular sexual relationships; and abstinence and prophylaxis, he said, won't mix. The emotional urge to intercourse is not particularly powerful, he thinks, in the young ages. The trouble is that sexual maturity is reached before economic maturity; but the recommendations in the Beveridge report, if implemented, would make marriage possible at an earlier age. He pointed out that since no-one wishes to employ the prostitute, prostitution is becoming a reserved occupation in this war.—Dr. MAITLAND RADFORD felt that a false antithesis was before the meeting: the distinction was not between a moral and an amoral approach but between the Church and the secular approach. Sex is not universally regarded, he said, as sacred. Yet all parties at the conference were seeking to overcome venereal disease, public soliciting, public indecency, illegitimacy, prostitution, over-indulgence in alcohol and irresponsible sex behaviour. He feared the establishment of any sex taboo which would lead the young to break out and become rebels. We owe the young food, a house, a job, early marriage, children, social security and education.

Alderman ERNEST BLOOM, mayor of West Hartlepool, advocated sex education in secondary and elementary schools. Meanwhile he believed in prevention.—Sir DRUMMOND SHIELS felt that patients must be attracted, for treatment, to good clinics, human and friendly, and held at convenient hours. Education in war-time must be directed specifically towards venereal disease, not because that was best but because the need was urgent. With adolescents this should form part of graduated sex education.

Sir FRANCIS FREMANTLE objected to any distinction between the medical and moral sides of the question. He thought a good way to educate the men in the Services would be to distribute Miss Machnee's speech among them.—The Rev. GEORGE KENDALL, who had been chaplain of the largest VD hospital on the Rhine after the 1914-18 war, made a plea for open-air discussion of the question, and invited the Archbishop to share his platform in Hyde Park.—Dr. DAVID NABARRO urged the need for a blood test of every expectant mother.—Alderman W. L. DINGLEY, Warwickshire County Council, said that more than 12% of inmates of mental hospitals owe their presence there to venereal disease. The health authorities must make it clear that treatment centres existed neither to condone nor condemn but to cure.

## PRACTICAL CONSIDERATIONS

At the afternoon session Dr. HAMILTON WILKIE, director of VD services in Leicester, told how he had given 180 lectures in his area to the general public, and to specified groups such as factory workers, the police force, and St. John Ambulance workers. He had also given two successful lectures to general practitioners with a view to promoting co-operation. Public lectures did not fulfil their real object because they did not attract the young people. The lectures to factory workers were much more successful, and discussion more intelligent.

LORD WINSTER spoke of work among seamen. He thought venereal diseases often sprang from the existing social system, and especially from the fact that low wages, insecure employment, and housing difficulties conspire to make marriage difficult for the young. In the course of this century, improvements in pay, prospects and leave have changed the sailor's outlook on marriage. Most of the men in the Navy nowadays are married; but the merchant seamen are still often without home attachments. The war-time increase in venereal diseases is chiefly in the ports. Thus between 1939 and 1941, he said, the increase in 7 inland towns was only 64 cases; in 7 ports with comparable population it was 1048 cases. The bulk of the cases have been among homeless foreign seamen. Sailors may acquire infection in a foreign port and not suspect it until they are at sea. He thought it important to warn them against quack doctors in foreign ports, and to tell them that the ship's medicine chest

contains, besides appropriate remedies, a list of approved treatment centres abroad, most of them free. He pointed out that no other form of wrongdoing has medical consequences, or could harm a wife and children; nor was any other transgression linked with a powerful instinctive urge. "For instance," he said, "I have my share of weaknesses, but I don't wake up in the morning and say, 'By Jove, I must commit arson today.'"

Dr. T. O. GARLAND, member of the BMA committee on industrial health, distinguished two types of pre-marital or extramarital sexual intercourse: promiscuity of an immature or adolescent type, indulged in with little sense of responsibility; and an adult relationship which might be entered into by people intending to marry later. The Registrar-General's statistical review for 1938 showed that at ages under 20, 42% of the women who married were pregnant before marriage; at 20, 31%; at 21, 22%; at 25, 10%; and at 30-34, 8%. The number of illegitimate births registered that year was 27,753; but more than twice this number of conceptions was followed by marriage before the child was born; and something further must be allowed for abortions. Full sex life before marriage is therefore widespread, and the relationships are often of a relatively mature type. This fact, he thinks, must be catered for. He had lately asked industrial doctors and shop stewards how the problem of venereal disease could be tackled among factory workers. Some of the doctors said they would not touch it, but nearly all the shop stewards, men and women, wanted full information about the symptoms, treatment and prevention of the diseases. Managerial opinion was on the whole opposed to a VD campaign. He believed, therefore, that a campaign in industry would have mixed support from doctors and management but full support among the workers. The school which said "preach and treat" had failed, he felt, and he favoured the school which said "educate and disinfect." Advice on disinfection, even in its simplest form of washing with soap and water after risk, could be honestly regarded as early treatment.

Major PAUL PADGET, of the USA Army, protested against the view uttered by some public officials in this country that the increase of venereal disease was due to American soldiers. The laughter with which his protest was received should have assured him that the idea had never entered the heads of most of his hearers, and that it would not be taken seriously by any responsible people. He thought the police could be more effective in stopping solicitation in Piccadilly. He described a method of contact tracing which had been adopted successfully in America. The infected man identifies his infector, who in turn identifies the source of her own infection, and this has led to an efficient system of case-finding.

Dr. ELSIE VINCENT, regional officer of the CCH, thought that moral training might be effective if a child received it young. But in Yorkshire she had to deal with adolescents who already had formed unshakable opinions about sex. The boys firmly regarded intercourse as necessary to health; the girls said that if they wanted a boy-friend they must consent. Their questions were "How do I prevent babies?" and "How do you avoid VD?" A club leader had found a mixed group discussing the positions in which intercourse could take place, as part of a "better health" programme. In the villages, parents often changed partners, and brothers and sisters slept together to the age of 18 or 20. She would like to see education begun for school-children aged 11 or 12.

Surgeon Captain LLOYD JONES said that he saw 1000 cases a year of venereal disease from Portsmouth alone. He thought the possibility of introducing chemical prophylaxis as a form of early treatment should be reconsidered.—Father LEYCESTER KING felt that if views diverged, practice would diverge. The social implications of venereal disease must be faced and a moral ideal built up. Rehabilitation, especially of the unmarried mother, was of vast importance; and besides educating the children we must educate the educators.—Councillor Mrs. BONHAM PRIDE (St. Pancras) suggested that everyone at the meeting should discuss the subject freely in such gatherings as firewatching parties and wardens' posts.—The Rev. JOHN MORRELL remarked that continence and control are a part of ordinary human nature.—Dr. S. K. APPLERON suggested that the CCH and the

medical officer of health should arrange talks to youth groups and pre-Service organisations.—Dr. I. FRIEDMAN (London) who had had 20 years' experience with the British Social Hygiene Council, warned those present that to leave VD entirely in the hands of the medical profession would lead to disaster. A group of youth seeking guidance does not expect merely to be told the symptoms and how to prevent them. The CCH should work out a practical philosophy of sex education.—Mr. MCADAM ECCLES was encouraged to find the public at last freely discussing a subject which for 50 years he had tried to bring to their notice. The doctors were looking to the public, he said, to give strong support to an educational campaign.—Mr. ALFRED KENT (Alliance of Honour) said that men responded if things were put before them in the right way. In this case, he suggested, the right way was to tell them that it pays to go straight. Appropriate long-term measures were youth guidance and sex education in schools.

### THE PUBLIC AND VD

IN the last few months a great social change has taken place. The Ministry of Health has sanctioned open discussion of the whole problem of venereal disease; Sir Wilson Jameson has broadcast about it; the press has mentioned it frankly in its columns. How has the public received this new departure? What do they feel about Regulation 33B, and how do they think it will affect them? Are they going to be willing co-operators in a campaign that promises to tackle this subject seriously? Of late these and similar questions must have been in the minds of many people, lay and medical.

For four months MASS-OBSERVATION has been intensively studying this question as it affects the ordinary man and woman. The survey is not yet complete, but it seems useful to set out some of the more important results; they are based largely on questionnaire methods and are in no way final. All the evidence points to a wide welcome for VD publicity by the Government. Most people interviewed were ready to talk about the various VD problems, and most of them talked without any sign of inhibition. Under a quarter showed any trace of embarrassment on being questioned. In this survey male investigators interviewed men, and women interviewed women; nevertheless, twice as many men as women showed signs of embarrassment. The less educated were ready to talk freely more often than the middle class, and in general the studies so far suggest that middle-class people as a whole are less informed of the elementary facts, more scared of the subject.

By December, 1942, three-quarters had recently heard or seen something about VD either on the BBC or in the press. As is usual in public opinion surveys of this kind, more men than women had noticed some kind of VD publicity; 4 out of 5 approved of VD being tackled in this way, and considerably more women than men. Similarly, about seven times as many men as women raised objections to VD being discussed in the press or on the BBC, only 2% of women being against public discussion. Women, whose knowledge of VD is in any case much slighter than men's, were much more appreciative of this publicity than men, who at present possess a much wider general sex knowledge. Several men said they disliked the removal of the taboo, and were embarrassed at the idea of their wives and daughters learning much about venereal diseases.

"Don't like the idea in a family newspaper."

(Artisan class, aged 60.)

"Don't like them in the house at all."

(Artisan class, aged 45.)

Very few people were without any VD knowledge, though a few women said that they had never heard of these diseases until they read about them in the press. But a welter of half knowledge and superstition exists, which in many cases is far worse and more damaging to the community than complete ignorance. Prominent among these is the lavatory superstition, variants being belief that VD can be caught by touching banisters, using other people's towels, pipes or hairbrushes, or wearing their clothes. It is also held that VD can be contracted by kissing infected people, by using public or swimming baths, or occasionally by intercourse with menstruating women. Among a long list of superstitions,

mentioned once or twice are infection through the pores of the skin, stroking infected dogs, or falling astride a ladder. A large number of superstitions surround the cure of VD. Most prominent amongst these is the belief that intercourse with a virgin, or with any other individual, will effect a cure—by passing it on to the second person. Drinking large quantities of beer is occasionally believed to cure gonorrhoea by washing it away, while the belief that VD can only be passed from woman to man is also still current in some country districts.

Till recently the difficulties encountered even by those who were interested in informing themselves about VD were enormous, as this account of a middle-aged, middle-class woman testifies:

"To begin with this hush-hush attitude is all wrong and the ignorance of the disease is appalling. My own mother had never even heard of it. Myself—doing voluntary work in hospital and very curious why one ward was definitely "no admittance"—got no explanations. I went to Uncle and asked whether I could borrow his books on the subject. Uncle said 'No,' didn't think it was necessary for me to know. Tried my cousin—he said, 'You don't want to read that stuff.' I got him to do some explaining—not very much, because the whole subject just seemed closed to anyone outside the medical profession."

How limited is the knowledge that exists can perhaps be best shown by quoting this young middle-class housewife:

"I've always had the impression that venereal disease was caused through prostitution—also it is hereditary, but I don't know where I read it. At least the disease is passed from one person to another and is very contagious. I don't know what form it takes, but think it affects the eyes and is a sort of rash on the skin. Apart from notices in public lavatories to report at once suspected cases I've seen very little reference to any methods of stamping it out."

Knowledge of this sort, picked up in a haphazard way through desultory reading, acquired more or less accidentally in adulthood, is usually only partial, and full of gaps on important points, such as knowledge of symptoms. Most people seem to have at least some idea of the final stages of syphilis, at times distorted into deep-seated personal fears. Many are clear about the worst possibilities of inherited syphilis or the origin of blindness in babies. Very few have any knowledge of early symptoms. Lack of knowledge of the early symptoms of syphilis is perhaps the most consciously felt gap, especially because many know vaguely that initial symptoms are relatively slight without having any idea of what these symptoms are. Very few know anything of prophylaxis, and even among those who do muddle and confusion exists. On the one hand, many feel that they personally stand no chance of ever contracting venereal disease, and on the other, lack of knowledge breeds fear and leads to incorrect and exaggerated assumptions.

Today, many people, especially the younger generation, have become science-minded. They would like to see the whole problem of VD removed from the realms of superstition, fear and guilt; they want to be able to regard these diseases in the same light as tuberculosis or chickenpox. Yet some find themselves in a quandary because of deep-seated distaste for the whole question of VD. This young electrician is a typical example

"I have profound feelings of horror and disgust connected with anything to do with VD. I think I would kill myself if I contracted it from whatever cause. I personally take no risk whatsoever."

(Note the wording "whatever cause").

#### COMPULSORY TREATMENT

It is against this general background that we must view attitudes to regulation 33B. Slightly over half had heard of 33B; four-fifths of this number approved of it. There were no significant sex or class differences. Of those who approved, the majority did so in general terms. They felt that 33B was a good and desirable measure, and would help to put a stop to the spread of VD. A smaller, yet considerable, body of opinion thought this new regulation good as far as it went. But they saw it only as the beginning of a campaign, and

hoped that the Government would take further and wider measures to tackle the problem. Many mentioned spontaneously that they were in favour of compulsory notification and treatment, a few suggesting that treatment ought to be compulsory even if the contact is only named by one source. Some felt that 33B was late in being introduced, and hoped for quick and more stringent action by the Ministry of Health.

Rather more than 1 person in 20 expressed some criticism of the regulation, men being slightly more critical than women. According to their different beliefs and temperament, people disapproved of 33B for different reasons. Far the most common objection is raised on the grounds that 33B will take away further personal liberties, and a dislike of compulsion in general. A small but vocal section of the public dislike compulsion in any form, though in the case of VD some find difficulty in understanding why those affected will not, on their own accord, seek treatment. Remarks of this kind are typical:

"I don't altogether like the idea of compulsion, but I think the party should be strongly advised to undergo treatment, pointing out the serious consequences of not doing so."

"I don't think it's necessary. If a person gets caught with it, surely they'll go and get treated."

There were also those who held that the new measure would do more harm than good, since it might stain the character of innocent people, or lead to blackmail of affected persons. Much of the opposition to 33B was due to an instinctive dislike of compulsion in general, less to adverse publicity given to 33B in the press. In general, however, 33B is widely welcomed as a first step by the Government. People are ready and waiting for a further lead by those in authority; now that they have been told that the problem exists, they would like to know how they themselves can help to tackle it.

#### TUBERCLE AND WAR

On Feb. 19 the Tuberculosis Association met to discuss the Medical Research Council's report on tuberculosis in war-time (HMSO, 9d.), with Mr. J. E. H. ROBERTS, the president, in the chair.

#### THE NURSING DIFFICULTY

Dr. H. G. TRAYER discussed the shortage of nurses, which is rather worse in institutions for the tuberculous, he thinks, than the estimated figure of 1100. He attached importance to the recommendations in the Rushcliffe report that a supplementary register should be established for tuberculosis nurses, that they should be given free travel to town twice a week and that a 96-hour fortnight should be established as soon as possible. He pointed out that the initial salary of a nurse holding the Tuberculosis Association certificate only was the same as that proposed for the assistant nurse in sanatoriums—namely, £85 a year. And though the assistant nurse could only hope to reach a maximum of £105 whereas the TA certificated nurse could attain £120, he thought the fact that initial salaries were the same would affect recruitment unfavourably. He also thought it unfortunate that the state-registered nurse received no extra pay if she took the TA certificate. The shortage of domestic staff is even more acute than that of nurses and he reminded the meeting that the Minister of Labour had now no power to direct women into domestic service in hospitals. He suggested that they should be called "hospital helpers" rather than domestics (a term they disliked), and that they should be given a definite training, and provided with a superannuation scheme and marriage dowries. He proposed that the association should suggest an extension of the terms of reference of the Rushcliffe Committee to cover hospital helpers.

Dr. PETER W. EDWARDS mentioned the value of pre-nursing courses held in secondary schools and polytechnics in the evenings. At the Cheshire Joint Sanatorium, he said, they run a pre-nursing course which girls enter at the age of 16; they spend their time in the laboratory, stores, laundry, and kitchens of the hospital until they are old enough to go into the wards, and are also instructed in anatomy, physiology, hygiene and first-aid. The course is not officially recognised by the General Nursing Council, but the girls, he finds, form a small useful pool of candidates for the staff of the sanatorium and the course bridges the gap between school-leaving age and

admission to nursing. They make it a practice there to call the domestic staff "hospital workers." These workers pass through the various departments of the domestic side of the hospital, taking a small practical test at the end of their time in each and getting a small increment of pay after each success. When they have passed all tests they become "assistant housekeepers" with a special uniform and a salary of £80-85 a year.

At the suggestion of the chairman Dr. Trayer's proposal was referred to the council in order that they might draw up a considered resolution.

#### PASTEURISATION OF MILK

Dr. D. P. SUTHERLAND reviewed the history of pasteurisation in Manchester. At present milk is sampled as it comes into the city, and in 1200 to 1800 samples examined yearly for the last ten years there have been 7-10% containing tubercle bacilli. That includes all samples of milk, but he was able to give some differential figures for the various grades. In pasteurised milk no tubercle bacilli were found from the year 1936, when plant was first established, until 1939; but in 1940 there were 1.1% of positive samples, and in 1941 again a small percentage of positives. This was explained, he thought, by loss of skilled staff and less expert care of the pasteurising plant. From supposedly safe (tuberculin-tested) herds there were 8.7% of positive samples in 1936, and in recent years 2.3-2.4%. In accredited (Grade A) milk the positive samples had ranged from 10.3% to 16.5% since 1936; other grades showed percentages ranging from 9.3 to 11.2, and ungraded milks had the rather better figures of 9.2-11.6. The 'Azurin' test was not reliable: 80% of a series of samples had been passed as satisfactory by the test, whereas on bacteriological examination 67% of the same series had proved unsatisfactory. The ideal of tubercle-free herds, he said, cannot be achieved in less than 25-50 years, and even then the milk could never be guaranteed as absolutely safe. The fact that heating spoils some of the food value is true of other foods besides milk. That pasteurisation can be 100% efficient has been shown in Toronto, but again it will take years to reach that standard here. He believed that the names of different grades should be abolished. He proposed that in view of the dangers of milk drinking the association should pass a resolution advocating the sterilisation of all milk at the place where it is to be consumed.

Dr. S. R. GLOYNE mentioned that he has found positive samples in pasteurised milks, and he agreed that grade names should be abolished. He thought that pasteurisation can only be properly carried out in large well-controlled plants; but since it is impossible to get plant just now other methods of making milk safe should be found. The local authorities should give more publicity to the results of testing samples. The milk-in-schools scheme has led to the drinking of non-sterilised milk in some instances. Where pasteurisation plant is unavailable boiled milk and dried milk should replace raw milk; it would be easy enough, he thinks, to acquire a taste for boiled milk.

Dr. F. A. GAYDON thought that the association owed some sort of warning to farmers. Many of them, he said, are building up TT herds at great expense; if the medical profession is going to say such herds are unsafe the farmers might prefer to acquire cheaper cattle.

Dr. Sutherland's resolution was accepted without dissentient votes.

#### MINIATURE RADIOGRAPHY

Surgeon Captain A. G. L. Reade, RNVR, quoted the findings of Surgeon Lieut.-Commander S. H. Price in the Navy where miniature radiography has been in use since 1939, and a quarter of a million cases have been examined. It has revealed 1.1% of cases of unsuspected tuberculosis in male ratings and 0.7% among WRNS. Among the men the highest incidence was found in the 35-40 age-group.

Dr. GREGORY KAYNE said that the use of mass radiography had shown up the importance of the financial position of the patient. In reorganising the tuberculosis service he thought it should be possible to ensure that one person was responsible for the patient throughout his illness, and this means that tuberculosis officers must be specially equipped for the task.

## MEDICINE AND THE LAW

### Seven Years for Bogus Doctor

SOME forms of fraud are really too easy. One of them, noted in this column from time to time, is the impersonation of a registered medical practitioner. The impostor annexes the name and qualifications of a doctor practising at a distance (preferably overseas), and can usually count upon a temporary success if only because the proof of the offence may involve technical difficulty and delay. Retribution followed with reasonable swiftness at the recent Exeter assizes when Arthur Sidney Stanger, a native of Newark, Notts, was found to have stolen the credentials of a duly qualified practitioner residing in Canada. He used visiting cards containing the legend "Edgar C. Barnes, M.D., C.M., M.C., and P.S. (Ont.)." The accused was stated to have spent 29 out of the past 33 years in gaol, to have served four terms of penal servitude (mainly for fraud and false pretences), and to have been deported three times from Canada and the United States. Mr. Justice Tucker described him at Exeter as a menace to the community and sentenced him to seven years' penal servitude.

The main charge, to which the accused pleaded "not guilty," was one of manslaughter. In 1925, in *R. v. Bateman*, Lord Hewart had occasion to explain the difference between civil and criminal negligence in relation to medical treatment. In a criminal court the question was whether or not the practitioner's want of care showed such disregard for the life and safety of others as amounted to an offence against the State. In the Exeter case this question was answered in the affirmative. According to the prosecution, the accused arrived in Plymouth last September. Using the name of Dr. Edgar Charles Barnes, he offered himself to a local practitioner who was in need of a locum tenens. He asserted that he was a doctor of medicine who had qualified at Ontario University. Asked about references, he said he could produce a book full. The Plymouth practitioner, doubtless making far less careful inquiry than he would have made in more normal and leisurely times, accepted his visitor's statement, and, being himself called up for service with the Forces on October 5, handed over his practice to a man who was in fact not qualified at all.

Called in to attend a six-months-old baby, the bogus doctor diagnosed teething trouble and prescribed two bottles of a sedative mixture. The child, according to the prosecution, was suffering from an internal complaint; nothing but an operation could have saved its life. Next day Stanger assured the parents that there was nothing to worry about and no need to send the baby to hospital. Three days later he repeated these reassurances, but, on the day following, he arranged for its removal to hospital where it died three hours after admission. Questioned by a detective inspector of the Plymouth police, he admitted that he had no medical degree, but claimed to have obtained from books a knowledge of medicine and diagnosis. At his trial he gave evidence of his medical career. He said his first contact with medicine was in 1909 when he entered the medical school of the University of Manitoba and took his primary examination; this, according to the police, was the year of his first conviction, which was for forgery. Continuing his account of himself, he told how he later worked on case papers and records for a French-Canadian doctor in Winnipeg, then, after a spell in England, returned to Canada about 1920 and, among other appointments, held the post of an assistant casualty officer. He worked, he said, in Chicago, New York and Milwaukee. Last autumn he was locum tenens for a doctor at Birmingham; then, coming to Plymouth, he was second medical officer to the St. Budeaux A.R.P. With regard to the baby's illness, he at first diagnosed teething trouble but, on his fourth visit, concluded that there was a stoppage and had the patient removed to hospital. He was naturally asked in cross-examination about his use of the name of Dr. Barnes. He answered that he first adopted it ten or twelve years ago: it was the name of a friend of his who lived at Newark. He was aware that there was a doctor of medicine of that name in Ontario. He had cards printed which contained the name and degrees of Dr. Barnes; this, he said, was to enable him to claim to be a doctor.

Convicted by the jury on the manslaughter charge, Stanger admitted seven charges of false pretences in which doctors at Birmingham and Plymouth had been victimised. These charges were taken into account in his sentence for frauds which, as the judge observed, had now imperilled human life. The community will be protected from him for the next few years.

#### Supervision by Registered Pharmacist

Under section 18 of the Pharmacy and Poisons Act, 1933, a poison in Part I of the Poisons List must not be sold by retail unless "the sale is effected by, or under the supervision of, a registered pharmacist." A recent decision of the Divisional Court in *Roberts v. Littlewoods Mail Order Stores* throws some light on the degree of supervision required. An inspector of the Pharmaceutical Society went to the company's premises and found articles displayed on a table in the custody of girls who sold to customers the goods they asked for. He asked a girl the price of a bottle containing a Part I poison; she said it was 1s. 10d.; he paid that sum and took the bottle. He then asked the girl where the registered pharmacist in charge of the department was to be found. She said he was in the stockroom upstairs. The Barnsley magistrates dismissed the inspector's information on the ground that the sale, though not "effected by," was sufficiently effected "under the supervision of" the registered pharmacist. The inspector's appeal was allowed. The High Court has remitted the case to the magistrates with a direction to find the offence proved, because the registered pharmacist's presence in another part of the building was not enough to satisfy the statute unless it was further shown that he could effect, by some mechanical means such as the telephone, a detailed supervision of the person by whose hands the particular sale was made.

It seems an imperfect safeguard that the requirement of the act would have been met if the girl had telephoned upstairs to say that she was selling a customer the bottle. The case does, however, show that the prescribed supervision of the sale of dangerous poisons is not to be ignored.

## In England Now

### *A Running Commentary by Peripatetic Correspondents*

HE is an orphan and was brought up by an elderly uncle who had forgotten what it feels like to be a small boy. As a result he was mostly in trouble though he generally managed to fall on his feet. I remember meeting him one day when he was out beagling. I suppose he would be about 12 at the time. He was thirsty and asked me if I could give him a drink. I happened to have a quart bottle of beer in my car and handed it over with some misgiving. Before I had time to turn round he had swigged the lot. I went on with my round and met him the next morning. "How did you get on yesterday afternoon?" I asked. He looked a bit sheepish. "Well, 'smatter of fact," he replied, "after drinking your beer I fell asleep in the hedge. Must have slept for quite a while. I was wakened by hounds going past me in full cry so I got up and followed. They killed just up the lane. I was first up and was given the mask."

During his holidays when he had nothing better to do he would come round with me in my car. He would repeatedly assure me that he could drive but he was under age and I would never let him try. One day while I was visiting a patient he tried to turn the car in a narrow place, jammed it across the road and bent both front wings. I was full of righteous wrath and rated him soundly. He seemed chastened and on the way home I thought he looked a trifle moist-eyed. It was the last day of the holidays and I suddenly felt sorry for the little brute. When I said good-bye I tipped him half a crown—for disobeying orders and damaging my car.

At Dartmouth he had a somewhat chequered career being often in trouble with authority. It was no business of mine, of course, but I happened to meet his term officer who was a shrewd fellow. "I'll put him in a position of responsibility," he said, "and see how it works." It worked a treat.

Early in this war he was serving in a drifter which encountered some rough weather in the North Sea.

Several times he was all but swept overboard and his skipper was debating whether they should take to the boat when the boat itself was carried away, so they brought the drifter into port. Pretty chewed-up she was, I gather. At Dunkirk he had ten craft of one sort or another sunk under him and a machine gun bullet through his ankle; but he didn't trouble to go sick. During the evacuation he was never dry outside or in, and lived mainly on whisky. One of his matlows received a great gash in his cheek which was bleeding freely. There was no doctor aboard the destroyer and no dressings of any kind so my young friend boiled up some tin-foil out of a cigarette-tin and bent it up into clips which he applied firmly to the wound. The hæmorrhage was controlled and healing was by first intention. His next adventure was to crash himself from a great height into the sea while piloting (without training or authority) an obsolete and unairworthy plane. He was picked up some hours later unconscious and caked with ice but soon recovered.

He turned up again last month on 24 hours' leave, drank all our beer (which we didn't mind) but also set our chimney alight (which we did). It seems that while we were out the drawing-room fire failed to give satisfaction so he found some paraffin and poured it on. We chivvied him up on to the roof with a length of garden hose between his teeth. After an anxious couple of hours work with the stirrup-pump, the wall began to cool off and we decided that it wouldn't be necessary after all to call the fire brigade. He had to be aboard again at midnight. At 8 PM he had had no supper and was enjoying a hot bath. His train left at 8.27 PM. He caught it with several seconds to spare. By a curious oversight he omitted to fracture the telephone wires while clambering about on the roof. He is now mine sweeping and has married a wife, poor girl. At longish intervals he writes me ribald letters. I shouldn't like anything to happen to him.

My secretary is an inconsequent girl, and her environment takes on a similar colour. She is always having strange little adventures which have no ending. For example, she greeted me yesterday with the words: "Such a funny thing happened to me this morning." My mind conjured up a picture of two Polish airmen, for my secretary's adventures usually involve our allies. This time I was wrong. "There was a man sitting next me in the room," she sent on, "and he'd got a note-book on his lap. He'd got a pencil in his hand, but he'd only written one sentence, and I couldn't help seeing it." I assured her I had similar weaknesses. I remember, in my student days when I caught the 8.31 every morning how once, when I was reading Samson Wright, a girl next me was writing a letter. Out of the corner of my eye, I read "There is a man next to me and he is reading a medical book which I do not think people should do in trains as it puts things into your head." Heartened by my reminiscences my secretary continued: "Well, the funny thing was that one sentence he had written. It was 'To be or not to be, that is the question.' And he didn't write any more the whole journey. I suppose he couldn't make up his mind." Then, apparently as an after-thought, she added, "and I didn't get a chance to look at him till we got to Baker Street. And then you could have knocked me down with a feather, for he'd got a lock of hair falling down over his right eye and a little black moustache."

Mayer-Gross and Guttman have approached pain with the caution of good psychologists. Most of us are less objective and more speculative about it. Biology and physiology share the theme song "Structure subserves Function" and a very pretty harmony they make of it. But when we come to the nervous mechanism of pain we find that it is shockingly badly adapted to function, or else that we have never so far found out what its function is. If it has really evolved, as we like to say, to provide a warning of danger, what is one to make of a hack on the shin? In this painful experience the sensation is well out of proportion to the damage: the merest bump would be ample to make an intelligent animal like man sheer off and take another route. Compare this hysterical exaggeration on the part of the shin with the imbecile reticence of the breast growing a

cancer. Compare the violent and unnecessary pain of toothache or an avulsed nail—both superficial and harmless to life—with the absence of pain in organic heart disease. We like to say that the outside of the body needs to be more aware of danger than the inside, because the animal can fly from an outside danger, but an inside one it must bear. But there are plenty of inside pains as disproportionate to their purpose as the hack on the shin—the pains of childbirth, and gall-stone colic for example. What is the sense of a danger signal in normal childbirth, where there isn't any danger? Or in gall-stone colic where the victim cannot fly? Why should the organs make such a shocking do-do about distension and take constriction in their stride? Why has pain sensation not evolved in accordance with the harms to which we are exposed?

Looked at from the structure-function angle, pain is clumsy and slapdash. If it really is an evolutionary attempt to preserve us from danger either it falls badly short of other evolutionary achievements, or else they are all really as slipshod as pain and we have not yet spotted it. Pain is the one thing we all seriously fear; painless death is a universal hope. Can that subserve a biological purpose? Would a painless, and therefore fearless, race of men soon exterminate itself perhaps? Races (like the Red Indians) which are strikingly indifferent to pain have not been biologically successful in the long run; nor are they wholly lovable in that aspect of their characters. The whole subject wants looking into, if you ask me.

I don't think the time has yet come to consider the "How" in medical planning. We must still peg away, as Priestley puts it, at "what we want and why we want it." So while I welcome the BMA Commission and all the other planning bodies (e.g. the under 45's) in so far as they make us think about the "what" and the "why," I save time by not reading much about their "hows." Until the men away on active service get back and we hear what they have to say we must keep things fluid. Last time this did not happen. Meanwhile let us survey the ground, measure it up, see what has to be cleared away and—if we are certain—clean it and send down shafts to learn about the subsoil. But do not let us at present even dig the foundations, or if we must begin, let's dig them in such a way that they will fit any superstructure which seems best later on. But there is need for a lot more talk before we lay a single brick.

Joe is now a subaltern in the Middle East. I have known him since he was a small boy. When his parents told me that he had married suddenly before going overseas I groaned inwardly. Just another of these war marriages, I thought. A case of marry in haste and repeat at leisure. I bet she's just a little bit of nonsense and no more. Mrs. Joe came down to visit her in-laws and as the doctor and old friend of the family I was invited to meet her. She was certainly easy to look at, with eyes the colour of a woodcock's and rather a fine head of hair. Burnished copper I think you'd call it. But there was nothing chocolate-boxy about her. She was a quiet, still sort of person and entirely self-possessed in what she must have felt to be a somewhat critical environment. "How old are you, my dear?" I asked. "Twenty," she replied. "What are you doing with yourself?" "I'm an inspector in an aircraft factory." "An inspector, eh? Then, I suppose, you've been through the mill?" "No, I was quite ready to, but when I went up for my interview they made me an inspector at once." "Hours long?" "Pretty long." "Pay good?" "Not bad." "You get your allowance from Joe, of course?" "Yes, but I never touch that. I live quite comfortably on my pay. You see, my tastes aren't very expensive and Joe will want something behind him after the war so I bank all I get from him—and a bit more." Not sure that young Joe has been such a chump after all.

It has been said that no young surgeon has won his spurs until he has invented an instrument. The equivalent achievement for the rising physician is to describe a new disease, but this is not so easy. However, having had my eye on the possibility of this method of achieving fame for some time, I am able to draw the attention of

the profession to a hitherto undescribed condition which I have called Slawkenburgius syndrome. (This is not to be confused with the Slawkenburgius anomaly, macrorrhinia, which has been fully described by Sterne.) The condition occurs in two forms, acute and chronic. In the acute form the patient is suddenly seized with a high degree of excitement, the face becomes red and the brow wrinkled; risus sardonicus is frequently present. The shoulders are often hunched as if the axillary muscles of respiration were called into play. Violent jerking movements of the hands culminating in excessive gestures and the patient usually gives vent to remarks of an explosive character. In the chronic variety the volar aspect of the patient's thumb (usually the left) becomes discoloured, tender and even excoriated and the distal phalanx is usually hyper-extended. The excitement stage is also present but it is of a lower grade and the facies is marked by an expression of dogged determination which gradually lapses into a despair state. There are no noteworthy changes in the blood chemistry other than those due to the setting free of unusual amounts of adrenaline. As my name is a somewhat cumbersome one, I would propose shortening the title of the disease to *Aula and Caula*. The first stands for Acute and the second for Chronic Utility Lighter Anxiety. The only treatment appears to be that of providing the patient with an adequate supply of matches but this is of course an extremely difficult matter at the present.

\* \* \*

TO A FRIEND RECOVERING FROM DYSENTERY.

I do rejoice to hear your bowels  
Quiescent are and uncomplaining lie;  
Not making squirting sounds like Yiddish vowels  
Nor imitating the wild peacock's cry,  
But silent as a staid suburban spinster  
And uncontentious as a well-fed cat,  
With reverential sounds of close and minster  
They lie and chat.

God grant that they may soon be jesting  
On subjects such as pickles and pork-pie,  
And quietly chuckle as they go digesting  
Unhurt, unholed, unbleeding, pink and spry;  
May Peristalsis like some sobered Janus  
Demurely trundle all that comes downstairs;  
May Peace persist, yea, peace from mouth to anus—  
These are my prayers.

\* \* \*

Two workmen were seen studying a VD poster put up by a local MOH and one was overheard to say reflectively to the other, "I suppose that'll be the Wilson Jameson disease."

**EQUAL COMPENSATION.**—The report (HMSO, 3d.) has now appeared of the select committee appointed last December to consider the effect "on the general principles of compensation and on levels of remuneration" of the proposal that civilian women should be compensated equally with civilian men for war injuries. They have agreed that the proposal is not only just but that it could be put into practice with little difficulty and at relatively low cost. Under the existing scheme, civil defence volunteers and gainfully occupied people get 35s. injury allowance out of hospital if they are men, but only 28s. if they are women. In hospital, a married man gets 35s., a single man 24s. 6d., and a woman 17s. 6d. The rates offered to people who are not gainfully occupied show a similar sex differentiation and so do pensions. The proposal is to make the allowance 35s. in hospital, and the pension 37s. 6d. for both men and women, whether gainfully occupied or not. The distinction between gainful and non-gainful occupation, it was felt, has operated unfairly against the housewife. Besides, a housewife who was also a part-time unpaid civil defence volunteer got a higher pension if she was injured while doing her part-time service than if she was at home cooking her family's dinner. It is encouraging to know that so far the total number of civilian casualties has been much lower than was feared at the outbreak of war. The total claims up to Nov. 20, 1942—after more than three years of war—were for 95,315 injury allowances and 10,569 pensions (6321 for men and 4248 for women).



## Parliament

## ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE Secretary of State for War has given us a stimulating and optimistic account of the condition of the Army. The health of the troops is so good that Sir James Grigg only said that it was to the immense credit of the Army medical and nursing services that its medical history was a merciful blank. We had hoped to have had some of this blank painted in colourful detail with the achievements of the Army Medical Service at home and in the field. But as the excellence of the service is taken for granted the members preferred, perhaps naturally, to devote attention to the alleged inadequacies of tanks instead of to the physique and morale of the men which are not open to criticism.

The new tests for the selection of officers are now carried out by specially trained regimental officers and officers of the War Personnel Selection staff, "aided if necessary" by a psychiatrist—though the troops, Sir James thought, called him something different. (Can it be trick cyclist?) But it is only fair to army psychologists and psychiatrists to say that the adoption of the tests owes much to their advocacy. The results, Sir James told us, are so good that few candidates are turned back at the OCTU stage. The innovation was a success, and other non-medical speakers with recent service experience agreed. The Minister's statement, perhaps unconsciously, revealed how in total war the Army makes contact with nearly every aspect of civilian life. The growth in importance of the women's side of the Army brings with it, what Sir James did not mention, the extension of the work of the Education Corps and the RAMC to women. It was a fantasy some years ago, propounded by the author of *Cry Havoc*, that maiden aunts might be employed for bombing. That has not happened yet, but by June next 40% of the Ack-Ack command will be made up of women. And the increase of the employment of women in the services has finally scotched the ill-natured and slanderous criticisms which Miss Markham's report had shown to be unfounded.

The problem of welfare in the Army with which Mr. David Grenfell dealt in his amendment (proposed when the main debate ended) and to which Colonel Medicott and others added, shows a pleasant side of total war organisation. The best welfared units are those in which the commanding officer knows his job and does it, looking after his men as they are looked after in a Guards battalion. But nowadays there are many activities outside the scope of a CO in the sense that they are out of his control.

The care of the health and morale of men is the CO's first responsibility and the medical officer is his expert adviser. But beyond that there is the Army Education Corps, and here Mr. Grenfell wanted young men with broader ideas brought in. He urged that the soldier must get the best instruction possible on the problem of the postwar period.

Colonel Medicott thought that nowadays there were so many entertainments that variety tended to become monotony. The Army now has entertainment officers, cinema officers, ABCA officers, legal aid bureaux, as well as such bodies as the YMCA and the Salvation Army. Local-education authorities, universities, war hospitality committees, Empire clubs are also active on behalf of the troops. When Mr. Arthur Henderson replied he said the Army sought to cater for human needs—physical, mental and moral. They now had hostels in most of the large towns, Ensa and concert parties, and special camps for the "difficult" soldier. There was rehabilitation for soldiers discharged from hospital and remedial treatment to improve the physique of men who were under developed or had curved spine or flat feet. To this add vocational training and the cynic may begin to wonder when the soldier gets any time for fighting. But the proof of the soldier is in the fighting, and Sir James said that the 8th Army was the finest instrument of war so far fashioned in the history of the British Empire. The soldier of today, in the words of Cromwell, "knows what he fights for and loves what he knows."

## BEVERIDGE DEBATE IN THE LORDS

OPENING a two-day debate in the House of Lords on Feb. 24–25, Lord NATHAN welcomed the second chance to give a statesmanlike lead. If all the zeal evoked by Sir William Beveridge was allowed to run into the sand there might be a lowering of morale equivalent to that of a great military disaster. Are the Government prepared to say that the nation's wealth must be applied to guarantee the prevention of want as well as the defence of the realm and the payment of the National Debt? That was the crucial question. A ministry of social security was the keystone of the whole Beveridge arch.—Viscount SAMUEL said it was right for the nation as a whole to share in a scheme to prevent destitution and want; the Beveridge plan was a clear example of a sound method of bringing in social security and social justice. The great bulk of the money needed under the scheme was not a new charge, but merely the amalgamation of existing insurances and expenditures out of many funds. He also begged the Government to reconsider their decision about the establishment of an ad-hoc ministry.

ARCHBISHOP Lord LANG thought it reasonable before submitting legislation on this great State document to Parliament for the Government to review the situation as it might then be; but he wished the Chancellor had shown more confidence and optimism in regard to the future. The Beveridge plan might mean some redistribution of national income, but surely that income could stand a great deal more of public charge than it had yet sustained. He pleaded for the immediate appointment of a new minister.

## Lord Dawson examines the Medical Proposals

Viscount DAWSON OF PENN praised the Beveridge report as a fine piece of constructive thinking, well knit together and wonderfully expressed. He would himself have preferred to postpone an examination of the health proposals to a later date, but in the Commons debate family allowances, and the hospital and health services, were put in the foreground and were blessed by three ministers of the Crown, leading, he was sure, to "great activity within the Ministry of Health." He must therefore say something to show where the medical profession stood. Sir William Beveridge, wisely he thought, had left the handling of any scheme to the profession which had been assiduously studying the problems of replanning for the last two years. There was first the Medical Planning Commission under the aegis of the BMA and the Royal Colleges, on which all branches of the profession had been represented; "the considerable degree of agreement which they have reached is remarkable." At Oxford an active movement (not to be confused with a certain pathological revivalism) had behind it the three leaders Sir Farquhar Buzzard, Lord Nuffield and Sir William Goodenough. A third body, consisting of King Edward VII Hospital Fund and the Voluntary Hospitals Association, had also been studying the question and so far the agreement was substantial. At this point Lord Dawson paid tribute to the "stimulation and the sympathy which have been extended by the present Minister of Health and his medical officers to our efforts and to the excellent spirit in which they have met us."

## TWO IMMEDIATE OBJECTIVES

Assumption B in the Beveridge report, Lord Dawson continued, referred to an ideal, and an ideal was seldom attained at one stroke. The realisation of medical hopes must be gradual. There seemed to be an idea in the Commons the other day that it only required about six weeks to transform the practice of medicine into something very different from what it is now. "My suggestion is rather that we should go step by step, that we should do it by agreement between the different parties, and show both patience and statesmanship." But there were certain matters ready (indeed over-ready) for tackling now. The first was to bridge the gap between preventive and curative medicine. The detachment of these two branches had been to the disadvantage of both and an equal disadvantage to the public service. To bring them together was a first essential. "Hospital practice and general practice must comprise the care of people's health, the furtherance of health as their chief objective, and similarly the medical officers of health

must come out of their obscurity on to the staffs of the hospitals and meet regularly among their colleagues." And even more important than this was so to alter medical education that the student from his early days would be taught to give precedence to the building up of health over the cure of illness; that, in fact, a knowledge of one is necessary to the success of the other. "It is our united desire to put health and its furtherance in the primary position, not only in the curriculum, but in the daily practice of the profession."

The second matter that could be dealt with now was to make the practice of medicine increasingly institutional, for the reason that it was based on an increasing number of sciences and the search for truth requires teamwork. Teamwork requires equipment, and teams are better situated side by side in a building equipped for the purpose than carrying out separate and detached efforts. Once you admit the necessity of teamwork it is inevitable that institutional provision must increase. He would mention two instances with a very promising future. The first was the provision of health centres in industrial organisations. "Here there is a vast future of useful work. The principle is that of putting your practice where people assemble in groups. If you have inside an industrial organisation a health centre equipped with its doctor and nurse, you have a rallying point for the employees in which they gather steady and increasing confidence, and, more than that, they get into the habit of coming there when they are feeling ill. If they are really ailing, they are rapidly put right; if they are commencing a serious illness, they get all the advantage of early diagnosis and are sent off to places the most appropriate to heal them." Another movement lending itself to immediate action was the promotion of child health, which should take precedence of almost every other. In London there was a scheme for the leading children's hospital to join hands with the postgraduate medical school which would undertake the maternity end in the prenatal clinics. Not only voluntary associations but the great municipal organisations of London would take part in it. "We hope, and we have confidence, that that child welfare scheme will stand out as an example which other parts of the country will copy."

#### THE PATTERN OF THE SCHEME

"What I have said," continued Lord Dawson, "implies the necessity of a pattern of hospitals, health centres, and clinics allotted to every area. They must be of various grades, allotted according to the needs of the population, and distributed in the same way as the schools are distributed, where they are most needed. The areas over which those hospitals and clinics must be distributed must be large but not too large. They will have to include several major local authorities if they are going to serve their purpose well. If they are too small, you cannot have an adequate service, or you can only have it at excessive cost. These regions must be of adequate size, and the plan is that at the head of each region there will be a key hospital, and wherever possible that key hospital will be a teaching hospital. These hospitals will consist in part of local authority hospitals, and in part of voluntary hospitals, and it will require patience and statesmanship (to which I shall not refer today) to bring them together into what the Minister has described as partnership and close co-operation."

#### DEMAND FOR SELF-DETERMINATION

"One thing is clear to me," Lord Dawson went on, "and that is you cannot construct a great service of this description except under the skilled guidance of the medical profession. Medicine has become, and becomes more every year, a complex art based upon an increasing number of sciences, and it is idle to think that any scheme of hospital service could be run unless there is a vocational body always ready at hand to give advice to the final administrative authority. There is no disputing the fact that the administrative authority must have the last word, but it requires a vocational body close at hand to advise it before it takes its final decision. If you look at it from a professional point of view, it is not to be expected that a great profession is going to be moved about and take its orders from laymen. Under the agreed control of Parliament the medical profession will seek and demand self-determination in the same way as

the Bench, the Bar, the Church look after their affairs without let or hindrance. It is well for it to be known that, just as we are taking as a profession prime responsibility in putting forward these proposals, so we shall expect to take an equal part in their guidance. For myself, I have the firmest belief that we shall evolve out of the present situation stage by stage, but gradually, a fine new era of health and healing. It can be done, and it will be done by agreement. - We therefore have to recognise it must be done stage by stage."

Returning to the vocational body, Lord Dawson recalled that the big teaching hospitals, with an experience in some cases spread over centuries, and with great inherited traditions, were managed on a plan in which the medical council acted as the vocational body and the lay body as the administrative body. It had been the custom for years for the medical staff to take the initiative in policy and to submit proposals to the lay body which had the final say. Vast as had been the progress of the local-authority hospitals, and fine as was their service in some respects, they needed further development. In many instances they had not yet sufficiently thrown off the poor law tradition. The medical superintendent was supreme both in administration and treatment. He had technically the power to overrule his professional staff; he reported through the medical officer of health to the health committee, a body of laymen who might know little or nothing about the subject. In some way or other that would have to be corrected, and the statesmanlike way to do it is, in Lord Dawson's view, to set up an advisory committee which would always be at the right hand of the final administrative authority. The question of finance would settle itself as time went on; a beginning could be made before the Government had made up their minds on the Beveridge plan. The local authority and voluntary hospitals could go on working side by side, each with its own management, but coming together more and more, and agreeing more and more on matters of common policy. The voluntary hospitals might receive ad-hoc grants during the intermediate period and maintain to the full their contributory schemes. "No doubt, if the Beveridge scheme finally comes to full fruit, as we hope it may, then it will be quite easy to review the position."

#### COLLECTIVISM VERSUS INDIVIDUALISM

In conclusion Lord Dawson said that the medical profession had a difficulty that few callings have. They had to make it clear that in order to do good planning they must have collectivism for fabric, but they must also have a hundred per cent. individualism in personal relations. These two rather difficult opposite points of view must be combined. One thing every medical man had to learn was that there is no standardised type of disease. "There are no diseases," said the great French savant, "there are only sick people." If you are going to have individualism in personal relations you must keep your doctor individual, with the power to penetrate and grasp what his patient thinks and feels. "Indeed, we have to be careful that while we are doing our best to plan medicine aright we do not mechanise it and allow it to become a standardised performance. The doctor, too, in his training has very diverse sides of learning to master. He has to keep abreast of scientific knowledge, and more important than that he has to cultivate a scientific approach to his problem, but having done that he has further to relate that knowledge to an infinitely varying human nature. . . . In the greatly changing conditions of the modern world, doctors will need not only knowledge but understanding if they are to guide bodies and minds along the lines of health and content."

#### For and against the Government

Viscount BENNETT defended the Government's attitude. Unless the war was won all plans of social security were useless.—Viscount SANKEY said the liquidation of human fear, of human anxiety and human misery were well worth the sacrifices we are called on to make. He would not distract present ministers of state from their wartime jobs; a minister of social security should be appointed at once.

Viscount SIMON (Lord Chancellor) said the Beveridge plan was one of the greatest and most far-reaching measures of social reform ever promoted. It involved

tremendous issues and it would be wrong for the Government to be bumbled. The plan was only a portion of the problems in the postwar world; he would like the British people to regard social policy not as consisting in giving weekly benefits but as aiming at the happiness which came from work honestly done under good conditions and properly remunerated in a world where aggression had become only an evil memory and where citizens would live without privilege and without rivalry.

#### SECOND DAY'S DEBATE

The ARCHBISHOP OF CANTERBURY asked the Government to realise the degree of hope and expectation aroused in the country by the Beveridge plan, which was notable for its universality and its capacity to close the social division on the vital issue of economic security. He hoped that while security was given a sense of responsibility to the state would also be encouraged. He believed the setting up of a ministry of social security would have a symbolic as well as a practical value.—Lord RUSSELL supported the contention of the Government that time was needed to consider all the issues raised by the Beveridge scheme before legislation was introduced. He could not see that anything but harm could result from the setting up of a ministry of social security.

Lord SNELL in his reply for the Government made it clear that the decisions arrived at were not final and Parliament could at any time call on the Government to report progress.

#### QUESTION TIME

##### School Meals

Replying to Mr. KENNETH LINDSAY, Mr. R. A. BUTLER said he was considering making school meals a free service and the provision of other free services in kind in the light of the statements made on behalf of the Government on the Beveridge report. Answering other questions Mr. Butler said that he proposed to press ahead with the provision of children's welfare as quickly as he could in existing circumstances. The only difficulty would be to make the complete provision which he would like, because the equipment and other necessities would slow down progress, but he hoped to go on as fast as he could. The first thing he proposed to do was to extend the provision of meals and milk in schools, and the second to make a statement to the House about the implications of the statements made by his ministerial colleagues.

##### Sex Education

Mr. DAVID ADAMS asked the Minister of Health whether the propaganda campaign for the prevention and elimination of venereal disease would include a national appeal to all parents and guardians of children to instruct them in at least an elementary knowledge of sex and the natural functions of the body.—Mr. E. BROWN replied: At present I propose to leave such action to the initiative of parents, but the Central Council for Health Education arranges sex education talks to parents and young people, at the request of local authorities, local education authorities, and youth organisations. The campaign also includes pamphlets addressed to adolescents which may be distributed through local authorities and in other ways.—Mr. ADAMS: Does the minister not agree that this is a matter of the first importance, and that a more general national effort ought to be made, because large numbers of families still consider this to be an untouchable subject to the loss of the rising generation?—Mr. BROWN: From April 1 last year to date the Central Council has given about 200 courses of 3-4 lectures to young people, 30 to youth leaders, 20 to school leavers, and 30 to parents, so that considerable efforts are being made.—Mr. ADAMS: But that activity does not reach the nation at large.—Sir FRANCIS FREMANTLE: Are the Minister and the Central Council making use of the excellent pamphlets that are used in the Army to give instruction in this matter?—No further reply was given.

##### Sale of Cattle

Sir REGINALD CLARRY asked the Minister of Agriculture when, in order to limit the spread of bovine tuberculosis in cattle, he contemplated introducing measures to prevent the sale of disease-laden cattle in the open market; and whether he would enable the appropriate tests to be made on the animals concerned before they were offered for sale.—Mr. R. S. HUDSON replied: The removal from farm premises to a market of cattle affected with tuberculosis in a clinical form is pro-

hibited by the Tuberculosis Order. As regards other cattle it would be impracticable to require the passing of a tuberculin test as a general condition of entry to markets.

##### Adoption of Children

Sir FRANCIS FREMANTLE asked the Home Secretary whether he was aware of the concern felt amongst social workers regarding the increasing number of agencies for the adoption of children; and whether he would take steps for the proper regulation of adoption and the avoidance of traffic in unwanted children for gain by now appointing a day for bringing the Adoption of Children (Regulation) Act, 1939, into force.—Mr. H. MORRISON replied: The regulations under the act are nearly completed and the preliminary work of investigating applications can then be begun by the local authorities concerned. It is hoped to bring the act into full operation on June 1.

##### Treatment of Deafness

Sir ROBERT RANKIN asked the Minister of Health whether the plan of his ministry whereby Civil Defence workers and members of the Merchant Navy who were suffering from deafness as a result of war injuries were now provided with aids to hearing or taught lip-reading in the same way as patients from the services, was now in operation in the Liverpool area.—Mr. BROWN replied: Facilities were arranged some months ago and are available to the Liverpool area as well as to the rest of the country.

#### Letters to the Editor

##### A NURSING PROBLEM

SIR,—The difficulties referred to by Dr. Macdonald of finding adequate domestic and nursing staff for isolation hospitals and sanatoria are urgent in many areas, and the appearance of his letter raises the hope that publicity may achieve a solution which has not been obtainable by other means.

At present, when tuberculosis is definitely increasing, and when, as a result of a more extended use of mass radiography, the number of diagnosed cases will be still further increased, there are sanatoria where the accommodation available cannot be fully utilised owing to scarcity of staff. At isolation hospitals the reduction in domestic staff particularly is most serious, for employment in the wards of daily workers is obviously inadvisable, and the strain upon the depleted staffs results in still further resignations. There must be few isolation hospitals which, if called upon to do so, could deal in a satisfactory way with an epidemic.

No standstill order of any kind is in operation now, and hospital staff can leave just when they desire to do so. The only concession given to hospitals is that the staff are not taken away from their work there and directed to the Services or munition work; but many have been attracted to the Services and their places are not being filled. A solution seems impossible unless hospital work is recognised by the Ministry of Labour as essential war work, and the hospital services placed under the provisions of the Essential Works Order. Last November my local authority supported a resolution which was circulated by Derby Corporation asking that the Ministry of Labour should direct suitable persons to take up domestic work in isolation hospitals; and two months ago, when the problem was discussed at the Yorkshire branch of the Society of MOHs, a somewhat similar resolution was forwarded to the council of the society recommending that the Ministry of Health should be urged to take the necessary steps to have the domestic staff of hospitals and sanatoria brought within the provisions of the order.

I agree entirely with Dr. Macdonald that training of nurses should be comprehensive, but would point out that there is nothing to prevent him from putting it into operation in his own area. In 1930, when the poor-law institution in this area was taken over by the corporation, the General Nursing Council asked me to put into operation a more extensive training for the nurses, who at that time were dealing chiefly with chronic cases. The period of training then as now was four years, and it was arranged that probationers should spend the first year at the municipal hospital, then six months at the isolation

hospital to get experience in infectious diseases, six months at the sanatorium doing tuberculosis work, and six months at the local voluntary hospital to get greater experience in surgical work, finally returning for the remaining eighteen months to the municipal hospital. At the beginning there were some difficulties and jealousies to contend with, but these rapidly disappeared and the whole arrangement has been working fairly smoothly for the past twelve years. It is a helpful arrangement from the administrative point of view, for extra help can be directed wherever and whenever it is most required; also, it gives an extensive and valuable training to the nurses.

Perhaps I should mention that the scheme has received from the General Nursing Council not only its approval but also its blessing.

Public Health Department,  
Huddersfield.

JOHN M. GIBSON.

#### LAY OR MEDICAL HEAD?

SIR.—Your annotation of Feb. 20 entitled *Hospitals after the War* states that, "the voluntary hospitals are often highly successful in picking their lay administrators, the municipal hospitals sometimes less successful in picking their medical superintendents." Is it to be understood that the converse is equally true? If not, then I am compelled to join issue. You cannot compare two people with different functions. The voluntary hospital administrator is selected partly for his ability to collect funds and partly for his knowledge of the lay side of hospital administration. The medical superintendent's chief function, to which all else is subservient, is to ensure that every patient receives adequate treatment from the medical staff—and by this I do not imply interference with the clinical work of the staff. His second function is to coördinate the work of different departments for the good of the patient.

To most of us in the local government service it matters a great deal—apart from our bread and butter—whether hospitals are administered by medical men or laymen. The lay administrator is an anachronism, born originally of the need for raising subscriptions and exercising rigid economy. It is a remarkable thing that England and Wales are practically the only countries where such a method of hospital governance exists. Conveniently the protagonists of lay administration turn a blind eye towards Scotland where the teaching hospitals are administered by medical superintendents and show no sign of changing their system.

Much of the criticism of medical hospital administrators emanates from ill-informed sources.

Crumpsall Hospital, Manchester.

W. A. RAMSAY.

#### LOST LANCETS

SIR.—The Medical Library Association of America has given British medical libraries much help in the replacing of journals lost in transit from the U.S.A. The serious inconvenience caused by these losses in this country has been much mitigated by such help, which has been given to member and non-member libraries alike.

A recent letter from the Association reports the loss by enemy action of all copies of *THE LANCET* for March 15, 1941, and appeals for help in replacement. The undersigned British members of the Medical Library Association would, therefore, be grateful if any of your readers who can spare their copies of this issue would send them to one of the addresses given below. We have undertaken to forward them to medical libraries in America. So much has been done for British libraries that we welcome this opportunity to return in some measure the timely help which colleagues in America have given us.

CYRIL C. BARNARD,

Librarian, London School of Hygiene and Tropical Medicine,  
Keppel Street, Gower Street, London, W.C.1.

LESLIE T. MORTON,

Librarian, St. Thomas's Hospital Medical School, London,  
S.E.1.

W. R. LE FANU,

Librarian, Royal College of Surgeons, Lincoln's Inn Fields,  
London, W.C.2.

## Obituary

### ARCHIBALD BARR AITON

M B, B SC GLASG; SURGEON LIEUTENANT R N V R

Surgeon Lieutenant Aiton, who has been listed as "missing, believed killed" since last November, was the second son of Mr. John Aiton, of Strathaven, Lanarkshire. Born in 1917, he was educated at Hamilton Academy and Glasgow University, graduating BSc in 1938 and MB three years later. He held the post of house-physician to Prof. Noah Morris at Stobhill Hospital, Glasgow, till he was commissioned in the R.N.V.R. in July, 1942. In September he sailed in *HMS Martin* with the Russian convoy and was on this ship when she was lost in November during the operations for the occupation of North Africa.



Aiton, Glasgow

Aiton was a man of medium build, with a ready smile and a dry pawky type of humour. He was keen on golf and hockey. Professor Morris writes: In my contact with Archibald Aiton as student and doctor, I grew to like and admire the keen young mind, accurate and painstaking in observation, receptive but critical, and obviously anxious to add to medical knowledge. He was popular with his medical and nursing colleagues, and always ready to be of help. Above all he had that presence and influence which enables the true physician to comfort and encourage his patients. In the words of Hippocrates "he was a gentleman in character, and being this he was grave and kind to all."

### JOHN KEAY

CBE, MD GLASG, FRCPE

Dr. John Keay, who died on Jan. 21 at the age of 83, had spent a long and honourable career in the care of the mentally sick. He was and remained clinically minded, and, although he came to hold high administrative office, it was the relief of mental suffering and the brightening of the life of the individual sufferer that earned him the gratitude of his patients and the confidence of his fellow workers, who elected him in 1918 president of the (Royal) Medico-Psychological Association. Keay qualified from the University of Glasgow in 1881. After holding an assistant post at the Crichton Royal, Dumfries, he became superintendent of the Mavisbank Asylum, Edinburgh, and the District Asylum at Inverness before he was appointed to the Edinburgh District Asylum at Bangour. When the last war broke out he was entrusted with the task of converting his asylum into a 3000-bed military hospital. A surgeon who worked with him during those hectic years writes: "Lieut.-Colonel Keay's judgment remained clear and his temper unruffled through the strain of opening and expanding the hospital during the dark days when wounded were pouring back from France. His relations with the consultants, who were in charge under him of the special departments in the hospital, were always of the friendliest, and he handled equally successfully the old-fashioned army sister and the exuberant young MO who found it necessary to keep his eye in by revolver-shooting near his ward. Keay's dry humour was as much in evidence at 2 AM on the snow-covered station-platform where he was meeting a hospital train, as after a good dinner by his own hospitable fireside. He believed his staff could only be efficient if they were happy, and he spared no effort to make them so. Perhaps his one weakness was an unconscious look in his eye, which signified his feeling that brass-hats would be so much more manageable if they were certified."

Some ten years ago he retired to a pleasant home in Dorset with exquisitely trimmed garden, where his old friends always met with warm hospitality, unfailing interest in their doings and sympathy in their difficulties. He leaves a widow.

## GODFREY BROOKES DIXON

M.R.C.S., L.S.A.

Dr. G. B. Dixon, who died in Birmingham on Feb. 18, had held for 33 years the position of chief tuberculosis officer to the city and superintendent of the sanatorium. Tuberculosis officers when sanatorium benefit came into force under the NHI Act had no easy task, writes J. F. B., to establish their position; Dixon was one of the first to be appointed, and he triumphed over the many difficulties in his path. He had a flair for organisation, no detail being too small to escape him and all contingencies being foreseen; but he had also the knack of assessing the value of diagnostic and therapeutic procedures, and by his thorough clinical and scientific investigation he established his prestige with his colleagues, while his patience and kindness brought him the goodwill of his patients.

Dixon, who was a Cumbrian by birth, qualified in 1901 from Charing Cross Hospital where he was house-physician to Mitchell Bruce who turned his thoughts to tuberculosis. After some time at sea he spent two years at Davos before going to Walton Infirmary, Liverpool, and initiating there the open-air treatment of tubercle. Five years of general practice at Tolleshunt D'Arcy as assistant to his cousin, J. H. Salter, came to an end with an attack of pneumonia which led him to accept a post at the Yardley Road Sanatorium, Birmingham, and two years later he was appointed tuberculosis officer to the city. His letter in our columns on Jan. 5, 1918, shows a remarkably fair and balanced view of the value and limitations of sanatorium treatment. Later he published with Dr. J. R. Todhunter the results of an intensive study of pneumoconiosis arising from the use of abrasives in the grinding and polishing of metals. For many years he served on the council of the National Association and on the Joint Tuberculosis Council.

## JOHN LIONEL STRETTON

M.R.C.S., L.S.A., J.P.

Mr. J. L. Stretton, consulting surgeon to the Kidderminster and District General Hospital, was born at Kidderminster in 1860, and died there, after a few days' illness, on Feb. 14. He was trained at St. Bartholomew's Hospital, and passed the M.R.C.S. examination a few weeks after his twenty-first birthday. After holding house-appointments at St. Bart's he returned home in 1882 to join his father, Samuel Stretton, in general practice. At the end of the year he succeeded his father as a surgeon to the hospital, and he remained an active member of the staff for fifty-six years. There he perfected his method of sterilisation of the skin by tincture of iodine BP, described in the *British Medical Journal* in 1909 and afterwards generally adopted. The most remarkable of his pathological specimens were exhibited before the present war in the Wellcome Museum of Medical Science, London, and are now in its safe keeping.

Stretton was president of the hospital from 1924 to 1937, and his gifts as diagnostician and surgeon, organiser and administrator, were of incalculable value in its development. Thanks to his vision and energy, an extension of the hospital was opened, free of debt, in 1926, and ten years later he gave his private nursing-home with its equipment to the hospital to be used for paying patients.

A man of sound judgment and strong views, Stretton was inflexible in upholding what he considered right. He never got flurried in an emergency, and was also considerate and courteous to his assistants and nurses. He was a true friend and adviser to all his younger colleagues in many things besides their professional difficulties. He celebrated his golden wedding in 1934, and leaves a widow, two sons and a daughter. His younger son, John W. Stretton, senior surgeon to the hospital, represents the third generation of the family on its staff.

UNIVERSITY OF LONDON.—At a meeting of the senate on Feb. 24, it was resolved that for the duration of the war an additional MB, BS examination should be held early in February each year. The examination will thus be held three times in each academic year.

The William Julius Mickle fellowship has been awarded to Dr. E. C. Dodds, F.R.S., Courtauld professor of biochemistry at Middlesex Hospital medical school.

## Notes and News

## MOSQUITO CONTROL IN ENGLAND

A Ministry of Health memorandum (Memo 238/Med. HMSO, 6d.) on measures for the control of mosquito nuisances in Great Britain contains two maps showing the distribution of indigenous malaria in England and Wales; one during the eighteenth century and the other after the 1914-18 war. The resemblance is striking: the fen country, the Humber and Thames estuaries and the eastern parts of the south coast were the chosen haunts of infection in both periods. There are good reasons for supposing that the density of *Anopheles maculipennis* in these regions, and especially of its subspecies *atroparvus*, explains the distribution of cases. This subspecies likes brackish water to breed in and feeds readily on man, so that it will be a convenient vector when malarial men come home from overseas. Since bomb craters and fire-tanks offer new breeding grounds for other species the memo sets out measures to control the multiplication of any British mosquitoes likely to make nuisances of themselves. To get rid of *A. maculipennis* walls and ceilings in stables and byres should be sprayed with insecticides in October, so as to kill wintering adults, and again in March to catch those females thinking of flying off to lay their eggs. Aquatic vegetation should be rooted out of likely breeding places, and small fish introduced into them; larvicides, or mechanical measures such as the drainage or filling in of pools, may be needed. *Culex pipiens* should be kept down by similar means. Water-butts, tanks and cisterns should be oiled and old tin cans buried (or, better, given to the salvage man). For many types of mosquito no action is needed: these do not bite man nor, presumably, subject him to a war of nerves by sauntering through his bedroom at night, blowing an elfin siren.

## Medical Honours

The following honours have lately been awarded to medical men:

M.C.—Captain S. M. P. Conway, L.R.O.P., R.A.M.C.; Captain D. Nacrae, M.B., R.A.M.C.; Captain J. J. McCull, M.B. GLASG., R.A.M.C.; Captain Peter Unwin, M.R.C.S., R.A.M.C.

R.N.V.R. Officers Decoration.—Surgeon Commander W. M. O. MacGregor, O.B.E., M.B. CAMB.; Acting Surgeon Commander W. F. Lascelles, M.B. DURH.; Acting Surgeon Commander H. G. Ungley, F.R.C.S.

## Royal Medico-Psychological Association

A meeting of the association will be held at 11, Chandos Street, London, W.1, on Wednesday, March 10, at 10.30 AM, when papers will be read on the clinical aspects of prefrontal leucotomy by Dr. T. P. Rees, Dr. R. Ström-Olsen, Dr. S. L. Last, Dr. M. B. Brody, Dr. Geoffrey Knight and Dr. E. Cunningham Dax. At 2.15 PM, Dr. F. Golla, Mr. Wyllie McKissock and Mr. F. W. Willway will discuss the range and technique of the operation.

## Royal Society of Medicine

The section of psychiatry of this society will meet on Tuesday, March 9, at 2.30 PM, when Dr. W. Mayer-Gross will read a paper on hypoglycæmia as an experimental psychosis, and at 5 PM on the same day at the section of therapeutics and pharmacology there will be a discussion on spontaneous hypoglycæmia. The openers are to be Dr. W. G. Oakley, Mr. E. W. Riches, and Dr. George Graham. On March 10 at 2.30 PM the section of proctology will meet at St. Mark's Hospital, City Road, E.C.1, for demonstrations of operations for hæmorrhoids, fissure and fistulæ. On March 12, the clinical section is holding a meeting at the London Hospital, E.1, at 2.15 PM. On the same day at 2.30 PM, Mr. C. B. Goulden will read a paper to the section of ophthalmology on the control of ocular pain.

## Royal Sanitary Institute

A meeting of the institute will be held at the University of Bristol on Saturday, March 13, at 10 AM. Mr. H. G. H. Kearns, PhD, will speak on the control of domestic pests, Dr. R. J. Irving-Bell on the value of lethane (384 special) in the control of pediculosis, and at 2.30 PM, Dr. Marguerite Hughes will discuss problems in nursery provision. Further particulars may be had from the hon. local secretary, Prof. R. H. Parry, Public Health Department, Kenwith Lodge, Westbury Park, Bristol, 6.

### University of Cambridge

On Feb. 26 the following degrees were conferred:  
**MD.**—\*A. G. Cross, \*R. H. A. Swain, and F. H. King.  
**MB, BChir.**—\*R. B. Meyer, \*G. M. Barrett, \*S. O. H. Hood,  
 \*D. E. C. Whitton, \*P. N. Cunliffe, and \*G. C. L. Roberts.  
 \* By proxy.

### Child Welfare Organisation in USA

Wide variations in the characteristics and environments of the population of the United States have made it difficult to develop any common scheme of medical welfare, and on Feb. 6, Major H. F. Becker of the US medical corps gave the maternity and child welfare group of the Society of MOHs an attractive picture of unplanned medicine. A former paediatric consultant to the Kellogg Foundation, he spoke particularly of the organisation in his own specialty. Maternal and child welfare in America, he described as either government controlled (i.e. by federal, state, city or county government) or privately controlled (i.e. by philanthropic foundations and trusts, or voluntary societies dealing with a particular branch of child welfare). After the last war under the pressure of public opinion the federal children's bureau was organised, and the federally appointed Committee on the Cost of Medical Care showed that adequate curative and preventive medical care was beyond the reach of many of the middle and lower classes. Federal government aid is thus directed primarily to education and fact-finding. The government does not directly subsidise treatment or relief, but may give grants to a state, subject to agreed expenditure by the state, which might in turn allocate responsibility to its counties. The public-health nurse, who usually holds a university as well as a nursing degree, takes an important part in state-aided educational work. Thousands of privately controlled agencies deal with health and welfare, and many work in touch with government departments. The Kellogg Foundation, Dr. Becker continued, began by trying to improve the health of the children of Michigan by creating or financing clinics and hospitals, but this policy seemed to have little effect on succeeding generations and the emphasis was shifted to education—especially the education of doctors and of public opinion through the schools, the clergy and the newspapers. Dr. Becker spoke with conviction of the good results achieved by intensive educational work among general practitioners for whom the foundation arranges meetings and postgraduate courses in paediatrics and obstetrics and supplies the services of consultant paediatricians whose work was deliberately educational as well as clinical.

### Czechoslovak Graduation at Oxford

The University of Oxford, as sponsor of the Czechoslovak universities which have been closed under the German occupation, on Feb. 27 held a convocation in the Sheldonian Theatre at which the degree of MUDr (Czechoslovakia) was conferred on Czech medical students who have completed their studies in this country and passed the special qualifying examination held by the English Conjoint Board. The vice-chancellor of the university presided at the request of the Czechoslovak government and the President of the Czechoslovak Republic attended the ceremony, and Oxford's public orator acclaimed the novelty of the occasion and the indomitable spirit of the university's guests.

### Towels for Medical Practitioners

Doctors may now claim, for professional purposes only, a special ration of towels for the period to Dec. 31, 1943. This is available to specialists, consultants and general practitioners in private practice, but not to those working in institutions or under local authorities. On or after March 8 a certificate equivalent to 4 coupons will be obtainable from the Secretary, British Medical Association, BMA House, Tavistock Square, London, W.C.1. Envelopes should be marked "towels" in the top left-hand corner and a stamped addressed envelope must be enclosed. It is particularly requested that no application should be made until new towels are genuinely needed.

If a practitioner, because of the size or nature of his practice, finds it impossible to manage on the ration allowed, a case for special consideration may be stated to (in England) the regional medical officers, (in Scotland) the Department of Health for Scotland, St. Andrews House, Edinburgh 1, or (in Northern Ireland) the Medical Officer, Ministry of Home Affairs, Stormont, Belfast.

The supply of towels is now so limited that members of the public must use their own towels more and more. For example, patients who receive treatment in their own homes or by appointment at surgeries or in private nursing-homes will be expected to provide their own towels.

### Royal Faculty of Physicians and Surgeons of Glasgow

Prof. Dugald Baird will deliver a John Burns lecture in the hall of the faculty, 242, St. Vincent Street, Glasgow, on Wednesday, March 10, at 4 pm. The title of his lecture will be the problem of the high stillbirth and neonatal mortality in Scotland.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

### Infectious Disease in England and Wales

WEEK ENDED FEB. 20

**Notifications.**—The following cases of infectious disease were notified during the week; smallpox, 0; scarlet fever, 1922; whooping-cough, 1581; diphtheria, 828; paratyphoid, 7; typhoid, 6; measles (excluding rubella), 18,215; pneumonia (primary or influenzal), 1399; puerperal pyrexia, 146; cerebrospinal fever, 96; poliomyelitis, 5; polio-encephalitis, 0; encephalitis lethargica, 0; dysentery, 89; ophthalmia neonatorum, 87. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Feb. 10 was 2359, including scarlet fever, 626; diphtheria, 267; measles, 675; whooping-cough, 245; enteritis, 95; chickenpox, 79; erysipelas, 35; mumps, 37; poliomyelitis, 2; dysentery, 32; cerebrospinal fever, 21; puerperal sepsis, 17; enteric-fevers, 8; german measles, 8; osteomyelitis, 1.

**Deaths.**—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 24 (0) from measles, 16 (4) from whooping-cough, 25 (2) from diphtheria, 45 (7) from diarrhoea and enteritis under two years, and 102 (13) from influenza. The figures in parentheses are those for London itself.

Birmingham reported 10 deaths from diarrhoea, 8 from influenza, and 5 from whooping-cough. Liverpool had 4 fatal cases of diphtheria.

The number of stillbirths notified during the week was 231 (corresponding to a rate of 35 per thousand total births), including 19 in London.

## Births, Marriages and Deaths

### BIRTHS

ADAMS.—On Feb. 19, at Twickenham, the wife of Major G. S. Adams, RAMC—a son.  
 BOLTON.—On Feb. 24, at Belfast, the wife of Dr. Sloan Bolton, Portrush—a son.  
 BRODRIBB.—On Feb. 28, the wife of Captain J. H. G. Brodrigg, RAMC—a daughter.  
 BROOMHALL.—On Feb. 19, at Paoning, W. China, the wife of Dr. James Broomhall—a daughter.  
 CRANSTON.—On Feb. 27, at Gayton, Cheshire, the wife of Surgeon Lieutenant Kenneth Cranston, RNVF—a daughter.  
 DAVIS.—On Feb. 20, in London, the wife of Dr. Eli Davis—a daughter.  
 EPPS.—On Feb. 24, at Chichester, the wife of Captain L. C. de R. Epps, RAMC—a daughter.  
 GIBSON.—On Feb. 14, at Northampton, the wife of Dr. John Gibson—a son.  
 HARPER.—On Feb. 23, at Limsfield, Surrey, the wife of Major Ernest Harper, RRCs, RAMC—a daughter.  
 LILLICRAP.—On Feb. 16, at Lincoln, the wife of Dr. C. A. Lillcrap—a daughter.  
 MCCALL.—On Feb. 25, at Stoke-on-Trent, the wife of Dr. A. J. McCall—twin daughters.  
 OWLES.—On Feb. 21, the wife of Dr. W. H. Owles—a daughter.  
 SIDERS.—On Feb. 21, at Torquay, the wife of Surgeon Lieutenant Geoffrey Sheers, RNVF—a son.

### MARRIAGES

GILLOTT—BAILEY.—On Feb. 20, at Northwood, John Arthur Gillott, captain RA, to Ursula Mary Bailey.  
 TYRRELL—KAY.—On Feb. 21, in Edinburgh, James Munro Tyrrell, MB, to Jean Wylie Taylor Kay.

### DEATHS

ARCHER.—On Jan. 9, in Godalming, Samuel Arthur Archer, CMG, MRCS, colonel AMS ret'd., aged 71.  
 ARMOUR.—On Feb. 21, in Liverpool, Theodore Robert William Armour, MB EDIN., FRCS, JP.  
 GABE.—On Feb. 20, Ivor Stanley Gabe, MRCS.  
 MUMFORD.—On Feb. 23, at Beaconsfield, Alfred Alexander Mumford, MD LOND., formerly of Manchester, aged 80.  
 RIDDELL.—On Feb. 22, at Wyresdale Park, Scorton, Hugh Ridwell, MB GLASG.  
 RUTHERFORD.—On Feb. 22, James Mair Rutherford, MB EDIN., FRCP EDIN., of Brislington, Bristol, aged 70.  
 SATCHEL.—On Feb. 26, at Welford-on-Avon, Ernest Percy Satchell, MB., of Barnes, S.W.13, aged 81.  
 TASKER.—In November, 1942, through enemy action at sea, Ronald Henry Tasker, MRCS, of the Burmah Oil Company.  
 WIGHAM.—On Feb. 22, at Bournemouth, William Harper Wigham, MD DURH., aged 87.

## SOCIAL AND INDUSTRIAL ENVIRONMENT AND DISEASE\*

MAJOR GREENWOOD, D SC, F R C P, F R S  
PROFESSOR OF EPIDEMIOLOGY AND VITAL STATISTICS IN THE  
UNIVERSITY OF LONDON

"The following were the circumstances attending the illnesses from which I framed my judgments, learning from the common nature of all and particular nature of the individual, from the illness, from the sick person, from the regimen, even from the prescriber; these make the judgment more or less favourable."

This saying of Hippocrates contains the fundamental truth that a physician must study not only the biological processes of health and disease, what is happening within the cellular systems of the individual, but the relation of the individual to his environment, his social-economic setting. All great physicians have taught this, but, in our world, to coördinate the necessary knowledge of microcosm and macrocosm has become increasingly difficult. There is so much to learn.

In the age of Hippocrates the training of a physician was fundamentally different from the medical education of our own time but similar to that of a hundred years ago. Both my grandfathers, my father and four of my uncles were general medical practitioners; I have an intimate traditional and personal knowledge of more than a century's vicissitudes in medical education. In the time of my grandparents, primary medical training was personal; the relation of apprentice to master. Each reform of medical education has weakened the personal link in non-medical families. Already by my father's time it had been severed. In his case, it was only weakened; his "walking the hospital" was longer than his father's but he was still allowed to visit patients before "qualifying." Even in my time 40 years ago an East End doctor's son was not wholly dissociated from patients. Of course I could not visit them, that would have broken the rule against "covering"; but I made up medicines (I still instinctively take the stopper out of a bottle between the little finger of my left hand and the palm) and watched the patients, listening to their consultations with my father in his far from soundproof consulting-room and when I was "qualified" visited patients.

But that introduction to medical life was only possible in medical families and only in those families in country practice or in town working-class practice. Now, or any time these sixty years, a young man or a young woman from a non-medical family may never have entered the home of a patient (except on external midwifery practice) before graduation.

### GAIN AND LOSS

That a medical graduate of 1942 can diagnose the physical cause of an illness and prescribe appropriate treatment far more efficiently than a new graduate of 1842 is certain. Not merely in the obvious sense that he has greater knowledge but in the less obvious sense that the average or below average man of 1942 is nearer to the best attainable standard of his time than his great grandfather, because of the greater general efficiency of medical education. The education of a future "consultant" in 1842 was wholly different from that of a future general practitioner. But the neophyte of 1842 began his career with more intimate knowledge and experience of the way life is lived than his successor in 1942.

It is as important not to over-value what has been lost as not to over-praise what has been gained. We are not tempted to make the latter mistake; we can too easily see the faults of our own time. But the past is seen through a mist which, as we grow older, is more and more rose-tinted. That an eager sensitive lad who had lived in the family of a wise doctor for years, began to "walk" the hospital with a knowledge of human nature and how people lived more valuable to a physician than any of the science or technology expounded by professors in medical schools may well be true; such a pupil, unlike many medical writers now, knew that "case" and "patient" were not synonymous. But all

apprentices were not sensitive and not all surgeon-apothecaries wise;—Bob Sawyer, Benjamin Allen and the parish apothecary's apprentice who attended old Sally's deathbed do not suggest a golden age of Hippocratic medicine. They had had experience our students lack, but had not profited by it; the cynical phrase—*eo immitior qui toleravit*—is statistically true.

Simon, and in our time Dr. Buer, have emphasised the truth that a growth of the general spirit of humanity was the most powerful factor of sanitary reform. That the great reformer in whose honour these lectures are given was less successful than he deserved to be, was partly due to the fact that, while he loved mankind, he did not sympathise with individuals or allow for their intellectual difficulties and lack of imagination. One thinks of the gloomy tragedy in Nathaniel Hawthorne's *Blythedale Romance*. The ideal physician combines knowledge—what, for want of a better word, I may call statistical knowledge of the patient's environment—with sympathetic insight into the individual peculiarities of the patient. That the latter virtue is the more important, I am sure; but I do not have any better prescription for its culture than is to be found in the New Testament.† I can, perhaps, make some suggestions under the former heading—viz., as to what non-medical knowledge is valuable to the practitioner of medicine, why it is important and how it may be acquired. That is the topic of this lecture; the study of the social-economic setting of "patients." Mindful of our benefactor's primary interest in housing I begin with that.

### THE HOMES OF THE POOR

If one compares the housing condition of the country as disclosed by the census of 1931 with that of nearly a century ago as revealed by Chadwick, the improvement is manifest. But we learn from the census of 1931 that at least 55,650 families were living more than four persons to a room. It is a very small proportion of the 10 million families enumerated but comprises more than 300,000 individuals, the population of a large county borough. They were not concentrated in any one area, they were not, of course, all adults. Perhaps some of them were subdued to conditions which few of those who hear these words emotionally realise. But in that large absolute number of human beings were some vividly conscious of social injustice. "Whatever recklessness and obscene brutality arises from it—whatever deep injury it inflicts on the community—whatever debasement or abolition of God's image in men's hearts is tokened by it—these belong not to my office . . ." I will not continue the quotation (I am apt to repeat it too often) but it is as applicable to tens of thousands now as it was to hundreds of thousands when Simon first used the words almost a century ago.

It is important for the young doctor to know this and also to know something of the regional distribution of the evil. In 1931 there were still four great towns in England in which more than one-fifth of the population were living more than two to a room—Gateshead, South Shields, Sunderland, Newcastle on Tyne. Ten years earlier the proportion in each of these towns was more than one-third. That was the aftermath of the first phase of the world war. Knowledge of these facts is important in the limited professional sense that the prognosis of infectious or infective diseases, both as regards the patient and his housemates, is greatly affected by overcrowding; and it is more important still in its bearing on mass psychology. I think some of us have judged our neighbours, for instance when we are told that the coal output is not what we should like it to be, that there is too much absenteeism and so on, without remembering or even knowing the conditions of life in mining districts. A great medical statistician, an Ulsterman, once said to me: "John Bull forgave himself so long ago for what he did in Ireland a very long time ago, that he is genuinely puzzled that other people remember it."

We don't have to go back to Cromwell or even to 1798 to find dreadful evils in the north of England. They cannot be forgotten. In those four towns the

† *Corinthians*, I. 13. It is a sad reflection that the noble word, by which our forefathers rendered *ἀγάπη*, charity, in common usage means a subscription or—an insult.

\* A lecture delivered in London on Feb. 23, 1943, under the Chadwick Trust.

position deteriorated between 1911 and 1921. What will it be three years after the armistice of 194-?

One must also remember that to know what to do is easier than to do it. Overcrowding is a *great* evil, but as Walter Scott remarked in *Guy Mannering*, most evils have a rateable proportion of good. I have had many reasons to be proud of my countrymen since 1939; I have been most proud of my fellow East Enders; of bombed-out guests, of cheerful "matey" women of fifty-plus who still spoke the speech of Shoreditch of my childhood, called me "young man" and were grateful for a lift in my car when on their way back to search the ruins of their homes. The morale of these people is not to be shaken by all the gangsters in the world. How much of it is due to the camaraderie of what middle-class people call a slum? "He wandered among the cheery, strolling crowds. The twilight air was heavy and stale with the odours of traffic and litter and hot, congested humanity. But the High Street became fuller and merrier." That was Mr. Reginald Fortune, frightened out of an East End police-station by Superintendent Bell's suggestion of a "sort of high tea." The air in a new housing estate is not "stale with the odours of traffic etc."; neither does the High Street become full and merry; there is no High Street. It is *very* easy to suppose that what one likes oneself other people enjoy. Next comes occupation.

#### HEALTH AND WORK

As I have said above it is easy to see and exaggerate the evils of our own time and the criticisms I shall make must be coloured by that emotinal bias. Long before the last war, specific occupational hazards had been made the object of scientific study by state employees or with the aid of state grants. But a serious study not of specific but general hazards or inconveniences associated with factory work and its social setting really began with the Health of Munition Workers Committee presided over by Sir George Newman. Out of the work then done was evolved the Industrial Fatigue Research Board afterwards named Industrial Health Research Board. It all *began* with the problem of hours of labour. Then, as in 1939, we were short of munitions. How long hours could be safely worked? What was the effect of night work? But inevitably the scope widened to include feeding, social amenities, even wages. The garrulity of sixty-plus incites me to dwell upon those early days but I will restrain it. I will, however, state dogmatically that

- (1) The investigations, particularly those of Dr. H. M. Vernon, on the physiological and pathological effects of varying the hours worked were quite conclusive.
- (2) Adequate statistical methods of measuring labour wastage were devised and some progress was made in elucidating the causes of wastage.
- (3) A beginning was made in the precise study of the psychological factors of ill health.

In the years following the armistice of 1918 these researches were continued. To those who collaborated the interest of the work was its own reward. It was not rewarded by utilisation in the country whose taxpayers provided the salaries of the investigators. I permit myself a faintly amusing illustration. During the last war labour wastage in munition factories was a serious problem. If novices enter a munition factory they are—for a longer or shorter time, depending on the nature of the job, but always for *some* time—inefficient; they have to learn their job. A factory the workers in which drift away after a short period cannot be so productive as one which retains its employees after they have become efficient. This wastage was thought to be large; what was the reason? Before one can intelligently discuss the causes of an effect its intensity must be measured. I was given this task by the Health of Munition Workers' Committee. The method I devised had no fundamental novelty in principle; it was an application to a particular class of data of statistical methods actuaries had applied to the facts of mortality for generations. It displayed the relevant facts and permitted some of the causes of wastage to be inferred.† Some years later an Italian statistician, Prof. Albino Ugge‡ applied the method to

Italian factory data. He remarked, with courteous meiosis: "Il saggio del Greenwood non ha ricevuto grande attenzione." The omission of the word "grande" would make the statement literally true.

Nearly a quarter of a century passes and again labour wastage in munition factories becomes very important. The reader might naively suppose that preparations would have been made by officials (popularly supposed to lust after statistics) to measure wastage and absenteeism accurately. It was not even necessary to read a Stationery Office publication,|| written in English, a lowbrow practice naturally condemned by war-time civil servants who are so much more royalist than the king in their intellectual habits. An excellent short treatise by Professor Ugge was published in Italian ¶ in 1935, and to read Italian is culturally respectable.

But the Galleos cared for none of these things. The arithmetical statements put into the mouths of ministers respecting wastage and absenteeism were, to a statistician, grateful comic relief in gloomy broadcasts. One recollected the warning of Chrystal—learned in the days of diligent use of his *Algebra*—that no property of a function could be proved before the function was defined. Gradually in the less statistically chaotic of the Royal Ordnance Factories matters have improved; the methods and results of 25 years ago have been independently re-discovered and, in a few years, quite good statistics will be available. I chose this typical example because it does not stir my emotions. In peace-time labour wastage in the sense of these investigations is *not* a problem of first-rate importance. Had it been, great firms whose managements are enlightened would by precept and example have made it difficult for even Ministry of Supply employees to be totally ignorant of the subject. Muddle was inevitable and it cost less money and wrecked fewer lives than many other scandals we ignore.

#### SICK-LEAVE

I cannot so easily and unemotionally pass over the tragedies which underlie the colourless phrase Long Sick-leave, statistically defined as sick-leave involving more than 29 working days. The percentage of industrial workers who have long sick-leave is not large—of the order of 3 per cent.—but the absolute number of these sufferers is large. "Certain diseases," write Dr. May Smith and Miss Leiper (Report No. 75 of IHRB) "are characteristic of each group. Out of 29 groups varying in number from 200 to over 1000, the nervous breakdown type of illness occurs more frequently than any other one diagnosis—i.e., 27 times out of 29—and the range is from an amount that is negligible to nearly 40 per cent. in one group. Next in importance are accidents, influenzal debility, gastric affections and rheumatism." We have, I think, passed beyond the time when "nerves" (which diagnostically cover not only "nerves" pure and simple, but a large part of "gastric," much of influenzal, debility and some part of rheumatism) and malingering were regarded by tough-minded people as synonyms. Eleven years ago I took "nerves" and the public health for the text of a Chadwick lecture which, I think, interested some of my American statistical colleagues, for it was afterwards published in an American scientific journal. But it did not interest anybody else, for what has a statistical epidemiologist to do with "nerves"?

As an epidemiologist I ask myself what is the effect, not only on the individual sufferer but on the group, industrial or familial of which he or she is a member, of "nerves" or debility, nervous, gastric, or what you will, measured in terms of industrial inefficiency and human sorrow. I suggest to those who plan the brave new world of the future in general, and in particular to those who raise their eyebrows at the small proportion of medically qualified persons among those who have given the best years of their lives to the service of the Industrial Health Research Board, that if the reports of these "amateurs" had been read, *really* read, by those who presume to teach before they have been learners, long sick-leave might be a less ghastly problem than it is.

† Medical Research Committee, Spec. Rep. No. 16, London, 1918.  
‡ *In Misura statistica della mobilita del lavoro* (from *Raccolta di scritti in memoria di Giusseppe Toniolo nel decennio della sua morte*). Milan, 1929.

|| Industrial Health Research Board, Spec. Rep. No. 75, Stationery Office, 1936.

¶ *Trattato Elementare di Statistica* (directo da Corradi Gini) vol. vi, *Statistica Sociale*. Milan, 1935.



Even when emotionally moved, I do not wish to figure in the so easy rôle of an abusive critic of my own profession. That the great majority of qualified medical men cannot carry out either a statistical or a psychological investigation of fundamentally medical problems of modern industry, is no more a matter of reproach to them than the fact that a great majority cannot read Greek, Latin, or Russian. They have never been taught and they cannot be taught without a reform of the medical curriculum. This is under discussion and we may hope for a little more instruction of medical students in what it is fashionable to call social medicine. This is by no means futile; at the worst it will remove the grossest ignorance and at the best it may attract some eager minds to subjects for which they have aptitude. Lectures as means of didactic instruction are obsolescent, but a good lecturer can stimulate or even kindle enthusiasm. That medical students now are much more generally interested in social problems than they were 50 years ago is an encouraging feature of our time.

#### CLINICIANS AND NON-CLINICIANS

But the fact must be faced that social medicine—including epidemiology and medical statistics—must go the way chemistry, physiology, anatomy and pathology have gone and pass out of the control of clinicians, who are and must always be what the ordinary citizen thinks of as medical men, "doctors." That has been the course of history. It is hardly 300 years since the last attempt of learned physicians to control surgeons as mere "technicians" was decisively defeated; the ghost of that long-departed professional inferiority still lingers in the wholly English practice of addressing a physician as "Dr." and a surgeon as "Mr." even if the latter has ample academic right to the style "Dr." and the former has none. It is still true that a majority of teachers and research-workers in the non-clinical branches of medical science have graduated in medicine. But the enormous loading of the undergraduate curriculum in medicine will gradually make the majority a dwindling minority. Sir Thomas Lewis, foreseeing this, advocated years ago a modified general medical undergraduate course for those whose ambition was non-clinical. The advantage of this is obvious. While a man could become a good epidemiologist without ever seeing a patient suffering from measles, because he is concerned not with individuals but groups, it is true that knowledge of the individuals who are fused into groups is valuable. But no university has the courage to do what Sir Thomas Lewis advised.

No hierarchy of "doctors"—whether in Harley Street, Tavistock Square or Whitehall—will be permitted by public opinion to issue orders or, as it is politely put, coördinate the work of those whom they entitle technicians any more than solicitors are allowed to coördinate the work of barristers. The association of clinicians and non-clinicians will be on equal terms and, for a generation, until fully qualified medical men have had more training in quite difficult methods of research, the non-medical research-workers will take the lead. This is not because they are intrinsically wiser than clinical personnel or generally better educated, but because they have been *specialty* educated and acquired special experience. You will naturally and properly recall the remark of the cobbler on leather when you hear me say that statistical training and experience are of fundamental importance; yet I say it.

"When you can measure what you are speaking about and express it in numbers, you know something about it, but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind."

Those are the words not of a statistician but of Lord Kelvin and, I think, go beyond the truth. The knowledge a great physician has of the body and soul of his patient cannot be measured or expressed in numbers and is neither meagre nor unsatisfactory. But it is true that physicians not great will do well before pronouncing judgment, even in individual cases, to know something of group experience, and that physicians great and small cannot assess group experience without resort to a calculus of groups which must be statistical.

The great value of statistical methods in purely laboratory work has long been recognised; it is becoming

recognised in the assessment of clinical results. In psychological field work—the application of intelligence tests—statistical methods have long played an important part. The difficulty which occurs and will certainly not grow less is that with the increasing complexity of the problems proposed for solution—for example those of human personality or temperament—the statistical treatment grows more subtle. There is here a danger that the intellectual interest of the technique may outweigh interest in the human problems themselves. Having had my interest excited in mathematical methods proposed for the solution of such practical medico-psychological problems as the diagnosis of temperament and the relation of temperament to liability to physical disease, perusal, at first painful, of the mathematicians' writings, deflected my attention from the practical problems to the beauty of the method. I realised, with an effort that it would be a long time before data worthy of the methods would be available and that we must not alarm the neophyte or, alternatively, make him a mere technician by making the wheel turn a full circle and the clinician the servant of the non-clinician. Science has been sterilised before now not by under—but over-subtlety of intellect as the decline and fall of scholasticism proved. Science can be too abstract to hold the attention of many men well fitted to do important research work. The danger is not, however, acute. I am glad to see that Dr. Bradford Hill's *Principles of Medical Statistics* has gone into a third edition; when it is as familiar to all medical students as any manual of physiology it will be time enough to consider whether more should be learned. Let us look to it that none, medically qualified or not, presume to instruct others in the phenomena of groups, absenteeism, sickness, lost time, housing or diet, without knowledge of the only language in which group characters can be accurately described. That is the case for the statistical education of all medical students.

#### PSYCHOLOGY AND THE DOCTOR

Next in importance I rate instruction in psychology, group and individual. Ideally, knowledge of psychology is more important for the doctor than all the statistical knowledge of a Farr or a Karl Pearson, I place it second in recognition of human weakness; if we were all wise or all-perceptive we should need no statistical methods at all. The educational advantage of arithmetic or algebra is that nobody who is honest with himself can think he understands what he does not understand. An honest person having read a chapter of a textbook on a mathematical subject, tries the examples at the end and unless he can solve a reasonable proportion of them, knows that he must read the chapter again. It is very difficult to provide examples for working out in psychology. One may quite genuinely believe that one has mastered a psychological argument and yet be wrong. When I was a medical student, it used to be said that a clinical clerk, if intelligent, recognised in his first month that he knew nothing about "murmurs," in his second month believed he knew all about "murmurs" and in his sixth month (or later, the length of time varying inversely at his intelligence) discovered he knew very little about them.

To many of us such classics as Freud's *Psychopathology of Everyday Life* or his *Interpretation of Dreams* have seemed to give entrance to a new world of ideas. We have not lost that vision but we have realised that for us it must remain a world of ideas because to utilise the ideas requires a special mental aptitude which is not common and a clinical experience which implies years of pupillage.

Anybody who cares for chess will derive pleasure from playing over the games of a great master, a Morphy or a Lasker; he will not become an effective player by trying to mimic their subtle combinations, but by patiently mastering the elementary principles of chess tactics and strategy.

Before young doctors are encouraged to talk about complexes or interpret dreams, they should learn something of what many physicians and psychiatrists describe contemptuously as mere "academic" psychology and a good deal of psychological testing, where the validity of principles can be put to an arithmetical proof. I always try to persuade beginners in epidemiology to read *first*

Hippocrates' *Epidemics* Books 1 and 3 and his tract on *Airs, Waters and Places*. All can be read in two or three hours and contain little or nothing which shocks a modern reader—nothing, I mean, so remote from his ways of thinking as to divert his attention from the fundamental value of the work. I think a beginner in psychology should read Aristotle on *The Psyche* but not the whole treatise—a much abbreviated edition, omitting those chapters which use a nomenclature alien to our habits of mind. Anybody who understands what Aristotle meant by saying that the psyche was the realisation of the body will not thereby become a psychologist, but will have reached that mental poise which will enable him to learn psychology.

#### KNOWLEDGE OF LIFE

There still remains what I mentioned in the early paragraphs of this lecture, the vividly personal element. The criticism to which the instruction upon which I have rather concentrated notice is open is that, in the non-technical but wholly intelligible sense of the term, it has no soul. Statisticians are as human as others, but statistics are marks on pieces of paper. The most minute knowledge of the statistics of overcrowding is not so emotionally impressive as individual experience of overcrowding. Reading psychologists' case-reports and a little introspection are means of education, but not efficient substitutes for intercourse with living people placed in various settings.

### LABORATORY INFECTION WITH MURINE TYPHUS

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This paper records accidental infection in 12 workers in two separate laboratories during the progress of experimental work with the rickettsiae of typhus fever. The epidemiological and clinical features, and certain laboratory findings, are presented in the hope that they may help those confronted with the control of typhus infection, or with its diagnosis in individuals inoculated prophylactically.

#### EPIDEMIOLOGY

At the Hampstead laboratory the 4 original workers received three courses of typhus vaccine during October, November and December, 1941. Three doses of the vaccine were given at weekly intervals and an interval of two weeks elapsed between each course. One course of rat-lung Castaneda type of vaccine (Castaneda 1939) (killed murine rickettsiae) and two courses of a Cox yolk-sac type (Cox 1939) (killed epidemic rickettsiae) were given. Altogether 6.75 c.cm. of vaccine was received by each worker.

Work with the rickettsiae of murine typhus (Wilmington strain) began in November, 1941. For the first month it was confined to experiments on guinea-pigs, involving only the passage of brain and tunica-vaginalis emulsions. Intranasal inoculations of mice under ether anaesthesia with infected guinea-pig-tunica washings were first made on Dec. 9, 1941; but until Jan. 6, 1942, such inoculations were made only for routine passage of the virus. They were carried out in a glass and metal box which prevented dispersion of the coarser droplets expelled by the mouse during the actual instillation. After inoculation the mice were at once removed from the box and placed in a cage.

On Jan. 6 the virus was titrated intranasally for the first time, and a chemotherapeutic experiment was done, involving repeated intraperitoneal injections of a large number of intranasally infected mice. Many of the injections were given between midnight and 9 AM by a single worker. All 4 people employed on this work

How individual experience can be gained under the conditions of modern medical pupillage I do not know. That is a problem I cannot solve. Unless it is solved, the reforms I suggest will go but a little way towards the goal. I can only give this hint. Some weeks ago a "brains trust" of listeners was asked to define greatness and one of them said it was kindness. It did not, perhaps, seem to many an adequate definition, but to those who read their Bibles and do not think that charity is just giving money to a deserving cause, it might have appealed. Perhaps sympathy, or sympathetic imagination, is a word more easily stomachable in these days. Medical students are more interested in the social background of patients than their great grandfathers, far more interested, but prone to exalt to heaven or thrust down to hell, typical individuals or classes. Ideologies are necessarily more influential on young people than their seniors. An old man who sneers at the youth's enthusiasm for general ideas is a fool, but a young man who attributes an older man's distrust of general propositions wholly to intellectual and emotional sluggishness due to arteriosclerosis is not very wise.

The rectification of the youth's too easy generalisations is effected not by elderly reproof but by individual experience. He can learn something from books and statistical tables but not enough, not nearly enough. "And now abideth Faith, Hope, Charity, these three; but the greatest of these is Charity."

took ill during the period approximately from Jan. 8 to 16. In 3, the onset was between Jan. 14 and 16, and in the 4th case (Y), which was ambulant, the onset could only be determined approximately as Jan. 8. Of these patients 2 (A and J) were admitted to the LCC North Eastern Hospital. A 5th mild illness occurred on May 28 in L, who had been exposed to the risk of infection during the inoculation of yolk-sac material intranasally into mice. This worker had received a course of murine vaccine (Castaneda) in November, 1941, and one of epidemic typhus vaccine (Cox type) in April, 1942, some weeks before handling infected material. Two other laboratory workers, vaccinated and exposed to the risk of infection like the others, suffered no clinical illness during the period of their exposure. All the workers who took ill were exposed only to the murine strain of typhus rickettsiae prior to their illness.

At the military laboratory, a single course of inoculations with epidemic typhus vaccine (Cox type) was given to the workers in December, 1941, and to others who joined the staff in January, 1942. A total of 3.0 c.cm. of vaccine in four separate doses was administered, and all excepting Fi (who was not actually working with rickettsiae) received a "recall" dose of 1.0 c.cm. of vaccine in April. The Wilmington strain of murine typhus was received in the laboratory on Jan. 1 and was maintained only by intraperitoneal passage through guinea-pigs until April. Three days after the recall dose of vaccine, mice were inoculated intranasally with guinea-pig material and successive intranasal passages with lung material were made thereafter. At about the same time the virus was cultivated successfully in the yolk-sac of hens' eggs. Abundant growths of rickettsiae in the mouse-lung and in the yolk-sac were obtained from April 25 onwards. From the last week in April the Tunisian epidemic strain of typhus was maintained in the laboratory by routine intraperitoneal passage in the guinea-pig. No mouse inoculations were performed until June and egg inoculation with this strain did not result in successful cultivation of the virus.

From May 2 to 21, 5 of the 7 workers chiefly at risk developed symptoms; 3 patients (H, P, M) were admitted to the American Red Cross Harvard Field Hospital Unit; the 4th (B) experienced mild symptoms for four days and the 5th (F), though symptomatically ill, remained at work throughout the period of illness. The remaining 2 cases of laboratory infection occurred under different circumstances.

Fi, the officer in charge of the laboratory, was not actually working with rickettsiae, but was present in the laboratory from April 1 onwards for about half an hour each day. He experienced symptoms from Aug. 1 onwards and was admitted to hospital on Aug. 9.

T, who joined the research team in July, received three doses of epidemic typhus vaccine, and a fourth dose of 1.0 c.cm. of a yolk-sac murine vaccine. He did not take part in typhus work until August, two weeks after the completion of vaccination. Symptoms began on Sept. 3, and he was admitted to hospital on the 10th.

All the patients from the military laboratory were exposed in some measure to the rickettsiæ of both murine and epidemic typhus, but the original workers were exposed to a much greater risk of infection from the murine virus than from the epidemic one, in the period immediately before their infection. In the case of T and Fi, exposure was equally to the murine and epidemic viruses. The clinical and laboratory findings in all 7 patients from the military laboratory agreed with those in the Hampstead patients who were exposed only to murine virus prior to their illnesses. Finally, 2 workers at the military laboratory, who were vaccinated similarly to the others, and who took an active part in the experimental work, remained free from symptoms during the period under consideration.<sup>1</sup>

PRECAUTIONS

The precautions taken to avoid infection by workers in both laboratories included the wearing of rubber gloves and also at the military laboratory of oilskin capes. Gauze masks were worn during intranasal inoculation of mice, and in both laboratories mice were inoculated in a glass and metal box. After the first run of illnesses in the military laboratory, all mouse inoculations were carried out in a room attached to the animal hut and away from the laboratory. F and T had spent only brief periods in this room, but longer periods in the main laboratory.

SOURCE OF INFECTION

Experience in other laboratories (Findlay 1941) has indicated that mouse inoculation by the intranasal route with rickettsiæ is particularly dangerous to man. The small epidemics of illnesses in the two laboratories developed very soon after intranasal inoculations of mice were begun and good growths of rickettsiæ were being obtained. Experiments were accordingly undertaken at Hampstead, to test the possibility of infection during mouse inoculation.

Mice were inoculated intranasally under anaesthesia with 0.05 c.cm. doses of a heavy suspension of *Chr. prodigiosum*, the inoculations being performed in a closed box of approximately 5 c. ft. volume. Samples of the air in the box were taken with the slit sampler (Bourdillon, Lidwell and Thomas 1941), during inoculation, and at varying times during the period when the mice were recovering from the anaesthetic. These experiments, which will be reported in detail, showed that very large numbers of *Chr. prodigiosum* were disseminated into the air, both during inoculation and for at least 45 minutes thereafter. The risk of inhalation infection under the conditions in which inoculations of typhus material were performed must, therefore, have been considerable.

It has been impossible to determine the danger of infection from dust. Dust may, however, be of great importance, and at least in the case of Fi, who did not perform any mouse inoculations himself, it may have been the vehicle of infection. Dust-borne infection with the rickettsiæ of Q. fever in the laboratory has been described (Hornibrook et al. 1940).

CLINICAL DATA

The illness of the 12 patients exhibited certain common features, but differed so much in clinical severity that individual description is necessary. The first 7 patients were those admitted to hospital and are tabulated in approximate order of severity of symptoms:—

CASE 1.—A, aged 45, was seen by one of us (E. H. R. H.) in consultation with Dr. D. K. M. Chalmers on Jan. 17, and admitted next day to the North Eastern Hospital. When first seen, he had been ill for two days. He complained of severe intermittent frontal headache, general malaise, anorexia and constipation. He looked ill. The face showed a general faint dull red flush; there was no conjunctival

injection. The tongue was furred and moist; it showed no tremors on protrusion, then or later. No rash was visible on first examination. The spleen was not palpable at any time during the illness.

On admission to hospital on the 4th day of illness, the general condition was much the same as that already recorded, T. 101° F., P. 96, R. 28, blood-pressure 120/75. Nothing abnormal was noted in the heart, lungs, abdomen or central nervous system. The urine showed a very faint trace of albumin and from it was cultured a non-lactose-fermenter later identified as *Bact. alkalescens*. A faint mottling of the skin of the back was observed together with a few scattered macules upon the trunk and arms. During the next two days the rash became more profuse; it was confined chiefly to the trunk; there were but few lesions upon the limbs and none upon the face. The lesions consisted of the characteristic dull or "dirty" pink macules, very variable in size and shape and showing a tendency to cluster over the lower part of the

TABLE I.—WEIL-FELIX TESTS IN SIX OF THE CASES

Name	Date	Day of disease	OX19	Name	Date	Day of disease	OX19
A	Dec. 8	Pre	+ (20)	B	April 30	Pre	*- (25)
	Jan. 19	5th	+ (20)		May 28	19th	+ (125)
	" 21	7th	+ (60)	M	April 30	Pre	- (40)
	" 26	12th	+ (640)		May 20	5th	+ (20)
E	" 21	2nd	- (20)	" 24	9th	+ (35)	
	" 23	4th	- (20)	" 30	15th	+ (40)	
	" 26	7th	± (20)	June 3	19th	- (40)	
	" 29	10th	+ (40)	S	April 30	Pre	- (40)
	Feb. 6	18th	+ (80)		May 8	7th	+ (40)
" 8	19th	+ (500)	" 12		11th	+ (80)	
F	May 25	5th	+ (25)	" 16	15th	+ (160)	
	June 1	12th	+ (160)	" 20	19th	+ (160)	
	" 8	19th	+ (500)	June 3	33rd	+ (80)	

back. No true subcuticular mottling was seen. The macules passed through the typical stages of rusty red to brown and finally faded out. No branny desquamation was observed. No lesions became petechial, wholly or in part, and there were no ecchymoses. During the eruption of the rash the patient's general condition showed some deterioration. He complained of severe intermittent headache (there was a history of periodic migraine) and of flashes of light before the eyes. Sleep was troubled and on two occasions dreams of an occupational character were experienced.

The temperature was at first remittent and then intermittent; it finally became normal nine days after admission. There was a slight cough, but no appreciable physical signs in the lungs. Except for some weakening of the first sound, there was no clinical evidence of myocardial impairment. An electrocardiogram taken a week after admission showed low voltage, but otherwise nothing abnormal. With the fall of temperature, the headaches ceased; the tongue cleaned and the appetite and general condition improved. The patient was allowed up on Jan. 31 and was discharged on Feb. 3.

Soon after his return home he began to suffer from attacks of tachycardia which became progressively more frequent and distressing. Though the heart-rate was usually only 100 to 120, the attacks were often accompanied by faintness and, later, dyspnoea. They were related especially to taking of food and were probably of sinus origin, as their onset was usually, and their termination always, gradual. They necessitated readmission to hospital for 4½ weeks. Return to normal health was rather slow, and the patient did not resume work for nearly 6 months from the onset. Occasional mild attacks of tachycardia occurred up to 9 months after infection.

CASE 2.—Fi, aged 49. Admitted Aug. 9 on the 9th day of illness which had commenced with pains in the limbs, aching in the back, malaise but no headache. Two days later he felt feverish; muscular aching was more severe and a bilateral postorbital headache developed. There were shivering attacks each day at about 4 PM and 2 AM, and daily rises of temperature to 101°-102°. Examination revealed several fine macules over the anterior lower chest, tenderness over the eyeballs and a spleen palpable two fingers below the costal margin. The temperature became and remained normal after the 12th day of disease, by which time the symptoms had abated. Convalescence was rapid without sequelæ.

CASE 3.—S, aged 32. Admitted May 8 on the 7th day of illness which began with vague malaise and low pyrexia

1. One of these has since developed moderately severe typhus, after having safely assisted in the inoculations of mice on several occasions during the previous 3 months.

(99.2°). On May 5 there was shiveriness and headache. On the 6th the temperature was 100.5° and headache severe, bursting and bipolar. Headache, lassitude and pyrexia continued, and there was nausea and anorexia. The palpebral conjunctivæ were mildly injected, the gums were moderately swollen and tender, the tongue had a greyish coating of the posterior third; a non-tender firm spleen edge was felt one finger below the costal edge, and three pale pink macules which disappeared in 24 hours, were seen on the right lower thorax. Fever subsided by the 9th day of illness. There was no prostration, and the patient felt quite well on discharge on May 15, when the spleen was still easily palpable, though somewhat softer.

CASE 4.—M, aged 24. Admitted May 19 on the 4th day of illness which began with shivering, sweating and a generalised heavy headache. During the next two days the patient felt tired, had severe headache, and pain shooting down the back of the neck between the scapulæ. Temperature was 99° on admission, and there was low-grade fever up to 100.4°, until the 11th day of illness. On admission small firm non-tender lymph-nodes in neck, axillæ and epitrochlear region were palpable. The spleen did not become palpable until the 9th day of illness when the patient was nearly symptom-free. No rash or conjunctivitis appeared.

CASE 5.—P, aged 26. Admitted May 14 on the 6th day of illness which began with shivering, headache and slight stiffness of the neck. Irregular temperature rises occurred until the 12th day. At this time the spleen was palpable just below the costal margin. There was no rash.

CASE 6.—J, aged 19. Admitted Jan. 18 on the 5th day of illness with intermittent headache, malaise, anorexia and constipation. Temperature was 103° on the evening of the 3rd day of disease, 99.2° on admission, with pulse 100, BP 115/70. The temperature remained below 99° F. from the 6th day onwards. The patient was pale with slight conjunctival injection and moist furred tongue. There was a sparse macular rash on chest, abdomen and back, which began to fade after two days, leaving one or two brownish depressed stains. During convalescence, which was prolonged, there were recurrent mild attacks of tachycardia which were precipitated by effort.

CASE 7.—T, aged 27. Admitted on Sept. 10, 1942, on the 7th day of illness which began with an evening headache. On the 5th day of illness there was slight photophobia and an evening temperature of 100.4°. On admission the patient complained only of headache, and nothing abnormal was found except for a few small palpable lymph-nodes in the left posterior cervical region. The evening rise of temperature up to 100° or 101° and headache continued until the 12th day of illness. The spleen became distinctly palpable on the 10th day of illness.

CASE 8.—E, aged 29. The illness began on Jan. 17 with malaise, vague headache and a chilly feeling, especially in the evenings, and associated with pyrexia of 100°. Headache, which was frontal and temporal in distribution, was severe on the 3rd day of illness. Next day a rash appeared on the trunk (sides of the chest and back) consisting of a moderate number of small pink macules. Headache, nightmares, sleeplessness and irregular intermittent temperature persisted until the 9th day of illness. The rash faded after the 7th day of illness. The spleen was not felt.

The remaining 4 patients remained ambulant during their illnesses which were distinctly milder than the above:—

CASE 9.—F, aged 32. Headache on May 21. This continued, accompanied by pains in the neck, lassitude, shivering and a temperature of 99°. A few macules were seen on the chest on the 6th to 8th day, and, on percussion, the area of splenic dullness was thought to be enlarged. Headache persisted for 12 days in all.

CASE 10.—Y, aged 20. Malaise and headache for 10 days from approximately Jan. 8 onwards.

CASE 11.—B, aged 50. Shivering on May 10 and backache and headache for the following 4 days.

CASE 12.—L, aged 32. Malaise, shivering, headache and evening pyrexia of 100°–101° from May 26 for one week.

#### CLINICAL SUMMARY

All these cases had certain characteristics in common. The onset of illness, though quite definite, was often

followed by a few days of indefinite symptoms, which might ordinarily be overlooked. Thereafter the fever, which usually lasted 10–14 days, was remittent or intermittent. Several patients felt well in the morning and were able to start work normally, but headache was definite by midday, and in the evening there was incapacity or disinclination for activity, accompanying the rise of temperature. Many of the patients complained of chilliness or actual attacks of shivering. Headache was the outstanding symptom, although it varied in location, being in some generalised, in others temporal, and in some retro-orbital. Muscular aching in the back, neck or limbs was common. Physical signs were few. The rash was definite only in 3 of the patients (A, E and J). Macules were observed in several others, but were too evanescent to be of help in diagnosis. Splenomegaly was found in all the 5 patients admitted to the Harvard Unit; in several it did not become evident until towards the end of the fever. Conjunctivitis was seen in only 1 patient and doubtfully in another.

The illness of many of the patients was mild, and without knowledge of exposure to rickettsiæ or search for serological change, diagnosis would have been difficult, except in the cases with well-marked rash. The severe sequelæ observed in one of the patients emphasise the necessity of prolonged convalescence in typhus (and this implies absolute rest), however mild the attack may seem to have been, and however well the patient may feel. The remaining patients made complete clinical recovery after the cessation of pyrexia.

#### LABORATORY FINDINGS

Some of the earlier cases in both series of infections were investigated in detail by stool, blood and urinary culture, blood-counts and serological tests. In addition, attempts to recover rickettsiæ by guinea-pig inoculation were made from 3 Hampstead patients, and in 2 of the military cases. In spite of the withdrawal of blood at an early stage of the disease, and the inoculation intraperitoneally of emulsified blood-clot after separation of the serum, with passage from the first series of guinea-pigs to other animals, the results were uniformly negative. Virus was not recovered by mouse inoculation with emulsified blood from the 2 Hampstead cases in which this method of isolation was attempted. In one case (E) an attempt was made to transmit the infection to lice by allowing them to feed on the patient during the stage of the rash. Guinea-pigs later inoculated with emulsions of these lice showed no scrotal reaction or fever, nor could rickettsiæ be demonstrated in smears of louse gut. Cultural studies of the blood (3 patients), stools (4 patients) and urine (2 patients) were entirely negative, except that *Bact. alkaligenes* was recovered on one occasion from the urine of 1 patient (A). The serum of this patient and of one other showed no agglutinins for the organism so recovered.

Serological studies of the blood of all these patients have been made and are still in progress. The more ordinary method of examination consisted of Weil-Felix tests, and tests for agglutinins to brucella and enteric organisms.

The Weil-Felix reactions demonstrated that every patient either developed agglutinins to proteus OXI9 or showed an increase in titre of agglutinins to this organism during the progress of the disease. Table 1 shows the great variation in the actual titres and rises of titres in individual cases. Rises of from two-fold up to twenty-fold were found in the various cases, and the extent of the rise in agglutinins was not correlated with the clinical severity of the case. Agglutinins either did not appear, or did not increase in amount before the second week of the disease, and the maximum titre was usually attained in early convalescence. Sera from 4 patients were tested with proteus OXK and from 3 with OX2. Two patients showed slight changes in OXK titres, and 2 also to OX2, but in no case did the rise exceed 100% of the initial titre. Brucella agglutinins present in low titre in 2 patients at an early stage of the disease either decreased or remained constant subsequently; 4 other patients failed to show any agglutination of brucella antigens. The majority of the sera were not examined in detail for agglutinins to the enteric organism, but those which were examined showed

no significant change. Thus, although the Weil-Felix reactions were variable, the change with the proteus OX19 antigen towards the end of the disease—that is after the height of the fever—agreed with the usually accepted change in typhus fever of the murine or epidemic variety.

The remaining pathological investigation included Paul Bunnell reactions (positive in 3 patients in low and insignificant titres—up to 1/28), erythrocyte-sedimentation-rates and blood-counts. Sedimentation-rates on 6 patients failed to show a consistent change from the normal, but figures of from 10 to 36 mm. sedimentation in one hour were recorded after the 7th day of illness in 4 patients. In one case (A), a sedimentation-rate of 28 mm./hr. was recorded during the 6th week of convalescence. The blood-counts showed no significant abnormality in erythrocytes or haemoglobin estimations.

Total leucocyte and differential counts were done on 8 patients; these included 10 examinations on 7 patients by the 8th day of disease. In spite of the mildness of the infection, an early change in the blood-picture in the

TABLE II—BLOOD COUNTS

Name	Date	Day of disease	Total WBC	Polys.	Lym-phos.	Monos.	Eosin.	Baso.	Plasma cells
A	Jan. 17	3rd	5500	64	15	21	..	..	1
	" 19	5th	4250	53	26	13	..	0	..
	" 21	7th	5000	59	23	17	1	0	..
	" 26	12th	9500	62	33	5	0	0	..
J	" 17	4th	..	52	32	16	..	..	..
	" 19	6th	9850	61	26	13	0	0	..
	" 21	8th	8000	42	43	14	1	0	..
	" 26	13th	9300	40	52	6	2	0	..
E	" 21	4th	3800	64	26	10	..	..	..
	" 26	9th	9000	62	29	7	2	..	..
S	May 9	8th	5400	65	23	11	1	0	..
	" 12	11th	5000	62	30	8	0	0	..
P	" 19	10th	6000	63	29	5	2	1	..
	" 21	12th	8000	57	37	3	1	2	..
	" 27	18th	10000	58	36	6	0	0	..
M	" 19	4th	8000	70	22	5	3	0	..
	" 23	8th	9000	50	36	12	0	2	..
	" 27	12th	6000	57	34	8	1	0	..
Fi	Aug. 4	4th	6200	56	36	8	..	..	..
	" 9	9th	7000	70	27	3	..	..	..
	" 11	11th	6000	66	32	1	1	..	..
T	Sept. 10	7th	6000	63	20	8	6	..	..
	" 14	11th	7000	55	40	5	..	..	..

form of neutropenia with relative or absolute monocytosis was observed in all but one of the cases (M) who, although he had no neutropenia, had 12% monocytes (total 720) on the 8th day of disease. The average total white-cell count for the 10 examinations was 6530, with a range from 3800 to 9850. The neutrophil polymorphonuclear count averaged 3776. In only 2 instances was the count above the normal average. The average monocyte count for the 10 examinations was 702, with a relative monocytosis ranging from 5 to 18% (normal 2-5%). A relative lymphocytosis was not present except in one case (J) in the 2nd week of infection, and this negative finding may help in the differential diagnosis from typhoid fever. Complete absence of eosinophils, noted by some workers, was not observed. In the 2nd and 3rd weeks of infection, the total white-cell and differential counts were returning to normal.

DISCUSSION

Three points merit discussion: (1) the effect of prophylactic inoculation; (2) the mode of infection; and (3) the early diagnosis of typhus.

1. All the cases had had at least one course of injections of vaccine of killed rickettsiae prepared from infected rat-lung or yolk-sac of chick embryos. The vaccines did not afford absolute protection, but it is remarkable that in no case was the illness severe, although three of the patients were 45 years of age or more. It is probable that the vaccines conferred partial immunity, and this may account for the failure to isolate the causal rickettsia from the circulating blood.

2. Although proof cannot be given, it seems reasonably certain that the majority, if not all, the infections were related to intranasal inoculations in mice. The strictest precautions are therefore necessary when this procedure is employed. The fact that inhalation infections may occur under laboratory conditions suggests that the risk from inhalation of heavily infected louse faeces during typhus epidemics may be a real one (Klose 1942).

3. The early diagnosis of typhus is not easy. The rash does not appear before the 4th-6th day and, even with its help, diagnosis may be difficult; for example, in 87 small outbreaks of typhus in Glasgow the first case was diagnosed as typhus in 51 instances, as enteric in 22, as pneumonia in 5, and as other infections in 9 (Davidson and Cruickshank 1927). Splenomegaly when present was late, and was thus of little help in the diagnosis. Its occurrence during early convalescence is important, however, in suggesting that the termination of fever may not coincide with the termination of active infection.

The production of a characteristic febrile illness in guineapigs by inoculation of fresh blood from patients during the febrile stage has often been suggested as a diagnostic aid. At best this test is slow, and it cannot be of value in the early diagnosis. Furthermore, the infection is frequently difficult to establish in guineapigs, even with blood from human typhus cases (Wolbach, Todd and Palfrey 1922). In the present series of cases, it has been uniformly negative, although admittedly all cases were mild, and all had previously been vaccinated. Other investigators have reported irregular results with guineapig inoculation. Gold and Fitzpatrick (1942) obtained one positive result in five guineapigs inoculated with blood from two infected patients. Findlay, on the other hand, obtained positive results with both cases of laboratory infection which he reported.

The Weil-Felix reaction is seldom significantly positive before the 7th day and in mild cases may be further delayed. Any aid to early diagnosis would, therefore, be welcome, and in this respect the blood-picture may be helpful. In the present series of rather atypical cases, a definite tendency to neutropenia with a relative or absolute monocytosis was a feature in the first week of infection. It is impossible to say whether these findings are applicable to natural infection with murine or louse-borne typhus, and the literature on this point is sparse. Danielopoulu and Craciun (1939), confirming results obtained in Rumania in the last war, stated that, while leucopenia may be present in mild cases, a slight degree of leucocytosis (10,000-16,000) due to an absolute increase in mononuclears, including plasma and Türk cells, was found in most cases. Schürer (1938) maintained that there is a leucopenia in the early stage of typhus fever and that a polymorphonuclear leucocytosis develops only in the presence of secondary complications—never before the 7th-8th day of infection. Wolbach, Todd and Palfrey (1922) reported that among 179 cases in which blood-counts were done, mostly in the second week, 142 (80%) had white-cell counts from 6000 to 14,000 and a fatality-rate of 9.8% compared with 21.6% for those with a greater leucocytosis. Monocytes averaged 5.9% in 59 cases where differential counts were done. Monocytosis is said to be present in Rocky Mountain spotted fever (Whitby and Britton 1939) absent in tropical typhus (Anigstein 1933). Two infections in which leucopenia with monocytosis may rarely occur are rubella and infectious mononucleosis, neither of which is likely to be mistaken for typhus.

SUMMARY

Twelve laboratory-workers engaged in research on typhus fever were accidentally infected with murine typhus. They had all been immunised with typhus vaccine previously. The disease was moderately severe in three cases, and mild in the others.

In eleven cases infection can probably be attributed to the inhalation of infective droplets during intranasal inoculations of mice under ether anaesthesia. In the remaining case infected dust may have been the source of infection.

Neutropenia with relative or absolute monocytosis may be a useful aid to the early diagnosis of typhus.

We wish to express our thanks to Dr. and Mrs. D. K. M. Chalmers for giving hospitality to one of the patients (E) during his illness. Mr. J. R. Busvine, PhD, kindly supplied and supervised the manipulation of the lice. Our thanks are extended also to Mr. A. Felix, DSc, who performed some of the Weil-Felix tests; to Prof. F. R. Fraser, Dr. E. F. Scowen and Dr. J. Campbell Maxwell for their professional attention to one of the patients (A) during his protracted illness; and to the staffs of the American Red Cross Harvard Field Unit, and the LCC North Eastern Hospital, in whose care the majority of the patients were placed. The assistance of Miss D. Lush, Major A. E. Francis and Major A. M. Begg was invaluable in continuing laboratory work at a time when the rest of the research teams were ill.

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## TROPICAL NEURASTHENIA

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BEFORE this war conditions diagnosed as "tropical neurasthenia" were common as a cause of invalidating from the tropics. The name is applied to many disease-states of varying pathology but similar symptomatology, including syndromes with such picturesque titles as "Punjab head," "Bengal head," "furor tropicus" and "West Coast memory." Its importance is shown by Manson-Bahr's remark, "as a cause of disability it has superseded tropical disease."<sup>1</sup>

Is there a tropical neurasthenia exclusively characteristic of the tropics? The symptoms are familiar to the clinician in the temperate zone: excessive nervousness, fidgetiness, restlessness, irritability, difficulty in concentration, the ready onset of mental fatigue, forgetfulness and over-anxiety. Such symptoms are certainly common in tropical residents, but my own observations lead me to conclude that there is no form of neurosis caused only by tropical conditions, or which cannot appear in other latitudes. Tropical life, however, can exaggerate the symptoms of, or a predisposition towards, neurasthenia or neurosis, and also favours the development of symptoms which, though due to physical disease, simulate those of neurasthenia or neurosis. The word "neurasthenia" is not fashionable among medical psychologists, but its everyday meaning is clear and real. It is used here to describe those symptoms suggestive of mental fatigue and irritability already outlined. In temperate zones physical states responsible for neurasthenic symptoms include the menopause, cerebral arteriosclerosis, chronic alcoholism, drug addiction, chronic general infections and head injury; a neurasthenic type of temperament is often associated with the asthenic physique, duodenal ulcer, or with Graves's disease; cerebral diseases in their early stages may show neurasthenic symptoms (disseminated sclerosis is one of the commonest examples).

There is a tendency to include under the term tropical neurasthenia not only mental states due to physical disease but also neuroses regarded as purely psychogenic, such as anxiety neurosis and hysteria—two conditions as likely to appear in one part of the world as in another, since latitude and climate have nothing to do with their aetiology. Many psychologists regard the neurasthenic state (in which feelings of intellectual and emotional exhaustion predominate) as having fundamentally some sort of organic origin, and as being distinct from anxiety neurosis with its sensations of constant and inexplicable

dread. There may be much truth in this opinion. It is certainly the neurasthenic picture as distinct from anxiety neurosis or hysteria which is characteristic of the minor mental disorders of the tropics. The name tropical neurasthenia therefore seems as good and as accurate a one as could be chosen.

## TROPICAL FACTORS

In the bustling atmosphere of an urban industrial civilisation the restless fancies of the neurasthenic and the neurotic can receive some satisfaction; in a tropical region where monotony invades all aspects of life and social contacts are few these restless undisciplined minds find conditions unbearable; they become introspective and chronically unhappy. Thus the presence of neurasthenia or neurosis is a definite contra-indication to service in equatorial regions. Without being definitely neurotic or a poorly educated European, if drawn suddenly from stimulating town life to serve in a remote area in the tropics, may find life intolerably dull and become so exasperated that he tries his hardest to get away; but it is doubtful whether a state of true neurasthenia or neurosis can be induced by the mere unhappiness of life unless the individual has a neurotic tendency. A state of being disgruntled, common enough anywhere and not exclusive to the tropics, is after all not a disease but a normal reaction to circumstances.

There is no real evidence that a tropical climate is a sole cause of neurasthenia, but in so far as it can undermine general physical health it may provoke the appearance of neurasthenic symptoms in the course of physical disorder. To what extent climate in the tropics can affect physical health, however, is debatable. Can a steadily maintained temperature in the region of 90° F. or a sustained high humidity do any bodily damage? There is no evidence that they can. Phrases such as "bracing" or "enervating" as applied to climate have little scientific meaning; they are of more significance to the holiday posters of British railways. In so far as an atmosphere is cool and dry, though it may carry with it some unevaporated particles of moisture picked up from the sea over which it blows, it is "bracing": that is, stimulating to sensory nerve-endings in the skin. The reverse is the case if it is warm and humid. Such differences, however, are superficial and can play little part in inducing disease-processes in the body. It is not the climatic differences that make the tropics so unhealthy in comparison with northern latitudes but the other risks to health found in such areas: the numerous disease-carrying insects, parasites and pathogenic micro-organisms. Difficulties in obtaining suitable food may, in some regions, lead to malnutrition or vitamin deficiencies, though such conditions affect the native inhabitants more than Europeans. The well-known irritability of a neurasthenic may perhaps be increased by the constant discomfort of heat and humidity, and pre-existing neurasthenia may thus be exaggerated. There is nothing about heat and humidity in themselves to induce neurasthenia.

## CLASSIFICATION

In a series of 500 consecutive European admissions to a tropical hospital, 50 (10%) presented predominantly neurasthenic symptoms of disabling degree. The cases can be classified as follows:

*Constitutional or lifelong psychopathic states* (15 cases).—These were long-standing conditions of nervous instability made worse by tropical life. In nearly all there was clear evidence that a neurasthenic tendency had been exaggerated by physical disease acquired since arrival in the tropics. Of the 15, 10 had suffered severely and repeatedly from subtertian malaria; others had had such conditions as phthisis, dysentery, typhus, chronic bronchitis and heterophilia. Nearly all were psychologically unsuitable types for tropical life.

*Fear of disease and hypochondriasis* (9 cases).—This group was almost entirely composed of previously healthy and well-balanced people who, after serving in the tropics for long periods, had had a good deal of physical illness without suffering much physical deterioration as a result. They had lost confidence in their ability to stand tropical life and were in such constant apprehension of further illness that they became disabled. Of this group, 4 or 5 cases had had subtertian malaria repeatedly, and felt convinced that they would go on having it as long as they remained in the tropics.

1. Manson-Bahr, P. H. *Tropical Diseases*, London, 1940, p. 650.

## EVALUATION OF GASTROSCOPY

## ANALYSIS OF 1000 EXAMINATIONS

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**Malarial cachexia** (6 cases).—In this group it was clear that the neurasthenic symptoms were a direct manifestation of a debilitated state due to malarial cachexia (subtertian malaria).

**Conversion hysteria** (5 cases).—Straightforward examples of gross hysteria with varied symptoms and signs such as hysterical fits, sensory changes and paralyses. All these cases had long records as hysterics before entering the tropics. All showed some exaggeration of symptoms since arrival.

**Traumatic neurosis** (3 cases).—Neurosis induced by accidents before the patients came to the tropics. In all cases tropical life accentuated the symptoms.

**Alcoholism** (3 cases).—This is a proportionately much larger group in peace-time than in war-time in some tropical regions.

**Anxiety neurosis** (2 cases).—Typical examples of long-standing anxiety neurosis, present before the patients reached the tropics. All cases were made worse by tropical life.

**Head injury** (2 cases).—These had psychological symptoms following chronic cerebral contusion, acquired before being sent to the tropics. All were made worse by tropical life.

**Cerebral arteriosclerosis, phthisis and duodenal ulcer** were the associated factors in the remaining 7 cases.

## DISCUSSION

This analysis shows that the constitutional neurotic tendencies and long-established neurosis are important aetiological factors in tropical neurasthenia, being present in 22 of the series of 50. The other factor of importance is recurrent subtertian malaria; 18 cases were made worse by repeated attacks. In no examples could neurasthenic symptoms be ascribed to the direct effect only of tropical climate and conditions of life in a previously healthy person.

Neurasthenic symptoms can be easily overlooked in the tropics because physical disease can overshadow them and because they so often take the form of physical complaints by the patient. Thus a neurotic state due to loss of confidence as a result of much malaria may be misdiagnosed as malarial cachexia; the treatment is, of course, quite different in the two conditions. The danger of overlooking alcoholism is familiar to all physicians whether in temperate or tropical zones, deceit being so common among addicts. Careful history-taking is necessary in every case to elicit evidence of such conditions as traumatic neurosis, head injury and duodenal ulcer. The liability of phthisis and chronic bronchitis to flare up in the tropics must not be forgotten.

The two commonest causes of chronic ill health and invalidism in tropical countries are chronic physical damage due to recurrent and often subclinical subtertian malaria, and the neurasthenic state. Malaria is often handled perfunctorily, though it needs thorough treatment. Established neurasthenics and neurotics should be weeded out by careful examination before they leave for the tropics. For some years a large oil company has reported reduction in invaliding as a result of arranging psychological examinations for all their employees before appointing them to the tropics. There is generally a niche in western civilisation for the neurotic where he can do useful work; there is no such place for him in the tropics. Laymen, especially those of poor general education, if they are to serve in the tropics, should be given some instruction in the diseases they are likely to encounter, so that they will not fear the unknown and lose confidence too easily.

## SUMMARY

So-called tropical neurasthenia is a common cause of invaliding from the tropics.

There is no state of neurasthenia due purely to the effect of tropical climate on a previously healthy person.

Of 500 consecutive admissions to a tropical hospital, 50 showed a neurasthenic or neurotic state.

Tropical life may exaggerate a neurotic predisposition, and physical diseases of the tropics may manifest themselves partly in neurasthenic symptoms.

Constitutional neurotic predisposition, chronic recurrent subtertian malaria, and ignorance of tropical disease and hygiene are important causative factors of neurasthenia and neurosis.

Unstable personnel should be eliminated by examination before receiving appointments in the tropics; malaria should be thoroughly treated; and laymen going to the tropics should be instructed in principles of tropical medicine and hygiene.

OPINIONS of the value of gastroscopy in the elucidation of dyspepsia in the Services range from those who would employ it as a routine in the chronic case to others who consider its use should be limited to the investigation of doubtful cases of malignancy.

It is now over 10 years since the first flexible gastro-scope appeared and it has established itself as a valuable and safe instrument, giving little discomfort and much information, so that there can no longer be any of the doubt which naturally attaches to a new procedure. In dealing with the Service case, however, it is important that symptoms should not be encouraged by undue attention, and it has to be shown that any additional method of investigation produces results not attained by other means.

With regard to the first point, Hurst (1941) in England and Schindler (1942) in America have emphasised the value of the gastrointestinal unit, and Gill, Berridge and Jones (1942) have described the organisation and working of such a unit. Experience has shown that a soldier admitted thereto, and rapidly but thoroughly examined and investigated, feels that he has been fairly treated and is willing to accept the findings and recommendations without argument. On the other hand, indifference, apparent or real, can create a feeling of injustice, to rankle and exacerbate later if further investigation reveals an organic lesion previously missed. The suggestion is that the soldier with chronic dyspepsia profits from complete investigation, including gastroscopy, that this does not aggravate his symptoms, that he accepts the results, and that further investigation is rarely if ever necessary or justified.

To make the second point analysis is required of a reasonably large number of cases, and in the present series, comprising Service patients only, the findings are analysed in 1000 consecutive gastroscopic examinations, in which the Hermon Taylor gastro-scope was used throughout. To make the results comparable, civilians examined by the Hermon Taylor gastro-scope have been excluded, as also have all cases, civilian and Service, on whom the Wolf-Schindler instrument was used before 1941. The number of examinations per patient has varied, from one or two in the majority to four or five in a few cases; the total number of patients examined was 806.

## ANALYSIS OF MATERIAL

The table shows the gastroscopic findings in the present series. Unfortunately, since no other series of gastroscopic examinations in Service cases has been published, it is not possible to make any detailed comparisons with previous work, as can be done when considering the problem of dyspepsia as a whole in the Services. Schindler (1940) rescued the case-notes of 13 German ex-soldiers whom he examined with the rigid Schindler gastro-scope in 1921 and 1922; other investigations, including X ray, had proved negative or inconclusive; 7 had chronic gastritis (4 hypertrophic, 3 superficial), 2 were cases of ulcer, in 1 a benign tumour was found and 3 had normal stomachs. He stressed the value of gastroscopy in the Service case, especially in time of war. Compared with civilian cases, the chief difference, as might be expected owing to the age-group and the fact that men are not usually retained in the Services after operations on the stomach, is the low incidence of carcinoma and postoperative dyspepsia in the present series. Using the Wolf-Schindler instrument, Taylor (1941) in England found carcinoma in 10% and postoperative dyspepsia in 28% of 350 civilian cases; Flexner and Fleishman (1940) in America found carcinoma in 5% and postoperative dyspepsia in 7% of 256 examinations. With regard to the types of gastritis, there appears to be no difference between the civilian and the soldier, in both the order of frequency being superficial, hypertrophic and lastly atrophic.

The cases have been subdivided into three groups—A, B and C, according to the X-ray findings.

*Group A. Both X ray and gastroscopy revealed a gastric lesion.*—Naturally enough, it is in this group that the greatest co-relation is found between radiological and gastroscopic findings: nevertheless even in this group the gastroscope proved of practical value in certain cases. In the demonstration of the final healing of gastric ulcers gastroscopy is a cheaper and more certain method than X ray, and it is important that, although such patients are usually invalided, they should be made fit for other work of national value before discharge from hospital. In the classification of gastritis and follow-up of results of treatment gastroscopy is also of value. Most superficial and hypertrophic types are not sufficiently serious to incapacitate, and a soldier can be retained in a low medical category without hospital

which are inaccessible to the Wolf-Schindler instrument. The ulcer scar diagnosed radiologically was thought at gastroscopy to be a normal fold of mucosa. In our present state of knowledge absence of gastroscopic evidence cannot exclude gastritis, and where a strong clinical case is supported by radiological or other evidence the diagnosis should stand.

*Group B. No gastric or duodenal lesion found on X ray.*—Not all gastric ulcers can be demonstrated radiologically, since at the healing stage a crater may not be visible and others heal with only little scarring. Analysis of those cases in this group, comprising the majority, in which the radiology was comparable (F. R. B.) and the mucosal pattern technique was used shows that approximately the same number of ulcers are invisible to X ray as in the case of gastroscopy. Of the total of 34 cases of atrophic gastritis, more than half could not be diagnosed as gastritis radiologically although the finding of mucosal hypoplasia might be suggestive; the only other abnormal finding, apart from gastroscopy, was an achlorhydria or well-marked hypochlorhydria on fractional gastric analysis. It may be concluded that gastroscopy is indicated in any man with chronic dyspepsia and much diminution of acid secretion. The incidence of carcinoma in this series is too low for analysis, but Taylor (1941) has shown that a malignant lesion can be seen by gastroscopy before radiological changes occur, and the single case in this group (a carcinoma) falls into this category, a small nodule being visible on gastroscopy.

*Group C. No gastric lesion found on X ray but abnormality of duodenum or pyloric canal demonstrated.*—As might be expected the incidence of important gastric lesions was low in this group and comments already made are applicable.

*Cases in which instrumentation was partially (3) or wholly (8) unsuccessful.*—In 4 men insufficient co-operation was obtained and instrumentation was abandoned. In 1 the gastroscope came to a stop 11½ inches from the incisor teeth and subsequent X ray and cesophagoscopy revealed an oesophageal stricture, although the patient had no dysphagia. Failure of the light rendered 4 instrumentations valueless, while in 2, owing to the patients being unable to maintain a steady posture, examination was incomplete. Of these 11 cases, in 10 no gastric lesion was found on X ray, while in 1 a radiological diagnosis of gastritis was made.

ANALYSIS OF GASTROSCOPIC FINDINGS

	Whole series: No. and %	Group—		
		A	B	C
Normals	295 (36.6)	60	164	71
Ulcer (including benign pyloric stenosis)	43 (5.3)	34	9	0
Gastritis	396 (49.1)	201	102	93
<i>Superficial</i>	196	89a	63d	44g
<i>Hypertrophic</i>	166	98b	21e	47h
<i>Atrophic</i>	34	14c	18f	2i
Postoperative	6 (0.7)	6	..	..
<i>Gastroenterostomy</i>	4	4	..	..
<i>Partial gastrectomy</i>	2	2	..	..
Tumours	4 (0.5)	2	1	1
<i>Benign</i>	2	1	0	1
<i>Malignant</i>	2	1	1	0
Miscellaneous	51 (6.3)	16	15	22
<i>Multiple erosions</i>	36	16	15	5
<i>Multiple submucous hæm.</i>	6	1	2	3
<i>Multiple mucosal hæm.</i>	3	0	3	0
<i>Gastric diverticulum</i>	1	1	0	0
<i>Extrinsic pressure on antrum</i>	1	1	0	0
<i>Pigment spots</i>	3	0	2	1
<i>Dilated stomach</i>	1	0	0	1
Failures	11 (1.3)	1	10	0
Total	806	323	308	175

a including gastric catarrh 15; b including antral gastritis 25; c diffuse 5, patchy 9; d including gastric catarrh 10; e including antral gastritis 1; f diffuse 6, patchy 10; g including gastric catarrh 13; h including gastritis pseudopolyposa 1; i diffuse 0, patchy 2. Hæm., hæmorrhages.

treatment. On the other hand, the man with mucosal atrophy—in most cases a permanent progressive lesion—is a liability and should be invalided (Schindler 1942). Multiple gastric erosions usually respond rapidly to treatment, but unless dieted have a high relapse-rate, so that men with these lesions tend to report sick so often as to become a nuisance; bleeding is frequent and usually occult though one patient in this group had multiple hæmatemeses, previously unexplained; it has been suggested that untreated erosions may develop into chronic ulcers, and certainly some are chronic and resist treatment. On these grounds, invaliding has been recommended in those cases where a relapse has been proved on return to Army life after discharge from hospital. Small benign tumours are not always easy to demonstrate radiologically. The one in this group showed, on X ray, the changes associated with an antral gastritis. At gastroscopy, however, a small sessile ulcerated tumour was seen on the anterior wall of the pyloric antrum. The ulceration rapidly healed under treatment, the symptoms cleared and no further change has been seen on repeated examination over a period of 9 months.

In 60 cases a gastric lesion was not seen at gastroscopy but was found on X ray. These consisted of 4 cases of ulcer, 1 of ulcer scar and 55 of gastritis. All gastric ulcers cannot be seen by gastroscopy, although no doubt experience and the type of gastroscope used bear a close relation to the figures. These ulcers are usually situated in the roof of the antrum or on the posterior wall high up on the lesser curve, and the Hermon Taylor gastroscope allows inspection of many ulcers at these sites

SUMMARY AND CONCLUSIONS

By analysis of 1000 consecutive gastroscopic examinations in Service cases, an attempt is made to determine the value of and indications for gastroscopy in the assessment of the Service dyspeptic.

In gastric ulcer, the gastroscope may reveal ulcers not otherwise demonstrable and affords proof of healing more cheaply and accurately than any other method.

In chronic-gastritis, gastroscopy provides confirmation not otherwise obtainable and enables differentiation of type and degree of severity, essential for satisfactory disposal and treatment. Mucosal atrophy can only be diagnosed with any degree of certainty by gastroscopy.

Multiple gastric erosions are only rarely demonstrable by X rays, but by gastroscopy lesions of some significance can be diagnosed and differentiated into the chronic and acute, and disposal can be made accordingly.

In other Service cases, less numerous but no less important, gastroscopy may offer the only means of diagnosis. These include early gastric carcinoma, benign gastric tumours, postoperative dyspepsia, unexplained gastric hæmorrhage and achlorhydria.

My thanks are due to Dr. R. Arden Jones and Dr. F. R. Berridge for advice and criticism, and to the latter for most of the radiology.

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## IMMEDIATE SKIN GRAFTING FOR TRAUMATIC AMPUTATION OF FINGER-TIPS

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The purpose of this paper is to discuss the best treatment for an injury common in industrial centres. Traumatic amputation through the terminal phalanx of one or more fingers is seen particularly often in those who have only recently come to use cutting machines. It is disabling because epithelialisation can only take place after granulation tissue has covered the exposed end of the fractured bone, secondary infection is common, and the resulting scar is often tense, painful and not very sensitive to touch. Sometimes a skilled worker will be unable to resume his original occupation.

There are not sufficient beds available to admit these patients into hospital and they have to be treated in the casualty room. This means that they are not usually seen by medical officers of wide surgical experience. Treatment is customarily by one of these methods:

**Healing by granulation.**—The wound is cleaned and infection prevented as far as possible by hypertonic or antiseptic dressings. Complete healing takes up to 2 months, or longer if the bone becomes infected and a sequestrum has to separate. The resulting scar is so situated that it will be pressed on every time the finger is used and is often tender and rather insensitive to touch.

**Re-amputation.**—The edges of the wound are excised, volar and dorsal flaps fashioned, the bone shortened and the flaps sutured. Healing usually takes place by first intention and is often complete in a fortnight; but the finger is even shorter than after the original injury. Sometimes the whole of the terminal phalanx and the head of the middle phalanx must be removed in order that the flaps may meet without tension. This upsets the functional architecture of the hand more than necessary and is particularly bad in the case of the thumb.

Treatment of this condition in the casualty room should conserve all the length of the finger that is left, produce a finger-tip area with good sensation and not tender to pressure, and shorten the time of disability as much as possible. A successful full-thickness skin graft should achieve these aims. A Thiersch graft would not take where it is overlying exposed bone and even where it took it would not be sufficiently resistant to pressure.

If the raw area is covered by a skin graft within about 6 hours of the injury many days are saved because the usual preparation for delayed skin grafts will not be necessary. The pain disappears immediately and infection is usually prevented. Only very little scar tissue will form, and will contract later on, so that the shape of the finger will remain as nearly normal as possible after the injury. Tenderness disappears quickly and heavy manual labour can be resumed within a few weeks. Sensation returns to normal within 3-6 months according to the size of graft. The mechanism of this has been explained by McCarroll.<sup>1</sup> He states that sensation will appear almost simultaneously in all areas of a graft that is laid on a complete bed of healthy subcutaneous tissue. The nerves grow into the graft from below and the rapidity of the return of sensation varies inversely with the thickness of the graft. If part of a graft is laid on a bed not containing cutaneous nerves—i.e., bone, tendon, scar tissue—the nerves have to grow in from the sides. Return of sensation then proceeds from the margin inwards. I have been able to confirm these findings, since the grafts were usually laid on a central area of bone with a margin of subcutaneous tissue around it.

### CASE-HISTORIES

A series of 27 cases were treated by two different methods of full-thickness skin grafting, and 8 controls were left to granulate, some in a closed plaster cast and some without it. All the cases were treated as out-patients.

**Flap grafts.**—Cole<sup>2</sup> described a method of covering defects of finger-tips with flaps from the abdominal wall. The wound is excised very finely. A small flap of skin without subcutaneous tissue is raised and reflected and

sutured to the raw surface of the finger. Except for a small triangular area where the flap is inserted the resulting wound on the abdominal wall can be sutured immediately. The operation is done under local anaesthesia. After 10 days the flap is severed from the abdominal wall, its end shaped to fit the finger and fixed there with one or two sutures.

I have found this method very successful, but it needs two stages, the first of which I have never been able to do in less than an hour. It is also not at all comfortable for the patient to go about for 10 days with the arm fixed to the side in one position. Full excision of the wound is not essential. Thorough cleaning under local anaesthesia with excision of all badly lacerated parts and removal of loose bone usually suffices. A tourniquet may be necessary to control severe bleeding but it is better not to use it and to tie the arteries instead so as to avoid hæmorrhage underneath the graft after the tourniquet has been removed. I found the area over the lower ribs of the opposite side the best to use as donor area. If the wound involves more of the nail bed than of the palmar surface of the finger-tip it is better to cut the flap with its attached end laterally. If more of the palmar surface is missing it is best cut with its attached end medially and then reflected. Dressings and arm are fixed with strapping over one shoulder and round the chest. The patient is interviewed after about 5 days but the area is not then inspected unless painful. Results are shown in table 1.

TABLE I—RESULTS OF FLAP GRAFTS

#### 1. To amputations through terminal phalanx

Case	Take of graft (%)	Results		Time of healing (days)
		Functional	Cosmetic	
1	100	Good	Fair	About 46
2	0	Poor	Poor	46
3	100	Good	Fair	27
4	100	Good	Fair	35
5	100	Good	Good	35
6	100	Good	Good	22
7	100	Good	Good	32
8	100	Good	Good	31
9	67	Good	Fair	About 90
10	100	Good	Fair	26

Average take: 87%. Healing complete in those with 100% take after an average of 32 days.

#### 2. To amputations through middle phalanx

11	50	Fair	Fair	45
12	50	Fair	Fair	53

**Free full-thickness grafts.**—Reed and Harcourt<sup>3</sup> have described a method of using free full-thickness grafts in machine amputations of finger-tips with or without bony loss. They use local anaesthesia, clean the wound and excise loose tags. An area of the flexor surface of the same forearm is anaesthetised and a piece of skin of the necessary size dissected off the subcutaneous fat. The graft must not have any subcutaneous fat attached to it except perhaps a little at the centre. It is fixed with interrupted sutures which are removed after a fortnight. The authors claim 33 complete and 21 partial recoveries and only 3 complete failures in a series of 57 cases.

My results with this method were not as good as this. In a large percentage of cases the grafts did not live but shrivelled up into dry black areas or sometimes even became infected and produced a slough.

After the first few failures I decided to immobilise the finger in a complete plaster cast for a fortnight. This improved results. After the plaster was removed all or most of the graft was alive; but in a number of cases all or part of it still died during the third week. In many of the cases in which all the graft died I had the definite impression that the results were better than they would have been without a graft. This is confirmed by Röper<sup>4</sup> who used Reverdin grafts simply as a dressing to nail-bed injuries and removed them before they could heal on. This method is considerably easier and quicker to do than flap grafting. It is much more comfortable for

1. McCarroll, H. R. *Ann. Surg.* 1938, 108, 309.

2. Cole, P. P. *Brit. J. Surg.* 1941, 112, 585.

3. Reed, J. V., Harcourt, A. K. *Surg. Gynec. Obstet.* 1939, 68, 925.

4. Röper, W. *Zbl. Chir.* 1939, p. 2679.

the patient, since arm and hand can be used freely. In some cases patients have gone back to light work with the finger still in plaster. In only one case did a finger become painful in plaster. If a graft takes, the result is as good as with flap grafts but not nearly so reliable. Results are set out in table II and results in controls in table III.

TABLE II—RESULTS OF DIFFERENT METHODS OF TREATMENT

## 1. Free full-thickness grafts to amputations through terminal phalanx

Case	Take of graft (%)	Results		Time of healing (days)
		Functional	Cosmetic	
13	0	Good	Fair	37
14	0	Good	Fair	38
15	100	Good	Good	40
16	0	Good	Good	55
17	0	Good	Fair	80
18	100	Good	Good	About 20
19	0	Poor	Fair	76
20*	33			
21	33	Good	Good	63
22	100	Good	Good	23
23	33	Good	Good	32
24	0	Fair	Fair	43
25	100	Good	Fair	21
26	0	Fair	Fair	59

\* Did not return after 26th day.

Cases 15–26 treated in plaster. Average take: 36%. Healing complete in those with 100% take after 26 days on the average, in those with 0% take in 55 days.

## 2. Free full-thickness graft to amputation through middle phalanx

Case	Take of graft %	Results		Time of healing (days)
		Functional	Cosmetic	
27	0	Fair	Fair	90

(Not in plaster)

TABLE III—CONTROL CASES

## 1. Left to heal by granulation without plaster

2	—	Fair	Good	49
3	—	Fair	Fair	44
3	—	Fair	Fair	83

## 2. Controls in plaster

5	—	Fair	Good	59
6	—	Fair	Fair	52
7	—	Fair	Good	49
8	—	Fair	Fair	53

(No fracture)

\* Did not return after 42nd day.

Average number of days until healing complete: 55.

It was intended to leave the plaster on for a fortnight, but in 3 cases the finger became painful and the plaster had to be removed earlier. Healing took about as long as in those cases where the graft died, but the results were not so good. It must be mentioned that by chance most of the control cases had only lost a short length of bone so that there were no really poor results.

**Conclusions.**—I would recommend that flap grafts should be used in all cases where the thumb is involved, where perfect function of the injured finger is essential to the occupation of the patient, where tendon is exposed or more than about a third of the terminal phalanx is missing. Free full-thickness grafts may be satisfactory when only little bone has been lost and the injured finger is not essential.

## SUMMARY

Flap grafts and free full-thickness grafts were compared with one another and with a short series of controls in the treatment of traumatic amputations through the terminal phalanx. Flap grafts were found to be reliable and to give good results but to be rather difficult

to do in the casualty room and uncomfortable to the patient. Free grafts with immobilisation in plaster are easier to do but not so reliable; they will usually give fair results, however, even if the graft does not take completely. Letting the wound granulate, even in a plaster cast, is not a method of choice in amputations through the terminal phalanx.

I wish to thank Major J. D. Gray, FRCS, for the original suggestion and the honorary staff of the Sheffield Royal Hospital for permission to publish this paper.

## DEXTROSE AND CITRATE ANTICOAGULANT SOLUTION

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THIS paper describes a method of preparing an anticoagulant containing dextrose and sodium citrate together in one sterile solution, into which the blood to be preserved can be withdrawn with minimal risk of contamination. The use of plasma or serum has largely superseded the transfusion of preserved whole blood, because these blood products can be stored indefinitely and make grouping and special-matching unnecessary; but whole blood still has special uses in cases of severe hæmorrhage, hæmolytic anæmia and so on.

A technique for the withdrawal of blood in a completely closed system was perfected by Boland, Craig and Jacobs,<sup>1</sup> which greatly reduced the risk of bacterial contamination and consequent reactions. In their method IHT fluid<sup>2</sup> was used as the anticoagulant diluent; but more recently a solution of dextrose and sodium citrate has been advocated, because dextrose has been found to retard hæmolysis, reduce the incidence of untoward reactions, and enable blood to be stored for periods up to 3 weeks. It is this diluent which the Medical Research Council now recommends. The preparation of a sterile solution of dextrose and sodium citrate presents some difficulty, because it is apt on autoclaving to caramelize. The MRC therefore recommends<sup>3</sup> that the dextrose and sodium citrate be autoclaved as separate solutions and mixed before use, 20 ml. of 15% dextrose being added to 100 ml. of 3% sodium citrate for the collection of 420 ml. of blood. Such a procedure is incompatible with the proposed technique, and some method is needed to replace it.

## METHODS OF PREPARATION

Bono and Willder<sup>4</sup> sterilise the dextrose solution in a hard glass test-tube placed within the bottle containing the citrate solution, the two solutions being mixed by tilting the bottle after sterilisation. This does not seem to be a very convenient process, one drawback being the need for a hard glass tube of special size to fit into each bottle.

I tried to adjust the pH of the dextrose-citrate mixture before autoclaving, so as to prevent caramelisation. Solutions of pH 7 caramelize badly, owing possibly to the higher pH which is attained during autoclaving as a result of the greater ionisation of the sodium citrate at the higher temperature. To prevent caramelisation it was necessary to reduce the pH to about 6.5, and to do this a considerable quantity—about 2 g. per litre—of citric acid would have been required, owing to the buffering action of the sodium citrate present. Such a large addition was out of the question, so the method was abandoned. The second method tried has proved satisfactory however, and offers a practical solution to the problem.

A cold sterile solution of dextrose is put into the bottles which contain the citrate, in such a way that aerial contamination is avoided after these bottles have been sterilised and allowed to cool. A sufficient quantity of a 15% solution of dextrose in freshly distilled water for the number of bottles being prepared is placed in the flask of the apparatus illustrated (see figure). This flask must be made of alkali-free glass. The construction of the apparatus can be followed from the diagram, but

1. Boland, C. R., Craig, N. S. and Jacobs, A. L. *Lancet*, 1939, 1, 388.
2. IHT fluid has the following formula: sodium chloride 0.7, sodium citrate 0.52, potassium chloride 0.02, magnesium sulphate 0.004, freshly distilled water to 100.
3. Medical Research Council, War Memo No. 1, 1941.
4. Bono, R. A. and Willder, J. F. C. *Lancet*, 1942, 1, 138.

the rubber bungs are skirted with thin rubber tubing which is not shown; the object of the apparatus is to distribute the dextrose solution in measured quantities among the citrate bottles, without exposing it to contact with non-sterile air. The method by which the needle is protected has been described elsewhere<sup>4</sup>; the hard glass boiling tube is graduated by means of a file. The complete apparatus containing the dextrose solution, but without the metal screw-clips, is autoclaved, the flask being placed upright. The dextrose caramelises when sterilised in screw-capped bottles because these are not at present made of alkali-free glass; it does not caramelise in a hard glass flask.

In each 600 ml. screw-capped container is placed 100 ml. of 3% sodium citrate in freshly distilled water, together with 25 ml. of glass shot. The screw-cap must have a hole punched in it so that needles may be inserted through the rubber washer with which it is lined, and which is left intact. These bottles are autoclaved with the caps fitting loosely, and after autoclaving, as soon as the pressure has dropped to atmospheric, the caps are screwed down tightly, so that an efficient vacuum is produced by condensation of the steam. Some method of keeping the outer surfaces of the washers sterile until after the dextrose solution has been added must be adopted. The bottles may be inverted in 2% phenol if the holes punched in the metal caps are large enough to allow the solution to come in contact with the washers. Alternatively the metal caps may be covered with 'Cellophane' or a gauze pad before autoclaving.

When both solutions have cooled, the metal clips are placed in position on the apparatus, the flask inverted and 20 ml. of the dextrose solution added to each of the evacuated bottles containing the citrate solution; sufficient negative pressure remains for the collection of the blood. The dextrose-citrate solution so prepared is completely free from caramelisation, and has a pH of about 7.8.

I wish to thank the Medical Officer of Health, London County Council, for permission to publish this paper, and Mr. J. R. Elliott, PhC, for his valuable criticism.

**PREPARATION OF SCORPION TOXIN**

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I HAVE devised a technique for the preparation of amorphous and crystalline scorpion toxin which seems to be more potent than that produced by previous methods.

The dried telsons are mixed with a small quantity of quartz sand, wetted with a few c.cm. of physiological saline and ground thoroughly in a mortar for about half an hour. The finely ground mass is then extracted with saline, using 1 c.cm. to one sting. Four extractions are sufficient to remove all the toxin. The insoluble residue is removed by decantation. The combined decanted opalescent extracts are clarified by the addition of a little aluminium sulphate and lime water. The toxin may then be precipitated by the addition of pure acetone. The precipitate is centrifuged, washed with more dry

5. Elliott, J. R. and Hallstone, W. N. *Pharmacut. J.* 1939, 1, 105.

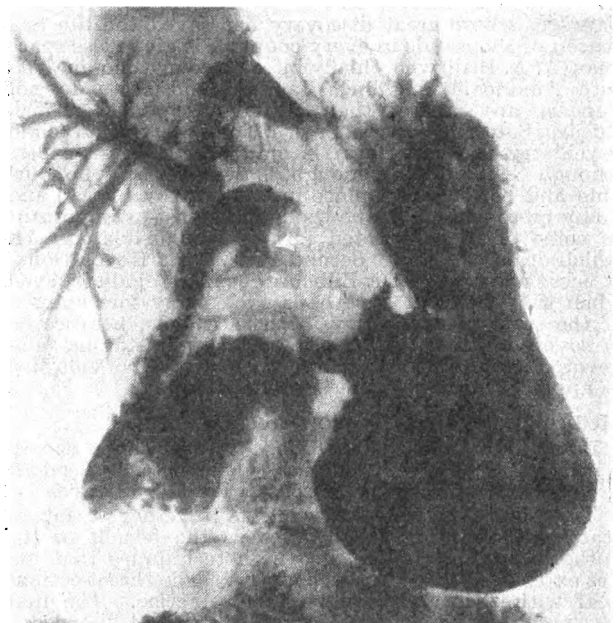
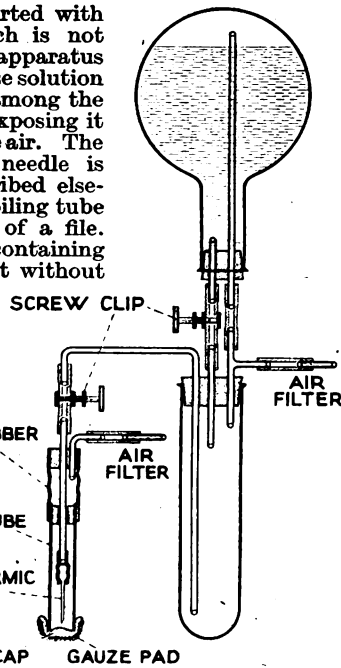
acetone and then with dry ether, and finally dried in vacuo, giving a white amorphous toxin. Or, the precipitate may be concentrated by evaporation under reduced pressure at 30° C. and the crystalline product dried in vacuo over phosphorus pentoxide. A thousand telsons produce 1.300 g. of the final crystalline toxin.

The crystalline material was found to be strongly active when injected subcutaneously into rats; 0.01 mg. is sufficient to kill an albino rat of 100 g. body-weight.

**AN UNEXPECTED CHOLEDOCHOGRAM**

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SURGEON REAR-ADMIRAL

A WOMAN who consulted me in 1922 for obstructive jaundice had had three previous operations for gall-stones performed elsewhere. Her gall-bladder had been removed. At operation (1922) I found the dilated common bile-duct in a dense mass of adhesions and I anastomosed it to the duodenum. The postoperative course was uneventful, the jaundice disappeared and she remained in good health for about 20 years; she walked long distances and was noted in the local hunt as an able performer. In April, 1942, she consulted Mr. Arthur Chance of Dublin for symptoms which pointed to pyloric obstruction. X rays after a barium meal (Dr. T. G. Hardman) not only showed the stomach and small intestines but clearly defined the junction of the common bile-duct with the duodenum, and gave a detailed picture of the intrahepatic ducts (see figure). Mr. Chance performed gastro-enterostomy. At the operation he found the duodenum, pylorus and head of the pancreas involved in a dense mass adherent to the anterior abdominal wall; this mass was not disturbed. She considerably improved after this operation but never completely regained her strength. In December, 1942,



Appearances after barium meal. Arrow shows position of pylorus.

she developed symptoms diagnosed as colonic obstruction. Her doctor contemplated sending her back to Dublin but she got rapidly worse and died.

Many radiological examinations must have been made after anastomosis of the bile-duct to the duodenum, but I have not seen any reports of a clear cholechochogram obtained by giving a barium meal. It is interesting to speculate on the intrahepatic ebb and flow of this woman's duodenal contents during the last 20 years. The ramifications of the ducts were apparently deluged by a ceaseless tide without ill effects.

I obtained the accompanying illustration through the courtesy of Mr. Chance.

## Reviews of Books

### A History of Medical Psychology

GREGORY ZILBOORG, MD, in collaboration with GEORGE W. HENRY, MD. London: Allen and Unwin. Pp. 606. 28s.

Dr. Zilboorg has ambitiously undertaken to supply the lack of any comprehensive account in English of the development of psychological medicine, and he has succeeded in producing a solid and learned work that is a credit to American scholarship. Its thoroughness has been purchased at a price: the style is heavy and at times humourless (as in the ponderous comment of Freud's little pleasantry about his aphasia when speaking French); there is much moralising, erudition clogs fluency, nothing is left unsaid, and nothing is said neatly and with point. Nevertheless, the lack of literary graces will not prevent the book being read as well as consulted, because it is enlightened and broad, and tells an important story straightforwardly. Dr. Zilboorg is inevitably indebted to predecessors like the Semelaignes, Friedreich and Kirchhoff, but strangely makes no reference, except in a casual footnote, to Kornfeld, whose work is much more exhaustive and reliable; among lesser contributions those of Birnbaum, Vinchon and Laignel-Lavastine do not seem to have been used. In the earlier part of the book he is somewhat superficial and derivative in his treatment of the Greeks, and permits himself the vulgar solecism of imputing schizophrenia to Socrates. Among Arab writers on insanity, he omits to mention Ishaq ibn Imras. Dr. Zilboorg shows an honest bias towards believing that the Shiloh of progress dwells in an American ark brooded over by the Freudian paraclete. This agreeable partiality (which is neither strained nor arrogant) leads him into some questionable, if tacit, depreciation of famous men. His references to Janet, Jung and Adler are decidedly brief. Dejerine, Morton Prince and Dubois are not mentioned at all. Wagner-Jauregg, whose great discovery has saved the life and reason of thousands in every country, is given less space than A. A. Brill who chiefly introduced psycho-analysis into America. Hughlings Jackson and Mott do not appear, any more than Wilmanns, Pick, Tanzi, Lugaro, Sante de Sanctis, Séglas, Toulouse, Séguin (child psychiatry in every form is omitted), Rüdín, Jaspers (though Gruhle, oddly enough, is awarded an "honourable and permanent" place in modern psychiatry) and many more who might be thought at least as important as some of those selected for mention in chapter II, which deals with the "Second Psychiatric Revolution." It is easy to forgive Dr. Zilboorg for his prejudices, even when they betoken a perhaps excessively low opinion of the state of psychiatry in these islands, because he is so obviously a sincere historian, painstaking and devoted; one must have toiled, in the same vineyard to appreciate the high merit of his labours.

### Medico-Legal Blood Group Determination

DAVID HARLEY, MD, BSc Edin., FIC, inoculation department, St. Mary's Hospital, Paddington. London: Wm. Heinemann (Medical Books). Pp. 119. 12s. 6d.

THIS useful little book collects together a lot of scattered information and gives us the benefit of the author's practical experience with techniques that are not extensively used in this country. The three sections deal with theory, technique, and practice. The first gives a clear and succinct account of present knowledge of the ABO and MN systems of blood-groups and similar factors, and deals thoroughly with their mode of inheritance. He draws attention to the fact that the ABO blood-group antigens can be detected in other body fluids, particularly semen and saliva, a fact which has criminological applications. The section on technique is practical and up to date. The final section on practice indicates the kind of case to which this knowledge can be applied—mostly paternity cases and criminal cases of alleged assault and murder. The main use of these tests is negative; they can prove non-paternity—Mr. X could not have been the father of little Y—but they cannot prove paternity. An affirmative answer only means that Mr. X, among thousands of others, could have been the father of Y. It is the same in the criminal cases; the examination of stains only gives conclusive

evidence *excluding* a suspect, as a case in which cigarette stubs were the clues shows well. The average man accused of paternity has a 1 in 3 chance, it seems, of proving he is *not* the father; if he is group ABN he has a 68.5% chance, if AMN only 5.3%. A useful table setting out possible and impossible combinations of parents' and child's groups is given. Dr. Harley pleads for a more extended use of these blood tests and feels that much time could be saved by the courts if they used them more; and he reproduces the draft of the Bastardy Bill which would have given them the necessary powers. Unfortunately this bill has been just another war victim.

### Problems of Intestinal Obstruction

JOHN P. PETERS, OWEN H. WANGENSTEEN, W. OSLER ABBOTT, ALLEN O. WHIPPLE, JOHN A. NELSON. London: Humphrey Milford, Oxford University Press. Pp. 56. 3s. 6d.

THIS little book contains four articles by authors whose work on intestinal obstruction has earned them international repute. Every abdominal surgeon will find it interesting and useful; and they should commend the volume to their assistants, on whom falls much of the responsibility of the care of the patient during the first week after operation for septic abdominal conditions and for intestinal injuries, when there is danger of ileus. The rationale of the treatment, therapeutic and prophylactic, of postoperative distension and ileus depends on a knowledge of the relation between the secretory and absorbent activities of the intestinal mucosa on the one hand and of the chemistry of the blood on the other. In the first article, Peters gives an account of our present knowledge of this subject which would be difficult to better. The other articles, on distension by Wangensteen, decompression by Abbott, and end-results of decompression by Whipple and Nelson are equally valuable.

### The Food You Eat

SAMUEL and VIOLETTE GLASSTONE. Oklahoma: University Press. Pp. 277. \$2.25.

THIS is a well-written study of dietetics for the average layman by a professor of chemistry, and his wife who is a botanist by profession. They are both graduates of English universities who have migrated to the United States and made their home there. They have great gifts in presenting the facts of dietetics simply and readably and in making practical suggestions, most of which are just as applicable in Great Britain as in the USA. Their scientific training saves them from the faddism which mars so many popular books on dietetics, though an acute nose might catch faint odours of the acid-base balance fad and the wholemeal obsession. There are minor blemishes in the book which might be removed in another edition by submission of the MS. to a physiologist; and naturally enough much of recent research on the effect of wholemeal bread on calcium and iron absorption has not yet reached the United States to modify the authors' enthusiasm for that food. None the less the book is sound in its major aspects and can be highly recommended to the lay reader.

THE twenty-ninth report of the HENRY PHIPPS INSTITUTE for the study, treatment and prevention of tuberculosis of the University of Pennsylvania contains an account of activities during the biennium 1940-41. It describes the organisation and administration of the institute; the instruction given by the staff in the form of routine courses; the research work undertaken; and the effect of the war upon smooth working. From the tables given it seems that of the total number of new and old white and negro patients 630 (17.1%) suffered from clinically significant pulmonary tuberculosis and 160 (4.3%) from tuberculosis not considered clinically significant. Much of the publication consists of reprints of articles published by members of the staff during the period under review, together with some new material. These articles are valuable sources of information on such subjects as the epidemiology and clinical course of tuberculosis, constitution and tuberculosis; tuberculin and tuberculin reaction (largely from the pen of Dr. Florence B. Seibert); pathology, immunology and bacteriology of the disease; and air-borne infection. The volume closes with three instructive dissertations on medical history by the director, Dr. Esmond Long.

# THE LANCET

LONDON: SATURDAY, MARCH 13, 1943

## SENSITIVITY TO SULPHONAMIDES

ADMINISTRATION of certain drugs is occasionally followed by symptoms attributable to sensitisation of the patient. The drug sensitivity thus revealed resembles allergy to foreign proteins in that it can be either congenital or acquired, the acquired variety usually taking about ten days to develop. Direct skin tests are of little help in detecting it, for the patient who reacts violently to a drug given by mouth may produce no weal when it is injected into his skin; and conversely a patient may develop a large weal when, for instance, a morphine compound is injected intradermally and yet take a full dose by mouth with impunity. It seems that the antigen is not the drug itself, but a combination of the drug with body proteins; for if the drug to which the patient is sensitive is incubated with his serum before being injected intradermally, he is more likely—though by no means certain—to show a skin reaction. His proteins in fact behave as foreign proteins after combination with the drug.

Intensive experience with the sulphonamides during the last few years has shown that they can be responsible not only for toxic effects such as nausea, vomiting, and renal damage, but also for allergic reactions which may be manifest in fever, rashes, and probably blood changes. WEDUM'S<sup>1</sup> experiments emphasise the similarity between this sensitivity to sulphonamides and sensitivity to a number of other drugs and to proteins. He prepared compounds in which sulphonamides were linked to proteins through an azo group, so that sulphonamide acted as the hapten group, and by repeated administration of these compounds he succeeded in sensitising rabbits and guinea-pigs. The fact that neither the sulphonamides nor the proteins by themselves elicited any sensitisation effects showed that the sulphonamide-protein complex was the antigen.

On the clinical side opinions about the frequency of ill effects from sensitisation to sulphonamides differ widely. LYONS and BALBEROR<sup>2</sup> suggest that about a third of patients treated with sulphathiazole become sensitive and will show allergic phenomena when given a subsequent course. Other figures, such as those of VERNON WILLIAMS,<sup>3</sup> support the view that at most 10% become intolerant to sulphonamides. Whatever the true figure may be, it is clear that an increasing number of people must be acquiring sulphonamide sensitivity, and as SPINK<sup>4</sup> says, failure to recognise this factor in drug therapy may have serious consequences when a second course is given or administration is continued over a long period. Nevertheless it is possible for patients to take sulphonamides for a long time without apparent harm. Thus THOMAS, FRANCE and REICHMAN<sup>5</sup> gave

daily doses of sulphanilamide for over six months at a time to patients who had previously suffered from rheumatic fever, and some received repeated courses, year after year during the rheumatic fever season; yet they observed no alarming reactions. Some drop in the total leucocyte count over a period of days or weeks was not uncommon, but the fall was self-limiting and never progressed to a serious granulopenia. The experience of COBURN and MOORE<sup>6</sup> was very similar, but STOWELL and BUTTON<sup>7</sup> observed one fatality from agranulocytosis and several severe rashes among 46 children treated in this way.

Much can be done to prevent the development of sulphonamide sensitivity. The drugs should be given only where there is definite indication for them and not haphazard to every feverish patient. The period of administration should be as short as possible; and, though the aim should be to reach an effective concentration in the blood rapidly by high initial dosage, the total amount should not exceed what is strictly necessary. Only in exceptional circumstances should the course of treatment last longer than 7 days or the total dose be more than 30 grammes. Increasingly often the question will arise whether a patient who has shown signs of sulphonamide sensitivity in a previous course can again be treated with a sulphonamide. If he is at all seriously ill, and if the previous symptoms consisted merely of fever and a rash, or of leucopenia, there should, according to the evidence at present available, be no hesitation in applying the treatment; but the doses should be small at first so as to diminish the severity of any reaction that may develop. On the other hand, a real agranulocytosis or severe exfoliative dermatitis should contra-indicate any further use of a sulphonamide, and in such a situation alternative bacteriostatic substances such as penicillin will be particularly useful when they are available in sufficient quantity. If it proves feasible, a happy solution of this difficult problem would be to follow ERSKINE'S<sup>8</sup> advice and, whenever a patient develops sensitivity, desensitise him before he is discharged as cured. Theoretically this could be done by giving a series of small doses, but it is not yet known whether it would work in practice or whether its effect would be permanent.

## BREAST ABSCESS

A BREAST abscess in the puerperium is a disaster. For the mother it spells discomfort, pain, and ill health for several weeks at least; for the baby it probably means deprivation of its natural food; and in the obstetrician it induces an uncomfortable feeling of self-reproach because he recognises that a breast abscess is an infective process and largely preventable. The condition most often develops after the mother and child have been discharged from the lying-in wards, when she undergoes the metamorphosis from a regimented patient into an overworked woman, and when details of hygiene and prophylaxis laboriously instilled by the hospital staff are forgotten. This is the critical period because the change of environment and the emotional and physical strain of house-keeping, nursing her baby and her other jobs are apt to upset the nicely balanced mechanism of

1. Wedum, A. G. *J. infect. Dis.* 1942, 70, 171.  
 2. Lyons, R. H. and Balberor, H. *Univ. Hosp. Bull. Ann Arbor*, 1941, 7, 19.  
 3. Williams, V. H. *Lancet*, 1943, i, 103.  
 4. Spink, W. W. *Sulphanilamide and related compounds in general practice*, 2nd ed., Chicago.  
 5. Thomas, C. B., France, R. and Reichman, F. *J. Amer. med. Ass.* 1941, 116, 551.

6. Coburn, A. F. and Moore, L. V. *J. clin. Invest.* 1939, 18, 147.  
 7. Stowell, D. D. and Button, V. H. *J. Amer. med. Ass.* 1941, 117, 2164.  
 8. Erskine, D. *Lancet*, 1942, ii., 568.

lactation. Inadequate care results in a sore (not necessarily cracked) nipple; the baby may be fractious and not feed properly; the mother may panic—the doctor consulted often panics, too—attempts are made to suppress lactation by giving salts, restricting fluids, and tight-binding the breast. The result of these measures is stasis and retention of milk; and it is not surprising that such a happy culture medium soon becomes infected. The exact route of this infection remains problematical: a cracked nipple may allow organisms to enter by the retrograde path of lymphatic channels which in the breast form a rich plexus around and below the nipple; a boil, pustule or septic finger may possibly start a blood-borne infection; and even the baby's mouth is not above suspicion. One thing is certain, that the general health of these mothers, because of their poor living conditions, is below par, so that they are unable to cope with even mild attacks by the *Staphylococcus aureus* or other invaders. Their well-to-do sisters are relatively immune from breast abscess, except when cross-infected in the wards of an institution.

MACPHERSON<sup>1</sup> does not regard a cracked nipple as of great causative importance; he found it in only 4 of his 26 cases. Far more significant in his view is the mismanagement of breast-feeding and inadequate emptying of the breast. In 11 cases there had been misapplied attempts at weaning by the patient herself; in almost all of these there was an interval of about a fortnight before symptoms began. In 10 further cases the mother said that the breast was tender and knotted, or that the baby did not get on at the breast. In short, 21 out of 26 experienced difficulty in feeding and had some symptoms and signs of engorgement and stasis. The organism responsible was the *Staph. aureus* in 18 of 20 cases that were bacteriologically examined; hæmolytic streptococci were found twice and in both these cases the nipples were cracked. All the mothers were in poor health but a search for associated foci of infection was unsuccessful in most of them. There is a rarer type of superficial abscess which may later extend to the substance of the breast and often starts as a pimple or small furuncle; but it is clear that the common intramammary abscess arises from infection of retained and stagnant milk by the *Staph. aureus*.

In treatment MACPHERSON delays incision until localisation is certain; this takes at least a week from the onset of symptoms and can be encouraged by dry, not moist, heat—kaolin poultice as opposed to the mischievous infection-spreading hot fomentation—and short-wave diathermy. His incision is small, about 1½ in. long, but all loculi are broken down and the cavity of the abscess is packed firmly but not tightly with gauze soaked in 0.1% acriflavine in water or liquid paraffin; and in some cases he used 10% sulphacetamide in a glycerin-eucerin base ('Euglamide'). Proflavine sulphate, or sulphathiazole and sulphanilamide powder might be useful alternatives for packing. Firm support is essential and is probably best applied by an elastic plaster brassière. The dressing should be left for 5 days. The pack is then removed gradually, taking only 2-3 days if the wound is fairly dry or if pressure is producing œdema in the surrounding tissues, but 10-14 days

if pus is still coming away or the cavity is especially large. Granulation is then allowed to take place from below, and a close watch is kept to prevent loculation. Lactation should be inhibited in every case, which can be done with ease and certainty with adequate doses of the synthetic oestrogens, such as 3 mg. of stilbœstrol four times a day for 4 days. This method makes the patient comfortable throughout the postoperative period; the pain and distress of daily dressings are avoided, and some 3-4 days after operation she can be treated as an out-patient. The abscess takes not less than 3-4 weeks to heal, and induration persists beneath the scar for 3-4 months, though it is not necessarily painful. This result was achieved in all MACPHERSON'S cases except one in which a small recurrence necessitated further treatment.

In prophylaxis the antenatal health of the mother and careful tuition in breast hygiene should form the first defence line. A far longer period of supervision by competent health visitors is required for the puerperal mother, and a longer period of institutional care is advisable. It is insufficient for a hard-working woman to spend 10-14 days in hospital and then be returned to full duties after the grilling ordeal of labour followed by the profound involitional changes of the puerperium. After childbirth a woman needs rehabilitation just as other patients need it after a surgical operation. Ideally she should be transferred to a puerperal rest centre for at least another 3 weeks. Here she will regain strength and learn the elementary principles of mothercraft; here she will have a real chance of establishing a proper routine of breast-feeding. In these columns there has lately been ample demonstration that the early weeks of breast-feeding are the critical ones, when a large proportion of mothers need skilled supervision with relief from home cares and housework if they are to avoid premature weaning.

#### NAMES AND DOSES OF LOCAL ANÆSTHETICS

At present the substance most widely used for infiltration and regional anæsthesia is procaine; but a number of more powerful new drugs—of which 'Nupercaine' and amethocaine are good examples—are also gaining favour. Both of those mentioned are best used in concentrations about one-tenth that of procaine, and it is correspondingly important that these stronger agents should not be mistaken for the weaker ones by dispenser, surgeon or anæsthetist. Unfortunately they are sold under a multiplicity of names. Procaine is basically synonymous with 'Novocain,' 'Planocaine,' and 'Sevicaine.' Nupercaine existed for many years under the name 'Percaine' (Ciba) until the manufacturers with great public spirit changed its title because it had been confused (twice fatally) with procaine. Amethocaine hydrochloride (the name approved by the GMC) is identical with 'Anethaine,' 'Decicain,' and 'Pontocaine.' ASHER'S comments on such diversity of names among drugs are apt.<sup>1</sup>

In a small book lately published JAMES<sup>2</sup> recommends amethocaine as a local anæsthetic for operations that are likely to be long or tedious. Procaine acts only for a relatively short time even if used in conjunction with adrenaline; after 1½-2 hours the

1. Macpherson, A. I. S. *Edinb. med. J.* January, 1943, p. 25.

1. Asher, R. A. J. *Lancet*, Feb. 13, 1943, p. 213.

2. James, N. R. *Regional Anæsthesia*. London: Churchill. Pp. 57. 6s.

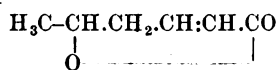
effect begins to wear off. Further infiltration on the earliest sign of returning sensation overcomes this drawback, but it is always preferable to be able to work within the time-limits of a drug. The duration of both nupercaine and amethocaine anaesthesia, when used with adrenaline, is almost double that of procaine, and their usefulness is thus evident. But a close watch must be kept on dosage. In this country there is perhaps a tendency to use unnecessarily high concentrations of local anaesthetics—a tendency springing no doubt from the fear that they may not work. Solutions of 1 or 2% procaine are often used where  $\frac{1}{2}$ % or even  $\frac{1}{4}$ % would be adequate; and this is a pity because, contrary to what might be expected, 100 c.cm. of  $x$ % solution of any local anaesthetic has less toxic effect than 50 c.cm. of  $2x$ % solution. The advantage of the more dilute solution is that, in infiltration at any rate, it can be more liberally applied—which must appeal to every anaesthetist not sure of the toleration and recrimination thresholds of his surgeon. In solutions of equal strength, amethocaine is  $4\frac{1}{2}$  times as toxic as procaine; and though it is usually employed in solutions only about one-tenth as strong, care should be taken to keep well within the maximum dosage. Unfortunately no large series of cases has yet been published in Great Britain, but JAMES suggests that the quantity given should be 2 mg. per 1 lb. of body-weight, with a total upper limit of 300 mg. He divides this total dose in two solutions—one being 160 c.cm. of 1 in 1000 (160 mg.) and the other 280 c.cm. of 1 in 2000 (140 mg.), so that he has 440 c.cm. for injection. This volume would hardly ever be used in full, even for an extensive operation, and the risk of an overdose should thus be avoided.

Mixtures of amethocaine and procaine have for some time been used for thoracoplasties by surgeons in Norway and in this country with satisfactory results. The prolonged action of the new drug and its ability to act on mucous membrane are clearly considerable assets, and it would be regrettable if misadventures due to confusion of proprietary names and consequent use of unduly strong solutions were to bring it into discredit.

### Annotations

#### A NEW SELECTIVE GROWTH INHIBITOR

THE power of compounds such as sulphonamides to inhibit the growth of many kinds of bacteria in concentrations which do not damage tissue cells is well known. An inhibitory compound now described by Medawar, Robinson and Robinson<sup>1</sup> differentiates between fibroblasts and epithelial cells, preventing growth of fibroblasts in concentrations which allow epithelial cells to proliferate freely. The existence of such compounds was first discovered in 1926 by Heaton,<sup>2</sup> who found that extracts of malt, among other things, could act in this way. Medawar and the Robinsons tried to isolate the active principle. The amount obtained was too small for accurate determination of its chemical structure but the general properties suggested an unsaturated lactone with the formula  $C_6H_8O_2$ . Guided by this and similar clues, they prepared 8-hexenolactone—



which produced differential inhibition of growth in

1. Medawar, P. R., Robinson, G. M. and Robinson, R. *Nature*, Lond. 1943, 151, 195.
2. Heaton, T. B. *J. Path. Bact.* 1926, 29, 293.

the same way as the crude malt extract. The purest products were active in a concentration of 0.006 mg. per c.cm. but were unstable and difficult to prepare. The authors suppose that this differential inhibition is due to the hexenolactone inhibiting a growth factor which is required by fibroblasts but not by epithelial cells, and they suggest (for reasons which are not clear) that this growth factor may be pantothenic acid.

If this hypothesis, which can readily be tested, is correct, hexenolactone would be expected to exert a chemotherapeutic action on hæmolytic streptococci, which also require an uninterrupted supply of pantothenic acid for their multiplication in the test-tube or in the body.

#### DOCTOR'S WIFE

Dr. M. H. Kettle used to say that the biggest handicap of a woman doctor was that she could not have a wife. For no housekeeper or keeper, secretary or dictaphone, companion or detective service can quite take the wife's place, and so far no husband has ever tried. A doctor's wife can make or wreck his career, but she can do far more—bring him misery in the midst of success or happiness in spite of failure. What qualities should she have if she is to give him—and therefore herself—both success and happiness? First among them McClinton<sup>1</sup> of Ontario puts good health, not only for the reasons which apply to anyone's wife but because her lesser ailments will never receive the attention they deserve; she can only mention them when her husband is hurried over breakfast or tired over dinner, and she must subsist mainly on samples from his dusty shelves. The doctor himself will be just as neglected therapeutically, and for what treatment he gets he will often look to her. "Happiness," says McClinton, "hangs round longer if the doctor's wife is his intellectual equal." It is her job to know as much as he does though not of the same subjects. She needs no skill with the stethoscope but must master the telephone. In two minutes she must learn the patient's name and social status, his address and how to get there, what he has and how long he has had it, and she must bear the blame if her assessment of urgency, based on the distorted tone values of a few hasty words, turns out wrong. Moreover, her reply to the message must be neither alarmingly sympathetic nor unkindly terse. The doctor's wife must remember that walls have ears, yet not carry secrecy to extremes, and she must be enough of an actress to wear Mrs. Dose's false nose without showing the join. McClinton would have her the doctor's social equal and sharing his social values, so that both will like quiet, good talk and old wines, or both boisterousness, chatter and beer. She need not have been to a finishing school (need anybody?) but it is convenient if she has the language of education and agreeable manners. She must know how to entertain their friends, remembering that too much entertainment in the doctor's home becomes obvious and odious. She may beg a little, says McClinton, egg a lot but must not nag; like an ointment for skin disease she should soothe and stimulate. She is fortunate if he worries, for if he does not he burns with no creative fire. The good doctor will often sweat when the phone rings at night, for fear of something he has left undone, while the bad one snuggles dry beneath the blankets knowing that most people get well anyhow. So it is the good doctor whose duodenum tends to ulcerate and arteries to harden, and the good wife with her sense and sympathy, tact and affection who sees they do not. Last of all McClinton talks of the accident without which all these qualities will fail—she must love the doctor. To act as such a combination of doormat and poultice she will have to.

1. McClinton, J. B. *Canad. med. Ass. J.* November, 1942, p. 472.

### ACQUIRED CHARACTERS AND INHERITANCE

A Lamarckian incendiary thrown into the ordered ranks of biologists, geneticists and Darwinians of all categories must surely set them all trying to extinguish it, or scampering for cover. In support of the Lamarckian hypothesis Wood Jones<sup>1</sup> brings up some anatomical observations which are difficult to explain on orthodox lines. Two of the most interesting may be quoted. In Oriental peoples who squat on their heels, so causing extreme dorsiflexion of the ankle, articular facets appear on the lower anterior border of the tibia and on the upper anterior aspect of the astragalus. These are seen in all Oriental peoples who adopt this posture, but are absent in others who make use of chairs. These facets, Wood Jones thinks, are the response of the organism to a habit continued over many generations and are now heritable. The point is not established: we are not told what happens to the children of squatting and faceted Oriental parents who are brought up from infancy to sit on chairs. In view of the capacity of the human organism to develop false joints (e.g. at the site of fractures) proof is required that these facets are not freshly developed in every individual as he learns to squat. If however they are in fact heritable one would wish for further facts, such as what the state of affairs is in the results of crosses between squatting faceted and non-squatting non-faceted parents. Perhaps the most difficult example to explain on non-Lamarckian principles is the reversal of direction of the hair-growth in the kangaroo. This is seen in the pouch-young, and so must have a hereditary basis. Most animals show a general tendency for the hair to grow out of the skin in a particular direction, cranio-caudad and dorso-ventrad. This direction in the kangaroo among other animals is reversed over certain sites, those sites being just where scratching movements of the fore or hind limb pull the hair in the opposite direction. The difficulty of explaining this is not primarily genetic. Genes are known which have just such specific and circumscribed effects (e.g. those governing colour patterns). The difficulty lies rather in seeing how this modification can have any selective advantage. The most plausible suggestion would seem to be that the reversal of hair-growth would contribute to the efficiency of the toilet of the skin, to the removal of ectozoa and the prevention of disease.

Wood Jones frankly admits that he is encouraged in his Lamarckian views by the illogical use of orthodox teaching on natural selection to bolster up Nazi and Fascist philosophies of life. Reduced to its crudest terms the argument runs: nature prefers the fittest, nature is red in tooth and claw, therefore those most red in tooth and claw are fittest to survive. But hypotheses are not to be preferred or rejected because they seem to lead to pleasant or unpleasant conclusions, but because they are more or less probable, or heuristically advantageous. Wood Jones suggests that the explanation of the observations he provides is simpler along Lamarckian than along orthodox lines. The Lamarckian hypothesis, however, is not simple: it is extremely difficult to see how an adaptive somatic change can produce such an alteration in the chromosomes—the main agents in hereditary transmission—that the adaptive change is reproduced in the next generation. Alterations in the chromosomes of the germ cells do occur under external influences, and are then heritable; but the somatic modifications with which they are associated appear to bear no relation to the original cause but only to the micro-anatomy of the chromosomal change.

The war between two hypotheses is always a war to the death: the only compromise possible is where they can

both be fitted together as harmonious parts of a larger theory. Every hypothesis must be stretched to breaking point before its limitations can be clearly defined. With remarkable flexibility, considering the simplicity of its fundamental assumptions, modern Darwinism can explain a vast wealth of facts from palæontology, genetics and systematics. At present it still holds the field.

### MORPHIA IN OBSTETRICS

THE value of morphia in the treatment of prolonged labour is well established. By its use, much needed rest is secured for the patient, fear and anxiety are allayed, and in most cases the cervix dilates more quickly. Whether morphia should be administered as a routine in normal labour is another matter. Mengert<sup>1</sup> has studied a series of patients who received various analgesics in labour and his broad views on the effects of the drugs do not differ from those generally held. He finds that morphia may produce respiratory embarrassment in the child; and that the foetal death-rate is increased and the incidence of forceps deliveries is raised when it is used. Morphia is particularly dangerous when the child is premature and should never be given during the three hours immediately preceding delivery. These dangers, though real, are not great and must not be overemphasised. Snyder and Lim<sup>2</sup> showed that the rhythmical breathing of the rabbit foetus—which can be observed when the unopened uterus is immersed in a bath of warm Ringer's solution—persisted even when the mother was given more than 15 times the analgesic dose of morphine. In another communication, however, they showed that if rabbits were heavily morphinised and allowed to deliver themselves there was a high incidence of foetal death from respiratory trouble; but if, after the same dose of morphia, delivery was by hysterotomy the foetal death-rate was much reduced. This fits in with the observation that morphia given preoperatively has little effect on the baby when the mother is delivered by caesarean section under local anaesthesia.

### A PLANNED PRACTICE

In her presidential address to the London Association of the Medical Women's Federation Dr. Annis Gillie<sup>3</sup> gave a critical and objective account of a group practice in which she recently worked. Situated in the country but adjoining a large town this amalgamation of three pre-existing practices normally employs four partners and an assistant. Its growth since the end of the last war has been carefully organised and the result is satisfactory both for patients and practitioners. Among the members of the group specialisation, apart from the inevitable bias of interest in certain directions, is barred; midwifery, for example, is undertaken by all five doctors though more by some than others. Apart from settling major questions of expenditure, the partners have nothing to do with financial details; bills are dealt with by the secretary working in conjunction with the accountant. Group expenses include salaries for secretary and dispenser, the telephone, drugs, and the running and upkeep of cars; all other expenses are individual. In the rural area served there is no choice of doctor outside the group, but on the fringes of the practice there are ample alternatives. The doctor-patient relationship is as completely personal as could be wished. Before the war adequate holidays were the rule, but apart from their holidays the doctors had no regular free time. (In a group of this size a weekly half-holiday and a guaranteed night off could surely be arranged without difficulty.) The bulk of dispensing is done by the practitioners themselves, a relic of the past which some will think undesirable. Nearly three-quarters of

1. Habit and Heritage. F. Wood Jones, DSc Lond, FRCS, FRS, professor of anatomy in the University of Manchester. London. Kegan Paul, Trench, Trübner. 1p. 100. 5s.

2. Snyder, W. F. *Amer. J. Obstet. Gynec.* 1942, 44, 888.  
3. Snyder, F. F. and Lim, K. T. *J. Pharmacol.* 1941, 72, 39;  
*Proc. Soc. exp. Biol. N.Y.* 1941, 48, 199.  
3. Gillie, A. C. *Med. Wom. Fed. quart. Rev.* January, 1943, p. 24.



the practice is private, and only a fifth of the group's takings comes from national health insurance. There is also a public medical service, not very remunerative but serving a useful purpose in that it covers a number of families who, as bad debts, formerly represented a liability rather than an asset. The unit for voluntary insurance is usually the family and Dr. Gillie views with some concern the tendency for the whole family to insure with the doctor attending the husband; in a group comprising doctors of both sexes it could surely be arranged that women and young children came under the care of a woman doctor where that was preferred. This practice happens to enjoy the wise counsel of an eminent consulting physician at present living in the neighbourhood; and this prompts Dr. Gillie to stress the need for mobile consulting physicians—on a similar footing to existing obstetric consultants—in districts outside the limited range of teaching centres. Her picture is one of a practice which, "though working against a background of machinery which has gaps and anachronisms," seems to her "to be organised humanly, professionally and also intellectually to a high degree." Opposition in the bad old sense of more or less cutthroat competition is surely on the wane and it is hard, if not die-hard, to believe that, whatever may be in store for him in the future, the general practitioner working as a member of a group will not thereby serve his patients the better.

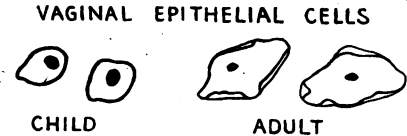
#### THE BRAIN IN HYPOGLYCÆMIA

MANY histological studies have been made of the brain in fatal hypoglycæmia with somewhat diverse results and explanations. While some have stressed the vascular basis of the degenerations and necroses that occur, perhaps most have regarded these as directly occasioned by the hypoglycæmia and the resultant defective oxygenation of the brain tissue. The latter thesis is developed by Lawrence, Meyer and Nevin<sup>1</sup> in their report of 6 cases in which death followed hypoglycæmic coma; 3 of these were diabetics and 2 schizophrenics, in all of whom insulin therapy had been adopted. In the sixth case there was an islet-adenoma of the pancreas. The period of coma in the series varied from  $\frac{3}{4}$  hour to 17 days, but the estimation of time in several instances was only approximate. In accordance with this variation different intensities of pathological reaction were observed histologically. In general large parts of the cerebral cortex had undergone necrosis, often of a pseudolaminar distribution, involving the inner or outer layers. Circumscribed lesions in the Sommer sector were also observed. Severe degenerations of neurones were noted in association with the necrosis. The corpus striatum and to a less extent the cerebellar cortex were similarly affected, but the brain-stem and spinal cord showed few changes. In all essentials the pathological picture agrees with that demonstrated in anoxic states, whether these be due to cutting off of the arterial supply as shown experimentally by Gildea and Cobb<sup>2</sup> and more recently by Weinberger and his colleagues,<sup>3</sup> or to nitrous oxide anaesthesia as described by Courville,<sup>4</sup> or to poisons such as carbon monoxide and cyanides. It may be noted however that in the conditions enumerated the deeper laminae of the cortex have usually been found more susceptible to degeneration than the superficial layers. In hypoglycæmia the mechanism responsible for cell-damage is a reduction of oxygen utilisation by the neurones, glucose being the main and probably the only substrate which the brain can use for its oxidative

processes. Since the term anoxia is not strictly applicable for such a process the authors suggest a new word "oxyachrestia" deriving from  $\chi\rho\eta\sigma\iota\varsigma$  ("use") which is familiar already in the term "achrestic anæmia."

#### OESTROGEN THERAPY OF VULVOVAGINITIS

Emmett Holt<sup>1</sup> was the first to draw attention to the alarming outbreaks of gonococcal vulvovaginitis in children's institutions. The source of infection was thought to be infected lavatory seats and soiled linen used by adults in the house. Lewis,<sup>1</sup> however, by careful inquiry established a history of sexual contact with men or boys in 8 of 15 cases chosen at random. Treatment of the condition remained unsatisfactory until Lewis<sup>2</sup> applied the experimental work of Allen and Doisy<sup>3</sup> on the conversion of the vaginal mucosa from the child to the adult type by the administration of oestrogens. He pointed out that the mucosa in gonococcal vaginitis was inflamed and ulcerated and that the gonococci lodged in the submucosa where they could not be reached by local treatment. He also showed that gonococci will not thrive in a medium whose pH is below



6, and that gonococcal vaginitis is non-existent in adults where there is a thick vaginal mucosa. Whereas the normal child's vagina is lined by four epithelial layers of cells with relatively large nuclei, the adult cornified state is characterised by 10-12 layers of cells with a curling edge and pyknotic nuclei.

Brown<sup>4</sup> describes a simple method of detecting this change. The discharge is cleansed from the vulva and a small cotton-wool applicator, moistened with saline, is gently introduced into the vagina, withdrawn, and smeared on a glass slide. After drying by heat the smear is stained by Gram's method. The basal cells are seen in abundance and are easily differentiated.

Russ and Collins<sup>5</sup> have stressed the importance of continuing with oestrogens until the adult type of cornification occurs, and Lewis also emphasises that this treatment will not succeed unless cornification is produced. This point has almost been lost sight of by most clinicians, too much reliance being placed on negative smears and cultures. It has been difficult to assess the cure-rate where oestrogens have been employed, for an average of 54 days treatment is required and relapses are common. Brown points out that there is a wide variation in the amount of oestrogen needed to produce cornification, and this may lead to insufficient dosage in some cases; in others treatment may be abandoned too early owing to vaginal sensitivity to the base in which the oestrin suppositories are made up. Adult cornification must be maintained for at least four weeks for successful cure. Brown does not advise the use of oestrogens in children after the age of 10 years or where there is an early menarche, on the grounds that in these cases cervicitis is more often present than vaginitis, and oestrogens may pave the way for a salpingitis by enlarging the uterus and tubes. He admits, though, that the fear of salpingitis has so far proved groundless.

Lewis reports the cure of 87% of cases of gonococcal vulvovaginitis in 6 days with sulphapyridine—a much quicker cure than oestrogens can accomplish—but there were some relapses. Brown mentions that cure cannot be effected by oestrogens in the presence of a urethritis, so that in some cases it may be necessary to combine the two forms of treatment.

1. Lawrence, R. D., Meyer, A. and Nevin, S. *Quart. J. Med.* 1942, **11**, 181.  
 2. Gildea, E. F. and Cobb, S. *Arch. Neurol. Psychiat., Lond.* 1930, **23**, 876.  
 3. Weinberger, L. M., Gibbon, M. H. and Gibbon, J. H. *Ibid.* 1940, **43**, 961.  
 4. Courville, C. B. *Untoward Effects of Nitrous Oxide Anesthesia*, Mountain View, Calif. 1939.

1. Lewis, R. M. *Amer. J. Syph.* 1941, **25**, 496.  
 2. Lewis, R. M. *Amer. J. Obstet. Gynec.* 1933, **26**, 593.  
 3. Allen, E. and Doisy, E. A. *Amer. J. Physiol.* 1929, **90**, 329.  
 4. Brown, W. E. *Amer. J. Dis. Child.* 1942, **64**, 221.  
 5. Russ, J. D. and Collins, C. G. *J. Amer. med. Ass.* 1940, **114**, 2446.

### SPUTUM DIAGNOSIS IN PULMONARY CARCINOMA

THE detection of carcinoma cells in sputum, once regarded as only rarely successful, has now become an encouraging and important part of the technique of the early diagnosis of carcinoma of the lung. Barnard<sup>1</sup> has included it in a comprehensive survey of the pathology of thoracic tumours. Gowar<sup>2</sup> has recently published the results of a series of investigations, using the Dudgeon technique, made in the thoracic unit of the London Hospital. A total of 238 specimens of sputum from 93 patients were examined—an average of 2.5 tests per patient. There were 36 instances in which fragments of growth were found in the sputum microscopically, 27 in which none were found though they were proved examples of new growth of lung or respiratory tract, and 30 suspected cases in which the cytological examination of the sputum was negative and in which the diagnosis ultimately turned out to be one of non-malignancy. Of the 36 patients with a growth-positive sputum, the diagnosis was confirmed by histological section (usually bronchoscopic biopsy) in 21, while in the remaining 15 the diagnosis became obvious from the subsequent course of the disease. The prospects of performing radical operations successfully on this group threw an interesting light on the early diagnostic value of this cytological method of examination of the sputum. Of the 13 patients considered operable 5 refused; of the remaining 8 half actually proved, on thoracotomy, to be suitable for pneumonectomy. Out of 20 instances of primary carcinoma with growth-negative sputum only 5 were regarded as potentially operable and of these 3 proved to be inoperable at thoracotomy, the other 2 declining operation. A statistical table is given with a classification of the different types of growth encountered on cytological examination of sputum as compared with biopsy in the whole series of 36 growth-positive cases. Both in the 21 instances in which this form of diagnosis was confirmed by biopsy and in the 15 in which it was not, the squamous type of growth predominated. This finding does not accord with some of the other series quoted and Gowar suggests that the discrepancies may be accounted for, in part by the pleomorphic nature of many of the tumours and in part by the different criteria adopted by the different pathologists classifying them. It is claimed that the simplicity of the technique, the lack of discomfort to the patient and the high percentage of positive results obtained, gives the method considerable clinical value. Contrary to the opinion held in many quarters it is not only the advanced case which is likely to give a growth-positive sputum test; the early potentially operable patient often does so.

### THE TRAFFIC IN DRUGS OF ADDICTION

NOTWITHSTANDING difficulties, the Central Opium Board and the advisory committee on traffic in dangerous drugs are valiantly carrying on the work of the League of Nations in the control of drugs of addiction. The board met in London last September, with Sir Atul Chatterjee of India as president, and reported that while their duties have been seriously impeded statistical returns have been received from 50 governments of the 66 contracting nations and 62 out of 99 dependencies and colonies. Moreover three accessions have been received to some of the opium conventions of 1912, 1925 and 1931—namely, Paraguay, the Belgian Congo and Egypt—while through its branch office in Washington the board has been enabled to get into closer touch with the governments of Central and South America.

The advisory committee of the league has furnished its analytical study and synoptic statistical tables for the year 1939 so far as information is to hand. Progress

continues in China under the six-year plan for the suppression of poppy cultivation, opium-smoking and drug-addiction; but "the Chinese Government regrets to report that conditions in the areas occupied by the enemy forces are becoming increasingly serious." In 1939 the number of drug-addicts in the United Kingdom was recorded as 534 (269 men and 265 women) of whom 121 were members of the medical profession, morphine being the drug most often employed. In Canada addiction to codeine still exists, while in the United States, despite a downward trend in narcotic traffic, there were in 1938 "not more than 50,000" drug-addicts. In Burma, according to the latest report received, there were some 36,000 addicts to opium, of whom 20,750 were registered smokers; there were in addition 18,703 addicts to cannabis. As regards raw materials it appears that in 1939 in Turkey the area under poppy cultivation had increased from 28,506 hectares to 31,129. In British India in the same year the area was 1947 hectares, mostly in the United Provinces, and the cultivator is "bound to sell the whole of the opium produce to the government opium factory at Ghazipur." Where the cultivation of the poppy has been discontinued sugar-cane and tobacco have replaced it. The consumption of excise opium for medical, quasi-medical and non-medical purposes in British India in 1939 was 1132.8 kg.

The government of Colombia is concerned at the number of eaters of coca leaves and suggests the preparation of a convention which would limit the cultivation of coca to world medical requirements. Indian hemp in the form of marihuana still causes anxiety in the United States, and during 1939 federal officers reported 951 violations of the Marihuana Act, involving 1545 seizures of marihuana in various forms. A campaign for the 'eradication of the cannabis plant throughout the states has been conducted and the Bureau of Narcotics laboratory is investigating the physiological potency of cannabis resin from plants grown on different soils.

### HEALTH EDUCATION JOURNAL

THE Central Council for Health Education has bravely launched a new quarterly intended for "all who care about the art of helping others towards a healthy life." The January number, whose appearance has been delayed, contains some answers to questions, by the Minister of Health, who describes education as the instrument of reform, the giver of hope, the guide which directs the conscious individual effort without which health cannot be attained; also articles on various aspects of health education, among others by Dr. Charles Hill on how the wireless can help, by Prof. J. M. Mackintosh of Glasgow on general aims; by Dr. Harley Williams on health films, by Sir Drummond Shiels on VD publicity, and by Dr. L. J. Picton on the function of the general practitioner. There is also an interview with Dr. Allen Daley in which he was asked to delve into his memory for the early history of health education and give his views on its scope. The annual subscription, 6s., should be sent to the General Secretary of the council at Tavistock House, Tavistock Square, W.C.1.

DENTAL TREATMENT FOR WORKERS.—The Ministry of Supply has for some time been providing dental treatment at one or two factories, and the scheme is now being extended to cover all the larger Royal Ordnance factories. Treatment will be restricted to extractions, fillings, and gum treatment. A charge of 2s. 6d. will be made for each visit irrespective of its duration, but no charge will be made for examinations. Workers who wish to visit the dentist will apply to the medical department at their factories and the dentist will only see workers on the recommendation of the medical officer. No deduction from wages will be made for time occupied by examination or treatment.

1. *Post Grad. med. J.* 1943, 19, 43.

2. Gowar, F. J. S. *Brit. J. Surg.* January, 1943, p. 193.

## Special Articles

## MEDICINE AND THE LAW

## Nature Doctor and the Medical Act

THE reason given by Parliament for the passing of the Medical Act is well known—"It is expedient that persons requiring medical aid should be enabled to distinguish qualified from unqualified practitioners." There are unqualified practitioners who are at pains to emphasise the distinction. Mr. George Charles Foster, of Forest Road, Walthamstow, for instance, the "nature doctor" who conducts three "clinics" (at Walthamstow, Hornchurch and Southend-on-Sea), exhibits a large notice, "to whom it may concern," at each of his three premises. It has come to his notice, he says, that divers unknown persons have been circulating the statement that he is a registered medical practitioner. He wishes it to be thoroughly understood that he is a consulting nature-cure practitioner; he does not believe in the whole of the system of medicine as practised by the state-registered doctors; "in many respects it is good, but in many others it is an absolute failure." He claims that he treats by medicine which will build up the tissue and not destroy it; he does not use drugs or medicines which poison the system or rob it of its natural properties. His desire to dissociate himself from the registered practitioner was made even more clear in evidence given last month during proceedings under the Medical Act. According to an inquiry agent, Mr. Foster insisted that he did not wish to do anything to mislead the public as to his credentials. "With all due respect to the medical profession, it would be detrimental to my own interests if I held myself out as a registered medical practitioner because—and I say this respectfully—the majority of the cases who come to me do so only because orthodox medicine has failed to give relief." He called, amongst other witnesses, a patient who said she had a bad leg for 23 years which Mr. Foster was now curing wonderfully; she never thought he was a doctor; she had read the notice in his waiting-room.

In spite of the distinction which the Medical Act enshrines and which Mr. Foster personally insists upon, confusion has arisen through his use of the word "doctor" and other descriptive titles. From 1912 to 1914, it appears, he attended a medical course at London University, but he volunteered for the Army before taking a degree. He took a PhD degree at a German university and naturally claims that thereafter he was entitled to call himself doctor. He told the inquiry agent that Mr. Justice Atkinson had assured him he could use the title doctor as long as he did not say that he was a registered medical practitioner. In the recent proceedings against him at the instance of the Medical Defence Union, three summonses related to applications to the Petroleum Board for his petrol ration; in so applying he described himself as "doctor," "medical practitioner," and "surgeon." On another occasion he had certified that Mrs. Emery, having an ulcerated leg due to varicose veins, should have an indoor air-raid shelter and had signed "G. C. Foster, Dr." Yet another summons related to his use of the priority sign "doctor" on the wind-screen of his car. The misunderstanding about the petrol applications he explained as the error of a new secretary; she had typed the words and he had signed the forms without realising that the words were there. He told the inquiry agent that he had personally visited the petroleum office and explained the nature of his work. The magistrates dismissed the six summonses relating to the petrol applications, but fined Mr. Foster £5 for signing the certificate and £5 for the card on his car. Though the bench did not say so, it would plainly help him to dissociate himself from the duly qualified practitioners if he would use the legend "doctor of philosophy," instead of the ambiguous "doctor."

Mr. David Weitzman, counsel for the defence, complained of the number of the summonses, attributing it to the fact that the fines, if any, would go to the Medical Defence Union. He also protested against the "new menace" that applications for petrol coupons can find their way into the hands of the MDU. There is, of course, no privilege attaching to such documents. In

any case it will matter less if Mr. Foster reads more carefully the documents he signs. Lastly counsel made the inevitable reference to the "Herbalists' Charter," the Act of 1542 (34 & 35 Henry VIII, c. 8). If antiquity be significant, there are other statutory references even more ancient. It is declared by Parliament in 1511 that "the science and cunning of physic and surgery (to the perfect knowledge whereof be requisite both great learning and ripe experience) is daily within this realm exercised by a great multitude of ignorant persons of whom the greater part have no manner of insight into same" (3 Henry VIII, c. 11). It was enacted in 1522 that no-one should practise physic "but only such persons that be profound, sad and discreet, groundedly learned and deeply studied in physic" (14 & 15 Henry VIII, c. 5). Mr. Foster can fairly claim that his statute of 1542 represents the wiser second thoughts of the legislature. There is, however, no dispute about the rights of unregistered practitioners to carry on their practice. All that the law asks of them is that they do not blur the distinction asserted in the Medical Act. As this object is evidently the desire of some of the unregistered practitioners themselves, the administration of the law will be the more easy.

## Diphtheria Inoculation and Prejudice

A medical officer of health has drawn the attention of his council to a newspaper statement which plainly could not be left unchallenged. A child died in November, 1941. A year later the parent inserted an in-memoriam notice containing the words "who died from inoculation." The facts were that the child was immunised for diphtheria in May, 1941, and again in June. There was apparently no adverse effect, but, some months afterwards, the child became ill and was sent to the infirmary by the medical practitioner attending the family. The patient was then found to be suffering from a rare blood disease for which there was no known cause or cure. This disease had nothing whatever to do with the immunisation and it was most unfair that death should thus have been attributed to the inoculation. It was also a reflexion on the medical staff of the council and a deterrent to the Ministry of Health's policy of immunisation. At the time of the death, added the medical officer, he had himself had a long consultation with the father who declared that he was not prepared to accept the agreed findings of the medical officer, the general practitioner and the hospital authorities. The newspaper company had admitted that the notice should not have received publicity in that form. The medical officer stated that he had encountered reluctance on the part of parents to bring their children forward for inoculation as a consequence of the belief expressed in the notice; he had therefore made careful inquiries. Asked by a councillor about the figures published by the Anti-Vivisection League, he answered that these referred to very early work when the methods of immunisation were still in the experimental stage. "I do not think," he said, "you will find half a dozen children whom I have inoculated in this way who had one bad night after it; if you ask the child to close its eyes till after the inoculation, most of them cannot point soon afterwards to the place where the needle entered." In reply to the chairman he thought that, in the particular village he had in mind, the newspaper notice and publicity had caused ten or fifteen fewer children to obtain immunisation.

## Parental Carelessness

Another unfortunate case, this time definitely connected with diphtheria, was investigated recently by the East Staffordshire coroner, as a result of the father's complaint that his child had not received proper treatment. There were several children in the family. One of them became ill and a swab was taken. This disclosed diphtheria and the case was removed to the isolation hospital. Soon afterwards a second child was found to be ill and was also removed. Then, on a Saturday, a 15-months-old baby began to suffer from a bad throat and cough. The doctor was summoned by telephone. The child's mother complained that he never examined the baby's throat but said that the baby was all right. As the breathing got worse, she applied capsicum wool and rubbed the baby. Asked by the coroner if, after

seeing the symptoms of the other children, she did not suspect diphtheria, the mother made no reply. She said she telephoned again for the doctor on the Thursday: he came and took a swab and promised to report the result in two days. On the Saturday night the child could hardly breathe and was scarcely conscious. She spoke to the doctor on the telephone but, according to her statement, he said he was not coming that night as he had been on his legs all day. The doctor, in his evidence, said he did not think he could be of service till he got the result of the swab which he expected would be negative. "In a house which must have been reeking with diphtheria," said the coroner, "would it not have been wise to have sent every child away without waiting for a swab?"

The mother, continuing her statement, told how she secured another doctor who had the child removed to the infirmary. She never told him that her two other children had been removed to the isolation hospital with diphtheria. A doctor from the infirmary stated that the baby was admitted in the early hours of the morning. He performed tracheotomy, injected diphtheria antitoxin and ordered immediate removal to the isolation hospital. He did all he could; the child was in extremis and the case was really hopeless.

The coroner observed that doctors were not super-human; they ought at all times to have the fullest information. He blamed the parents severely for leaving the doctors uninformed; "that was just as careless as anything else might have been careless." There had been "a chapter of accidents." Medical men were working under great strain at present. The jury found death to be due to natural causes; there was obvious negligence, they said, on the parents' part; at the same time the doctor first attending the household, having known of the two earlier cases, should have taken the precaution of having the baby removed to a place where proper treatment could be obtained.

#### Finger-prints

The *Solicitors' Journal* comments briefly on the case of *R. v. Berry*, tried at the Central Criminal Court on Feb. 1, when the evidence of finger-print identification seems to have been disregarded. Berry was charged with breaking and entering. The prosecution produced a print made by the third finger of the right hand of the supposed burglar on a brandy bottle in a room which was ransacked; this was compared with prints of Berry's fingers, taken while he was in custody; an expert showed that the prints corresponded. The burglary was in June; Berry was not arrested till December. He gave evidence at the trial that, on the day of the alleged robbery, he was in Leicester. The defence submitted that, apart from the alibi, the identification was insufficient. The print on the bottle, it was said, was smeared and did not correspond with the print of Berry's finger. The judge told the jury that, for all practical purposes, the finger-print system was accepted as a certainty, and that the defence was challenging its whole basis. The jury, instructed to study the prints carefully before reaching a decision, acquitted Berry. The legal journal recalls an earlier case, at Birmingham assizes in 1908, where an alleged burglar had left the imprint of one or more of his fingers on a champagne bottle and there were twelve identical ridge characteristics in the two sets of impressions. Bigham, J., was seemingly reluctant to let the case rest upon finger-print evidence alone. He twice invited the jury to acquit; they nevertheless convicted. As our contemporary points out, only an expert can say positively whether a print is so similar to an earlier print that it must be from the same finger, or whether it is not so smeared as to be of doubtful value. Cases may occur where an expert witness fails to command the confidence of judge or jury or where he may convince the one but not the other.

FACULTY OF RADIOLOGISTS.—At 2 PM on Friday, March 19, at 32, Welbeck Street, London, W.1, the therapy section of the faculty will hold a joint meeting with the British Institute of Radiology and the Faraday Society. There will be a discussion on the physical and chemical action of radiations in relation to their biological effects and the opening speakers will be Mr. D. E. Lea, Mr. C. B. Allsopp, and Dr. J. S. Mitchell.

## In England Now

### *A Running Commentary by Peripatetic Correspondents*

WHENEVER I become a patient and go through the routine of gastric investigation I am struck by the care taken to make the conditions as different as possible from those of daily life. Take a hypothetical navy who smokes, drinks and eats like a chimney, fish and navy respectively. He is all right on Sundays, and on working days till tea-time, but then he feels uncomfortably full and gets more and more bellyache till bedtime brings vomiting and relief. When he goes into hospital he is rested in bed for a day or two on "Sippy One" diet with no alcohol or tobacco. Then, on an empty stomach, he is nauseated by a Ryle's tube, given a "meal" unlike any he had at home, and made to lie and watch fractions of it being pumped up throughout a morning duller than a wet Sunday, with still no smokes or beer, but none of the cares of home. When the radiologist's turn comes our navy, having reached undreamt of heights of inner cleanliness, is starved, terrified by Wellsian machines humming and crackling in the dark, and told to swallow an unseen something, neither fodder nor tippie but a scented sliminess between the two. This second so-called meal passes self-consciously down an empty gut, like the Lord Mayor's coach through City streets, watched by an awestruck mucosa which has never seen its like before. All observations cease by tea-time, when our navy's bellyache was wont to start. Ah, you will say, we are studying gastric function under standard conditions, with complicating factors removed. Agreed; but sometimes these eliminated factors must include the cause of the trouble. Should not the test conditions resemble those under which the sufferer suffers? Should not a navy's test-meal be 50% bloater-paste, with vinegar and pepper to taste, and his barium meal be fish and chips with barium sauce, washed down with radiopaque old and mild? I would make the almoner assess the patient's home environment when she assesses his capacity to pay and would employ a noises-off expert to imitate it, so that our navy would take his meals in a corner of the children's casualty department and follow them with his usual pipe of shag and a hard few hours in the hospital furnace-room. No? Well, don't blame me if you miss this bloke's pyloric spasm altogether.

Most of us who are, according to the late Sir Henry Head, visual thinkers need reliable pictures on which to base our thoughts. Until the other day when I went down a pit I had only the grim picture of a recently injured miner once seen in hospital and some novel and newspaper descriptions of mining as the substrata of my reflections on the coal problem. But now I have received direct impressions of a modern coal mine and the sound of the manager's quiet voice saying (in answer to my question) "We've had two men killed and eight or nine with compensatable injuries in the last three years," and the sight of dozens of healthy, sturdy men who grinned and spoke to me as I crawled along the coal face has given balance to my morbid dramatic thinking on the subject.

The initial procedure is basically the same as for gaining entrance to a hospital operating theatre. If one is outside "the trade," acquaintance with a locally influential person is necessary and after arrival there are very similar anteroom preliminaries: coat and waistcoat and collar and tie come off and overalls and rubber boots go on; for the head there is a feather-weight helmet, and I would sooner suffer the surgeon's wrath for forgetting to put on my mask than take the knocks my head would have received but for this protective device.

A pit cage is a crude affair compared with a modern city lift; instead of fitting snugly into its shaft it hangs, loosely guided by cables at its four corners, in the centre of a wide brick-lined well; it is ungated and (except for the light of our lamps) unlit, and each man holds the rail as it drops non-stop to base. But in silence and speed it is unsurpassed by 'Otis' products, and anyhow they lack the cheerful way of bouncing like a ball on an elastic string at the end of the drop.

Once away from the shaft we set off down dark, rough lanes, treading among the lines, sleepers, cables

which haul the coal trucks, water and compressed-air pipes and electric power lines. The distance to the coal face was only about half a mile, but quite far enough in the circumstances to confirm my sympathy for the miners who must, after reaching the entrance to the mine, still walk in some pits 2 or 3 miles before and after each shift. The walls and roof of these lanes were supported by U-shaped arches of heavy I-section steel placed 3 or 4 ft. apart and behind them was a skeleton of rough timber which held back the loose rocks; but so great was the pressure that there had been many small falls, and where the steel had been long in position it had been bent and twisted out of shape and was slowly letting the roof down even in places by as much as 3 ft. This part of the mine was dry and the air was cool and fresh. Surprising, but welcome, was the freedom from industrial noises. The enormous mass and irregularity of the surface of the walls absorb all sound, and until one comes almost up to it there is no warning of any activity. We arrived at the upper end of a sloping seam only 3 ft. thick so it was necessary to crawl on hands and 'Sorbo' rubber knee-caps for its width of 50 yds. On one side lay the rich solid seam of coal shining black in contrast to the dull grey shale walls elsewhere, and on the other side, disappearing into darkness, was the space from which the coal had already been worked; only the part immediately behind the miners was propped, the intention being to let the roof fall in behind and so relieve the pressure forward over the working area. Some of this dead space had been filled with rubbish excavated in the approaches and at least part of the problem of what to do with the unsightly tips at the mouth of every coal mine is to be solved, they say, by mining operations planned to extend this practice of returning all the rubbish to the coal space.

Working a length of 3 or 4 yards each the miners knelt or squatted, picking carefully at the coal and shovelling or lifting the lumps as they fell down on to a conveyor close at his back. The task had been lightened by a machine cutter which between shifts undercuts the seam for a depth of 4 ft. thereby allowing the whole seam to fall an inch or so from the roof in a clean line of cleavage. The men worked easily and steadily without sweat or strain, and most of them had time for a word with the manager and "the stranger" he had brought with him. The older men were particularly proud of the length of time they had been working below ground—some for 20 and 30, and one for 40, years. None of them would agree that this low ceiling was any handicap; indeed, such is man's adaptability that several insisted that it was the ideal height to work in. The roof was smooth, almost like black marble. Said one man, tapping it and getting a good ring, "Ah, that's a fine roof." "Yes," said a second, "and it might fall down this minute." "That's true," replied the first, "there isn't such a thing as a safe roof. Still, this is a good 'un."

The first conveyor was a beautifully simple device consisting of a broad steel gutter riding on logs as it was jerked backwards and forwards by a compressed-air motor. As the coal fell on it it was jolted slowly downhill until it fell off the end of the gutter on to a belt conveyor which carried it up, to fall automatically into small trucks, strangely called "trams" and, more strangely, when coupled up to make a train of a dozen or so called "a journey." The rest is simple. Massive machinery picks up and tips out the ton of coal each tram carries as easily as if it was a basket of blackberries; it is then carried rapidly by another belt conveyor past the pickers, who take out any accidental pieces of rock, and so drops into a railway wagon ready for the market.

We rustic practitioners who are now "looking after" evacuated prep. schools are constantly being astonished at the range and development of fancy—I nearly said fanciful—therapeutics. Many of our little treasures return to school having been "thoroughly overhauled" during the holidays by some specialist or other with instructions that they are to receive bi-weekly injections of, or tri-daily dosage with, this or that proprietary remedy the name of which I, for one, have never heard and can seldom pronounce. I suppose it's all good for

trade, as we used to say in the old days. We have our sad victories, however. One lad turned up with a bunch of enlarged cervical glands. Some learned gent, having laid skilled fingers on these—tactus eruditus, you know—had firmly pronounced them to be non-tuberculous and "nothing to worry about." He was half right; the glands were certainly non-tuberculous but proved, on microscopic examination, to be Hodgkin's.

My wife was in Woolworth's the other day when a woman pushed past her, and as she did so, slipped a piece of paper into her hand. The woman hurried on in the opposite direction. Then my wife noticed standing about a yard away another woman whose clothes and general build were almost identical with her own. In a moment, she realised what had happened. The first woman had delivered her secret message to the wrong person. Her first thought was whether she could nab both spies at once, but by this time the deliverer of the message had vanished. She decided to concentrate on the second woman, to trail her out of Woolworth's, and to hand her over to the first policeman she met in the street. It was at this point that she cautiously glanced at the message, hiding it behind her bag. It was a shopping list—and I'm pleased to say that Mrs. Brown did get those clothes pegs and washing soda for Mrs. Smith after all.

Not far from my home there is a water-meadow where I sometimes go to wait for mallard fighting in to feed at dusk. To reach my hide I have to splash through water about a foot deep taking care not to step into any of the numerous interlacing drains which would take me well over my gumboots. At intervals I flush snipe but refrain from shooting at them because (I tell myself) I don't want to scare off any duck that might be coming in. The real reason is, of course, that I begrudge spending cartridges nowadays on these small and elusive birds. Having arrived I put on my balaclava helmet not so much for warmth as to conceal my bald head—and wait. More often than not—much more often than not—no duck come; but I watch the rooks at flight and sometimes see a heron or two (or even three). Later come the peewits crying like lost souls and wheeling drunkenly overhead. Lastly, if I'm lucky, I hear and see duck—never more than a dozen and sometimes not more than a pair. On my best evening this season I had ten chances—and picked up one solitary drake, a handsome fellow in full plumage and very good on the table. A nice, quiet place is my water-meadow, singularly remote from patients and telephones. I shan't tell you where it is.

Last September I took out the tonsils of the local practitioner's daughter, and on Christmas day she called to give me a book in gratitude—*All Trivia* by Logan Pearsall Smith. We had discussed books when she was convalescent and she had marked this down as one I had not got. She had not liked to write in it till she knew I would wish her to; but when I had asked her I saw her looking at it before she wrote and then I found within: "If you are losing your leisure, look out! You may be losing your soul." It is one of the "After-thoughts" from the book. "Is that a description of me?" I asked. "Well" she said, "perhaps a warning." Thus are the young today striving to educate their elders, which is very meet, right and their bounden duty. It is the only way to keep our minds alive; and is I think a discovery of this generation. My son is trying to do the same thing. He has invented a "Fatherson" book club. Each of us nominates three books every three months; and the other must read one of these. It is his idea to get me away from Dr. Johnson and other old fogies into the literature of today, and elaborate rules are made to prevent me luring him back to them. I shook him by starting him on a newer work than any he had up his sleeve—Professor Nevins's *Brief History of the United States*, compact, concise, and readable. We English know so little of the history of the States that it is well to begin with a short account. Then I lured him back to Stevenson with *Weir of Hermiston*. He went mad over it. The story, the character-drawing and the English alike inspired him. I shall get him back to Johnson in the end.

## Letters to the Editor

### THE NEUROTIC EX-SOLDIER

SIR,—I fail to see any association between Dr. Lewis's article and "Devon Doctor's" letter. The latter describes an amoral man of mentally defective stock who has been discharged from the RAF after 12 months' service. He suggests that this man should be sent to Dartmoor for the duration of the war. It would seem irrelevant whether he is in Dartmoor or under the care of a neighbouring practitioner; either location would have advantages.

Dr. Lewis, on the other hand, has drawn attention to the serious reduction of earning capacity in a group of neurosis cases who had served in the Army and who had subsequently had treatment in one of the best psychiatric centres in the country. The moral lies in the lack of facilities for intermediate treatment for these cases. Many patients discharged from the Services on account of neurosis are well able to adjust to civil life, but a substantial minority break down under the stress of industrial life and become a problem to society. The sudden transition from a neurosis centre, with its ordered life and supervision, to the long hours and exacting conditions of a factory is more than many of these men can withstand. The problem is well known to industrial medical officers, and I know of one large aircraft factory where men discharged from the Services for neuroses are often refused employment, or if taken on are only put on unskilled work, because they are found to break down so often in skilled or semi-skilled occupations. Many of the men refused work in this way are ex-members of bomber crews who have carried out repeated raids over enemy territory. If this policy spreads—and it certainly will in present circumstances—a serious social problem will be created after the war.

The solution lies in the establishment by the Ministry of Labour of residential training centres under psychiatric control, and equipped with full-scale workshops where training can be carried out and productive work done. Hours of work would be progressively increased and current wage rates paid. The patients would learn a skilled trade according to their past experience and special aptitudes. Psychotherapy, organised recreations, and physical training would be provided, and careful placement ensured. In some cases men might well continue to live in the training centre for some weeks after starting work in the outside world. The average stay in such a centre would be about three months, and cases from all three Services would be admitted.

Apart from the humanitarian aspect, the nation would be the chief beneficiary from this development; in the postwar years we shall need every skilled worker available and will be in no position to allow a substantial number to deteriorate in the way described by Dr. Lewis.

London, N.W.7.

T. M. LING.

### HOSPITAL VISITING

SIR,—In your most excellent leading article this week, you mention four "assumptions" in the way of amenities for patients in hospital. They are daily visiting, privacy, supper, and a wardrobe. The first two may be regarded as major amenities, and the last two as minor, perhaps, but most people concerned with hospital development will feel that all four of them should, and can, be reasonably satisfied in future, even in the case of general wards—and that without very greatly adding to the weekly cost.

But I write now to draw attention to the fact that the greatest amenity of them all—daily visiting—can be provided without any cost and forthwith. The North Middlesex was the first hospital in this country to introduce daily visiting, in 1937. It has been a great boon all round. To the patients and their relatives, it has brought pleasure and content, and to the staff it has given a really adequate means of keeping the patient's family in touch with his day-to-day progress.

It is not "impossible for the wards"; all that is needed is for the medical and nursing staffs to put their heads together and choose one half-hour a day when every patient may have one visitor. In any hospital a fairly slack half-hour can be found in the evening—it will generally coincide with some of the nurses' supper-time,

when routine work is at a low ebb. Hospital committees will be sure to embrace the idea with enthusiasm, once they are told by the staff that it can be done.

Here we have found 7.30–8 PM a very good time. On Sundays the times may with advantage be different, and in provincial hospitals it will no doubt be found useful to have a special midweek visiting period for country visitors.

And it is not "a nuisance having visitors every day"; what was a nuisance was the old practice of having hordes of visitors in relays during two whole afternoons a week, wearing out the patients, cluttering up the corridors, and generally paralysing the whole work of the hospital.

North Middlesex County Hospital.

IVOR LEWIS.

### THE NURSE'S PAY

SIR,—At a recent meeting of the Middlesex County Medical Society the recommendations of the Rushcliffe Committee on nurses' salaries were discussed.

This society has a membership of approximately 200 doctors, most of whom are clinicians in the whole-time employment of the Middlesex County Council, and include the medical staffs of seven large general hospitals and two sanatoria, with a total bed accommodation of 8472.

There was a unanimous feeling of dissatisfaction with the recommendations of the report in respect of the remuneration of ward sisters and its effect on their status. The members consider an efficient ward sister to be a most important person in the satisfactory treatment of patients, in the training of the student nurses, and in the scientific advancement of medicine. These facts will be readily agreed by all who have an intimate knowledge of hospital practice and it was regarded as deplorable that no ward sister was a member of the Rushcliffe Committee. The deliberations of the committee were felt to be influenced by the undue representation of the administrative hospital staff. It seemed obvious to the society that the upper limit of the ward sister's salary had been regulated so that in no instance should it exceed that of an administrative sister in small hospitals. This was felt to be quite unjustifiable.

It was suggested that the minimal salary scale of a ward sister should be that proposed by the Committee of the Royal College of Nursing in 1941 (£150, rising by increments of £10 to £250 per annum) exclusive of emoluments. These emoluments should not be less than those of the administrative sisters and they should be such as to encourage all trained staff to live outside the hospital. At present non-resident emoluments are based upon the cost of mass catering and accommodation in an institution; it should be quite obvious that no reasonable non-resident accommodation can be obtained at a comparable figure.

The society, therefore, wishes to place on record its dissatisfaction with the Rushcliffe Committee's recommendations, especially in regard to ward sisters. They feel it may deter the right type of girl from entering the nursing profession and prevent the good ward sisters from looking upon ward work as a position of honour in the profession. They feel it will stabilise, for years to come, her position of inferiority and prevent that co-operation which is so necessary between the clinical and administrative sisters.

London, N.W.10.

H. JOULES,  
Chairman.

### A NURSING PROBLEM

SIR,—Dr. Gibson's letter and Dr. Trayer's remarks to the Tuberculosis Association reported in your last issue will have struck a responsive chord in the heart of every sanatorium physician. The shortage of domestic staff in these institutions is one of the most serious problems with which we have ever been confronted, and little is being done by the Minister of Labour to ease the situation. Nevertheless his colleague, the Minister of Health, has launched his campaign against tuberculosis with the full co-operation of the medical profession; and it is obvious that as a result of this campaign we shall be faced with an ever-increasing demand for sanatorium accommodation.

Emphasis has been placed upon early diagnosis, costly material is being distributed over the country, and suitable personnel are being trained in its use. The unfortunate early case, diagnosed and recommended for treat-

ment, is surely entitled to receive this treatment as expeditiously as possible. At present the domestic staff necessary for the provision of treatment is not available, and if steps are not taken promptly to remedy the situation we can visualise the wrecking of the praiseworthy efforts of our health authorities. This possibility of itself should be sufficient to warrant the inclusion of this service in the Essential Works Order and we would add our plea to that of Dr. Gibson that powers be given to the Ministry of Labour now to direct sufficient numbers of women to domestic service in sanatoria and hospitals. If the pill of compulsion requires a sugar coating, we would suggest that a pension scheme be adopted for any of those unfortunate enough to contract tuberculosis while engaged in this work. We are convinced that few such grants would be necessary.

R. Y. KEERS.  
B. G. RIGDEN.

Murtle, Aberdeenshire.

### ARTIFICIAL RESPIRATION

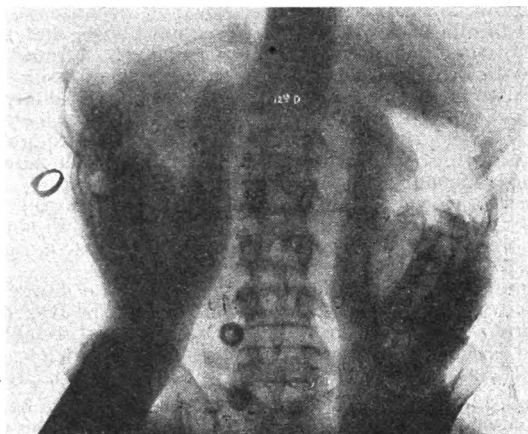
SIR,—Your excellent and reasoned leading article (Feb. 6, p. 178) draws attention to the fact that variations in the build of the subject and in the technique of the operator might well account for the different results obtained on different occasions. These comments especially apply to Schafer's method. There is general agreement that in an emergency when no special apparatus is available Schafer's method is the most efficient, and over long periods of time the least tiring to the operator. It is, however, of paramount importance that the technique of the method should not vary from that originally laid down, especially if the best results are to be obtained. From my own experience and that of others it is evident that at the present time operators, in spite of having had careful instruction, sometimes fail to recognise the importance of the correct position of the hands when practising the method. That this is not a new departure is revealed by correspondence in my possession between the late Sir Edward Sharpey-Schafer and other investigators. It shows that a similar difficulty loomed large in the past. It may be opportune, therefore, to attempt to clarify a few of the issues about which there may be doubt.

The view is sometimes held that in the prone-pressure method of artificial respiration manual compression of the lower thorax largely contributes to direct expulsion of the air from the lungs, and that inspiration is mainly caused by virtue of the elasticity of the thorax walls. This opinion may possibly be responsible for the tendency to place the hands too high. In this connexion I quote Sir Edward Sharpey-Schafer: "It is expressly enjoined that the hands should be placed as low as possible on the back: the wrists should be over the loins, the fingers over the lowest ribs." Again:

"The efficiency of the method mainly depends upon compression of the abdomen against the ground. This it is which, in the main, produces expiration, by forcing the abdominal viscera against the diaphragm, which is bulged towards the thorax and thus expels air from the lungs. On releasing the pressure, the compressed parts recover their position by virtue of their elasticity, the diaphragm descends along with the viscera in contact with it and air re-enters the chest. Some part, no doubt, is played in this process by concomitant change in the bony and cartilaginous thoracic parietes, but this part is subsidiary to the movement of the diaphragm."

With regard to the mechanism, Dr. Argyll Campbell (*Brit. med. J.* 1940, i, 909) raises the pertinent question as to whether "the diaphragm is slack enough for this or whether it is stretched by this pressure, or whether also the compression of the lower part of the thorax slacks off the diaphragm so that it can be pressed up by the abdominal viscera." His suggestion that X-ray examination will probably be necessary for the complete elucidation of the mechanism should be implemented. The difficulties of such an investigation are formidable but not insuperable. It would be necessary to conduct the X-ray examination on persons in apnoea, to record the blood-pressure, and to determine the effects of carbon-dioxide administration on the position and on the resistance of the thorax and diaphragm to artificial ventilation. Diaphragmatic tone is surely an important factor. It might well be that slight alterations in the position of the hands during compression would influence these factors.

These remarks are made, not because I consider that instruction in Schafer's method is inadequate, but for the reason that if more stress is laid upon the mechanism whereby ventilation is brought about, the necessity for placing the hands as low down as possible on the back becomes evident. They are made too in the hope that more elaborate studies than have been made hitherto



will throw further light on the mechanisms involved in Schafer's method.

The accompanying radiogram, which has not been previously published, is of interest. It shows the hands of Mr. J. Pirie placed by Sir Edward Sharpey-Schafer in the correct position for artificial respiration by his method. Mr. Pirie acted as assistant to Sir Edward when the original investigations were carried out. His fingers are long and the subject for artificial respiration in this case was of rather slight build; hence the fingers overlapped the lower ribs to a somewhat greater extent than usual. The heel of the wrist immediately anterior to the iliac crest is well shown.

Medical Research Council  
Physiological Laboratory, Dorset.

I. DE BURGH DALY.

### STATE CONTROL

SIR,—Your annotation of Feb. 20 on the MOHs' plan acknowledges that the scheme is not so simple as it looks. The GP is apparently to be compelled to work in health centres. In other words, in spite of the patients being free to choose their family doctor, within this totalitarian scheme the doctor is to lose his individuality and freedom, and a third party—the bureaucrat—is to come between him and his patient. Your views in the following issue (p. 271) about the patients having to steel themselves to public wards and being examined by students are relevant and show that under state control we are to be disallowed the privilege of even dying in one's own home or a private ward. The private wards and blocks are a boon, as in America, and I hope always will remain.

Gloucester Gate, NW1.

RUSSELL STEELE.

### INFANT AND MATERNAL MORTALITY

SIR,—Your reviewer (R. M. T.) questions whether my numbers in certain groups are adequate to support the conclusions drawn (*Lancet*, Dec. 5, 1942, p. 678). In no case do I give a table from which the numbers involved could not be deduced by a little very simple arithmetic. The criteria I used were those used by the Registrar-General in his 1911 special report on fertility and in no case did I draw conclusions from numbers less than those ordinarily accepted by statisticians.

Men were only described as unemployed when they had severed all connexion with their place of employment; among the young men, fathers of new families, these were the 5-6% referred to. Underemployment did however mean that the 80% of the total population engaged in industry exposed to unemployment had, on the average, incomes much below £3, and many in fact were better off on relief than in part-time employment. But to determine the exact amount of unemployment and the income for each father would have entailed a

monthly if not a weekly visit. A hundred health visitors with 50,000 children under their care could not hope to pay monthly visits to 17,000. I could not do this either, because county Durham is very extensive and I am no Atalanta.

Since I did what no-one else has ever done, it cannot fairly be said that my findings about housing and health differ from those of other people. I divided the overcrowded into those overcrowded because several small families were living in the same house, and those overcrowded because the family was large. I found that those first children who were as overcrowded as-children, in the worst of the large families had the extremely low death-rate of first children—that is to say, the death-rate followed the place in family and not the degree of overcrowding. This may be unpopular with housing enthusiasts, but that does not make it untrue.

Your reviewer says I am mistaken in supposing that family limitation has not spread to all ranks and classes, but, on page 11, I state in heavy type that it has so spread.

Finally, he says that my statement re the dangers of the life of miners' wives is not borne out by the Registrar-General's decennial supplement. But the statement is based precisely on the figures from that Report (Occupational Mortality 1931) given in my table LXVI, p. 210.

On p. 221 the Registrar-General gives the number of hewers, in each age-group, and the deaths among them in the three years 1930-32, from each cause. On pp. 222 and 224 he gives the same information for all mine-workers in the two classes: workers below ground other than hewers, and workers above ground. On pp. 272 and 273 he gives the figures for the wives of these workers. I calculated from these figures the total death-rate per 1000 per annum, the rate from non-natural causes (accident and suicide) and the puerperal death-rate. I give figures for the groups separately, since it is among the relatively well-paid hewers (the Registrar-General's class III) that the excess death-rate among wives is found; whereas there is hardly any excess in class IV lower-paid sections. The hewers are presumably chosen from healthy men, as their natural death-rate is extremely low, but their high accident rate gives them a high total death-rate. That the death-rate for their wives is higher still is all the more impressive, though the accident rate among them is as negligible as among other women.

The figures for hewers dominate the figures for the industry. Of a total of 575,321 mine workers, between 15 and 45, 302,969 are hewers, and of 331,261 mine workers' wives of that age, 206,545 are hewers' wives. If the total rates are calculated for all mine workers and their wives, we get for each age-group the following figures:

Age-group	Death-rate per 1000 per annum			
	15-19	20-24	25-34	35-44
Miners	3.4	3.8	4.2	6.4
Wives	5.1	4.8	4.5	5.6

Somewhere between the age of 35 and 45 the death-rate figures for the two sexes cross and if the curves relating death-rate to age are plotted for husbands and wives, it is found that they cross at about the age of 40; 98% of all births occur to women below the age of 40. At all stages between 15 and 40 the death-rate of miners' wives is higher than that of miners. So I assert again, basing my statement on the Registrar-General's decennial supplement, "that despite the specific industrial hazards of the miner, during the reproductive period, it is more dangerous to be a miner's wife than to be a miner."

The high death-rates among women at the reproductive period relative to those of men, wherever the birth-rate is high, whether this is in a primitive peasant community or in a highly industrialised civilisation emphasises that the figures we attribute to puerperal mortality are only a small fraction of the total biological cost of reproduction. Now, when our health services are in the melting pot, is the moment to recognise clearly that the problems of mammalian reproduction are interwoven with every part of the individual's life, and their solution demands the attention of the best brains. At the moment we are a healthy community to the extent,

precisely to the extent and only to the extent, that we are a dying race.

Newcastle-on-Tyne.

C. M. BURNS.

\*\* We have submitted this letter to R. M. T. who replies: "Any attempt to compare the mortalities of miners and miners' wives is complicated by the age factor. What is really required is the standardised death-rate at ages 15-44; an index which it is not possible to compute from the Registrar-General's tables. The deaths of miners and their wives are differently distributed over the four age-groups. Thus, among wives only 12% of the total deaths at ages 15-44 occur among the first two age-groups, as against a proportion of 27% for miners. The statement in my review was based on table 7 of the Registrar-General's occupational mortality report for 1931, namely:

*Percentage ratios of the 1930-32 mortality-rates (all causes) of males to the corresponding rates for married women of the same social class or occupation (husband's) group.*

	Ages	20-24	25-34	35-44	45-54	55-64
Hewers and getters	64	81	111	129	114	
Other workers below ground	103	121	118	117	121	
Workers above ground	117	118	136	134	127	

Bearing in mind the difficulties of age-distribution I do not think that the conclusion drawn from these figures by Mrs. Burns is completely justified. That the mortality ratio of married women to men is much closer in the coal-mining industry than in many other large occupational groups is, of course, not in dispute. Apart however from the inconclusive evidence for ages 15-44 the risks of reproduction do not stop at age 45, as Mrs. Burns recognised in her apt question 'When is a dead mother not a maternal mortality?'

"I fully appreciate the tremendous amount of labour involved in Mrs. Burns's investigation and can only repeat what I said in my review that 'the study has been made in a courageous and pioneering spirit and brings a great deal of material under review.' I felt it necessary, however, to draw attention to some of the statistical difficulties, as medical people and other readers do not usually trouble to translate tables of percentages into actual numbers."

PREVENTION OF VENEREAL DISEASE

SIR,—I see that the Archbishop of Canterbury has expressed exactly those pious wishes and moral platitudes on the subject of VD prevention which we have come to expect of the Church. But if the Church is afraid to do more than piously deplore immorality, the medical profession at least should have the moral courage to offer the public realistic advice of a scientific nature.

The Department of Health for Scotland has been widely advertising in the papers "Ten plain facts about Venereal Disease." No. 7 reads:

"Clean living is the only way to avoid infection: abstinence is not harmful. Free and easy sex behaviour must mean a risk of infection and cannot be made safe. An infected person may convey the infection to an innocent partner."

I do not question this statement but would it not have been wise, helpful and scientifically correct to have added:

"If abstinence is not possible a condom intelligently used will give a high degree of protection. Ask your doctor about this"?

Does the Department of Health for Scotland omit this additional advice because it is afraid of the inevitable protest from the Church? Does a certain well-known firm of chemists refuse to sell condoms for the same reason? If this is the explanation then logically the Church, on account of its prudish outlook, must be held directly responsible for much of the war-time increase of venereal disease amongst the civil population.

Be that as it may it is the clear duty of the medical profession (and this includes the medical advisers to the Ministry of Health and the Department of Health for Scotland) to give the public full knowledge about VD prevention, and at present this duty is not being carried out, and therefore for all practical purposes we doctors are acting as accessories to the crime of spreading VD. When are we going to clear away the cobwebs,



open the shutters and let in the light on this subject? Why must so much prudery, hypocrisy and cant surround and shroud venereal disease?

Edinburgh.

SHAKESPEAR COOKE.

SIR,—I beg leave to repeat a question which I asked during the controversy on VD in the war of 1914–18. What is the ethical difference between (1) instructing men who contemplate extramarital intercourse as to how they may prevent infection and (2) informing them that, if infected, early and adequate treatment will cure them, and where to obtain such treatment? Like the protagonists of twenty-five years ago the clerical contributors to the discussion on health education and VD (March 6, pp. 313–4) ignore the fact that the danger of promiscuity has been preached for 2000 years. One of them is reported as stating that continence and control are part of human nature. It is difficult to reconcile this with St. Paul's recommendation (I Corinthians) of marriage to those "who have not the gift of continency."

Devoran, Cornwall.

JAMES H. SEQUEIRA.

## Parliament

### ON THE FLOOR OF THE HOUSE

MEDICUS M P

THE House listened on Wednesday of last week to an enthralling narrative of the exploits of our Navy and of the position at sea in general. It had been suggested that the year under review did not afford many high lights in naval history. My short summary shows, said Mr. Alexander, that the Royal Navy has been full of them. And they would have been impossible without the courage and selfless endurance of the officers and men of the Merchant Navy. Remembering the U-boat campaign and the war in narrow seas, it must be accepted that the risks and hazards would increase. Mr. Ammon, who followed, stated that the critical period of U-boat warfare would be the next six months. Mr. Walter Edwards ("Stoker Edwards") added colour and vigour to the debate, speaking as one who had served 3 years at sea during this war on the dangers of the slow ship and on the work of rescue carried out by the smaller naval ships on convoy duties. Dozens of ships, he said, have been lost because of the slowness of convoys.

Admiral Sueter followed with more vigorous criticism and Lieut.-Commander Brabner had begun to speak when he was brought to a sudden and unexpected halt. The Deputy-Speaker (Colonel Clifton Brown) was in the chair, a message was brought in to him, he rose in his place and called "Order Order." The Serjeant-at-Arms advanced from his place to the table and removed the Mace. Then the Clerk-Assistant—one of the three bewigged men who sit immediately in front of the Speaker's chair—rose and said in a deep voice, controlled at the moment with difficulty, "It is with extreme sorrow I have to inform the House that Mr. Speaker died this afternoon." The House was full and hushed to complete silence. (When the Speaker dies the whole machinery of the House of Commons comes to a standstill; he embodies and is the guardian of the principle of the sovereignty of the people.) The Clerk-Assistant rose again but did not speak, he pointed with outstretched hand and arm to the Leader of the House, Mr. Anthony Eden. And Mr. Eden rose and spoke of the tragic personal blow each member had suffered, for the Speaker was a man whom every member had come to regard as a personal friend. On behalf of the House he would send a message of sympathy to Mrs. FitzRoy. In this members of other parties concurred and the House adjourned in silence.

For a century and a half no Speaker has died while holding office. Captain FitzRoy's death now swings wide the doors that open on the long vista of the history of hundreds of years and of the many parliaments of past centuries.

Mr. B. B. BULL asked the Minister of Health if he was satisfied that sufficient maternity homes existed to meet the requirements of the mothers ready to use them; and, if not, whether he was taking any steps to encourage their establishment.—Mr. E. BROWN replied: Steps are being taken to encourage the establishment of further maternity beds in London and in other places where they are urgently required.

### QUESTION TIME

#### Safe Milk

Dr. RUSSELL THOMAS asked the Parliamentary Secretary to the Ministry of Food what steps his department separately, or in conjunction with the Ministry of Agriculture and the Ministry of Health, had taken to ensure a clean, fresh and sound milk-supply for domestic consumption.—Mr. W. MABANE replied: The Minister, in consultation with the Minister of Health, the Secretary of State for Scotland and the Minister of Agriculture and Fisheries, is giving consideration to the steps which could be taken at the present time to provide the public with the maximum quantity of safe milk. He is also consulting representatives of producing and distributing interests. I am not in a position at present to make any statement on the subject, but I hope it may be possible to make an announcement of the Government's intentions at an early date.

#### Pasteurisation of Milk

Mr. G. W. RICKARDS asked the Parliamentary Secretary in view of the increase in the death-rate in London of 67%, alleged to be due to non-pulmonary tuberculosis in 1941, as compared to 1938, if he would refuse to make pasteurisation compulsory in London, as this death-rate was higher than the average rate in the country, where the proportion of raw milk drunk was higher.—Mr. MABANE replied: The question appears to rest on the assumption that non-pulmonary tuberculosis is due wholly or mainly to tuberculous infection of the bovine type and that its incidence is therefore an index of the amount of bovine infection. There is no evidence for this assumption. It was estimated before the war that only 30% of the cases of non-pulmonary tuberculosis at all ages were due to bovine infection, and it is to be expected that since the outbreak of war the incidence of non-pulmonary tuberculosis should have increased more in towns where the risks of human infection are greater, and are accentuated by war conditions, than in the country. The statements referred to do not bear directly on the question of pasteurisation.

Dr. RUSSELL THOMAS: Are any steps being taken to advertise the pasteurisation of milk.—Mr. MABANE replied: No.

#### Miners Medical Service

Mr. STEPHEN DAVIES asked the Minister of Fuel and Power in view of the importance attached to the development of the miners medical service in the various coalfields, if he would publish at an early date the report of the interdepartmental committee or arrange for the full summary of the committee's proposals to be made accessible to members of Parliament.—

Major G. LLOYD GEORGE replied: The report was made to me by a number of officials of different departments under the chairmanship of the joint parliamentary secretary. I can see no reason for departing from the usual rule that such reports to ministers are confidential. The report was fully summarised by the joint parliamentary secretary in his statement to the House on Oct. 1, and I do not think any summary which I might issue would be an improvement on that statement.

#### Rehabilitation of Miners

Mr. BERNARD TAYLOR asked the Minister what progress was being made in regard to rehabilitation services in the mining industry.—Major LLOYD GEORGE replied: Responsibility for ensuring that rehabilitation treatment is available for injured coalminers has, at the request of the Government, been undertaken by the Miners Welfare Commission and under war conditions it is a big and difficult task. The commission's first step was to investigate, in association with the health departments and the district miners welfare committees, to what extent existing accommodation and facilities could be made to serve the purpose. Where that has been found impossible, the commission is taking steps to obtain and adapt other premises, and to recruit and train the necessary staff. Centres are already in operation for six coal districts; the centres for the four Scottish districts being provided by the Department of Health for Scotland. Premises have been acquired for three districts and are under negotiation for seven districts, while in three districts the problem is before the district committees. The remaining six districts are too small to have special centres and will be fitted into the scheme as it develops.

#### Tuberculosis in the RAF

Sir REGINALD CLAREY asked the Secretary of State for Air whether a man serving with the Royal Air Force was immediately discharged if he was found to be suffering from tuber-

culosis; and what was the maximum period for which he would be entitled to receive his service pay under such circumstances.—Captain H. H. BALFOUR replied: Airmen found to be suffering from tuberculosis are retained in the Service and remain on pay during treatment if there is a reasonable probability of their becoming fit for duty within 9 months in the case of trained personnel or 4 months in the case of those still under training. Airmen who are to be invalided from the Service are granted 28 days' leave with pay before being discharged.

#### Prenatal Benefit

Mr. W. BROWN asked the Minister of Labour whether he has considered the recommendation of the Select Committee on National Expenditure that, as a war-time measure, the woman worker insured against unemployment should be eligible for unemployment benefit for two months before confinement and for a suitable period thereafter; and whether he is now prepared to take steps to extend eligibility for unemployment benefit to all such workers for a period prior to, during, and after confinement, to be determined after consultation with the Minister of Health?—Mr. G. TOMLINSON: This suggestion is mentioned in ¶ 48 of the committee's third report, session 1942-3; the committee make no recommendation on it. Unemployment benefit in such circumstances would not be appropriate as the qualifications for the receipt of that particular benefit would not be fulfilled: a claimant to unemployment benefit must be available for and capable of work in addition to being unemployed.

#### Protection of Panel Practices

Sir ERNEST GRAHAM-LITTLE asked the Minister of Health whether he would give the text, the date and the legal authority for the amendments of National Health Insurance Regulations, 1936, empowering insurance committees to give effect to the arrangements described as voluntary, embodied in the British Medical Association's Protection of Practices Scheme; and, inasmuch as these amendments had resulted in material restriction, as shown in examples submitted to him, of the insured person's statutory right under the Insurance Acts of free choice of doctor he would reconsider the position.—Mr. BROWN replied: Where the arrangements in question are on a voluntary basis they are operated by means of reciprocal agreements between the practitioners participating therein and do not involve any amendments of the National Health Insurance Regulations of 1936, though insurance committees assist in their operation. The agreements do not, in my view, restrict the statutory right of insured persons as to choice of doctor, and I see no sufficient reason for advising insurance committees to withdraw their assistance.

#### Infectious Disease in England and Wales

WEEK ENDED FEB. 27

**Notifications.**—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1934; whooping-cough, 1786; diphtheria, 813; paratyphoid, 6; typhoid, 3; measles (excluding rubella), 20,082; pneumonia (primary or influenzal), 1373; puerperal pyrexia, 180; cerebrospinal fever, 103; poliomyelitis, 3; polio-encephalitis, 2; encephalitis lethargica, 0; dysentery, 96; ophthalmia neonatorum, 79. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Feb. 17 was 2534, including scarlet fever, 614; diphtheria, 256; measles, 686; whooping-cough, 260; enteritis, 111; chicken-pox, 74; erysipelas, 25; mumps, 18; poliomyelitis, 2; dysentery, 18; cerebrospinal fever, 27; puerperal sepsis, 21; enteric fevers, 7; German measles, 9; osteomyelitis, 1; glandular fever, 1; encephalitis lethargica, 1.

**Deaths.**—In 126 great towns there were no deaths from enteric fever, 2 (0) from scarlet fever, 22 (1) from measles, 11 (2) from whooping-cough, 24 (1) from diphtheria, 45 (7) from diarrhoea and enteritis under two years, and 87 (17) from influenza. The figures in parentheses are those for London itself.

Birmingham reported 8 deaths from diarrhoea. There were 5 fatal cases of influenza at Bradford.

The number of stillbirths notified during the week was 232 (corresponding to a rate of 34 per thousand total births), including 26 in London.

**WESTMINSTER HOSPITAL.**—Mr. George H. Macnab has been appointed dean of the medical school in succession to Sir Adolphe Abrahams who has retired.

## Obituary

### ALFRED ALEXANDER MUMFORD

M D LOND, B SC MANC

Dr. A. A. Mumford died on Feb. 23, aged 80, at Beaconsfield, Bucks, where he retired some ten years ago from a study of the Manchester schoolboy—his brain, his body and his mind. But even in retirement his garden, with its large spinney, was always happily filled with the small boys of the neighbourhood: his regard for both kinds of saplings had never flagged. One who shared his interests, medical, sociological and historical, writes: "Mumford was an exhilarating enthusiast in all he took up, whether it was the development of local medicine, the history of Lancashire, or the health of young folk. The last was his life's work. After twenty-one years of general practice he turned his efforts to 'securing,' these are his own words, 'greater attention to the damaging effects that disease and ignorant management during the early years of childhood exert on the ultimate physique and attainments of school-children.' His work at the Manchester Northern Hospital, at the Greengate Institution, Salford, and above all at the Manchester Grammar School gave him the opportunity he wanted. He was of friendly, lovable character, and many a grammar school boy has been summed up quickly and accurately. 'He'll do all right; he's got it in him; he just lives in his own world; don't push him.' Such opinions as these have eased the minds of many a parent. And these remarks were based not only on a keen judgment but on an experience gained by painstaking measurements and calculations. His talk was always stimulating, interesting. I remember the occasion when, during his presidency of the Manchester Medical Society, the speaker of the evening failed to appear, and while he was being brought Mumford held the house for nearly an hour with his historical and social talk. It is a pity that that talk was not recorded."

Dr. Mumford's historical work is epitomised in his *History of Manchester Grammar School (1515-1915)*, and the founder of the school was later the subject of a separate volume, *Hugh Oldham (1452-1519)*. His medical studies were summed up in *Healthy Growth*. Though born in London, he was himself a Grammar School boy, passing into Owens College, from which he qualified in 1885. He is survived by his wife Edith E. Read Mumford, who has published many books on child psychology, and two daughters. Of his three sons, the eldest, Dr. P. B. Mumford, is dermatologist to the Royal Infirmary, Manchester; the second, secretary-general of the United Nations Information Office of America; and the third, a well-known entomologist.

### RONALD HENRY TASKER

M R C S

Dr. Ronald Tasker, until recently posted as missing, is now known to have lost his life at sea as the result of enemy action. Born in 1892, he qualified from the University of Bristol in 1917, and during the last war served as a temporary surgeon RN on HMS *Centurion* and afterwards at the RN Hospital, Plymouth. At that time he took a special interest in anaesthetics and when he returned to civilian life he held hospital appointments at Bristol and at Hereford. After a few years spent at Ham Green Fever Hospital, he entered the employ of the Burmah Oil Co. as a surgeon, and did excellent pioneer work for the company until the Japanese occupation. After a hazardous evacuation in which he took part in the destruction of plant and equipment he made his way to Calcutta. He was on his way home when his ship was sunk and he was adrift in a lifeboat with fifty-three others. In this ordeal he lost his life, and indeed only two survived out of his lifeboat's company.

Tasker was a man of unusual warmth and forcefulness of character. He was the most loyal of friends, genial, generous and staunch. His professional work was carried out with a neat exactitude which compelled admiration, and gave the finest end-results. All his life he was an athlete. He played soccer, tennis, hockey and badminton, and as a student he was for a time an amateur player in the second division of the Football League.

He married Dr. Dorothy Buckmaster, daughter of the late Professor Buckmaster who held the chair of physiology at Bristol, and leaves her with two young children.

#### FREDERICK JOHN CHANTER BLACKMORE

M.R.C.S.

Dr. Frederick Blackmore, who died at the end of last year, was tuberculosis officer for Woolwich from 1915 to 1940. He was keenly interested in social reform and in occupational therapy for the tuberculous. An active member of the old Tuberculosis Society, he was secretary during the two years before its amalgamation with the Society of Superintendents in 1923 to form the Tuberculosis Association. In 1924 Blackmore helped to found the Joint Tuberculosis Council, and he was mainly responsible for its valuable report on the best use of residential institutions in the treatment of tuberculosis. The tuberculosis group of the Society of M.O.H.s also owed much to his enthusiasm, and he was for a time their president. In 1930 he published *The TB Patient's Guide*. He could be fearless and outspoken when he felt that criticism was called for, but he roused no rancour and was always a good friend.

Blackmore was born in Devon in 1878, the son of the Rev. J. C. Blackmore, and educated at Clifton and University College Hospital. He qualified in 1909 and began to practise at Hereford, later becoming senior assistant T.O. for Birmingham. He returned from service with the R.A.M.C. in France to take up his work at Woolwich. When he retired owing to ill health two years ago, he settled in Brixham. He leaves a widow and three sons.

### Notes and News

#### THE CHILD AND THE NEEDLE

THREE parties must be won over in any diphtheria-immunisation campaign: the parents and child. The resistance of parents to the idea varies in different parts of the country. In his cautionary tale on the wireless last Sunday a doctor told how he fared, a dozen years ago, when he went to a country practice as a newly qualified locum. In a staid and reactionary community he was able to persuade the parents of nearly half the children to consent; and the children protected were able to resist infection successfully six months later when an epidemic came round.

Confident parents make confident children. A child whose mother says "This is just something every sensible person has done" takes it all for granted; but not every child is so blest. Probably the best way to approach a child is to let him approach the doctor as one of a cheerful line when the whole school is done. Then a confident spirit is abroad, and competition helps to maintain poise. But a failure in morale is just as catching, as Shand points out,<sup>1</sup> and a crying child can easily upset his companions. Shand, who was working with Portsmouth's mobile unit in a house-to-house campaign, remembers one street, where the first child immunised saw fit to cry, as "one long howl from beginning to end." A short street, luckily. He suggests that the only thing to do in such a dilemma is to pack up and come back another day, hoping for a smiling child to start off with. If mothers could be kept out of it, he thinks, the doctor would get on better. He never let the mother who said "It won't hurt you" go away uncorrected. A girl of nine, who fought and swore when coerced by her mother into receiving the first injection, came peacefully up with her class at school for her second, remarking affably "Hello, doctor." He finds it a good plan when working in a clinic to let a crying child out by a door which does not open into the waiting-room.

Defiant and aggressive children, he thinks, are best dealt with quickly, and he has a technique by which the health visitor stands behind the child, passes her left hand under his left arm and grasps his right hand. With her right arm she turns his head away. The doctor takes the child's left hand between his knees and gives the injection quickly. The injection is synchronised

with the nurse's movement in turning the child's head, and the whole thing is done in 4 seconds. Nervous and apprehensive children of course are much easier to manage: they need a little encouraging patter as they come in, and some small thing that they can do themselves—like holding the receiver for the swab. Shand gets them to count three, by which time he has done. He suggests that the doctor would get on better if he had less paraphernalia: no white coats, and a shield for the gleaming instruments. On the other hand, there is something to be said for getting the public accustomed to the accessories of asepsis early in life.

#### University of Oxford

In a congregation held on Feb. 27 the following degrees were conferred:

*B.M., B.Ch.*—J. M. Garvie, R. I. K. Elliott, D. G. T. Hicks, and J. C. Prestwich.

\* In absence.

An election of two members of the board of the faculty of Medicine will be held on Wednesday, June 9. Nominations, which must be signed by six members of the general medical electorate, will be received by the secretary of faculties at the University Registry, up to 10 AM on Wednesday, May 19.

On Feb. 23 congregation approved a decree to increase Miss Ida Mann's emoluments, as long as she remains Margaret Ogilvie reader in ophthalmology, so that she may give more time to research:

#### Royal College of Physicians of London

On Tuesday and Thursday, March 16 and 18, at 2.15 PM, Dr. Geoffrey Evans will deliver his Lumleian lectures to the college. He will speak on arteriosclerotic disease.

#### VD in Scotland

Speaking at a conference called at Edinburgh by the British Social Hygiene Council, Mr. THOMAS JOHNSTON, Secretary of State for Scotland, said that there had been a steady decline in venereal diseases between the two wars. In 1939 the clinic figures for syphilis in Scotland were just half what they had been in 1921; since then numbers have gone up rapidly and last year there were nearly 5000 fresh infections there, apart from Service cases. In one town, he said, the known infections had risen from 36 to 419. Treatment centres are adequate for the increased numbers, but about 40% of patients leave centres before they are pronounced cured, and over 20% leave even before completing a course of treatment.

#### War-time Work for Married Nurses

The National Society of Children's Nurseries, in conjunction with the Royal College of Nursing and the Association of Sick Children's Hospital Nurses, is holding a course in London for nurses eligible for positions as matrons and sisters in war-time nurseries. These posts are suitable for qualified nurses who are married, but are now anxious to do war work. If they have children under school age, provision can be made for their care. The course, which is under the auspices of the Ministry of Health, opens on Monday, March 29, and is free to nurses on the general and sick children's state register who intend to work in these nurseries. Registered fever nurses can also be accepted if they are unable to take employment in infectious diseases hospitals. Further particulars can be had from the director in the education department, Royal College of Nursing, 1A, Henrietta Place, London, W.1.

#### Distributing our Nurses

Addressing the newly formed National Advisory Council for the recruitment and distribution of nurses and midwives on Feb. 23, Mr. Ernest Bevin explained that the recruitment and distribution of nurses would be managed through the appointments department of the ministry, with its thirty-one local appointments offices: Advisers are giving technical and professional help to the ministry, and the health departments are also prepared to help. The principal officer in charge of the new work will be Mrs. Bethina Bennett, herself a state registered nurse, who is to act as secretary to the council. Similar officers, either whole or part-time, are taking up posts in the appointments offices throughout the country. Mr. M. S. McCorquodale, MP, chairman of the council, will keep in close touch with the minister and advise him on the decisions reached.

1. Shand, G. E., *Nursing Mirror*, Feb. 20, 1943, p. 331.

**Medical Society of London**

A meeting of this society will be held at 11, Chandos Street, W.1, on Monday, March 15, at 5 PM when Dr. Geoffrey Marshall, Mr. R. C. Brock, and Dr. F. MacDonald Allchin will introduce a discussion on the diagnosis and treatment of malignant growths of the lungs.

**British Institute of Philosophy**

Prof. Herbert Dingle's lecture on space and time in modern physics, which was postponed, will now be delivered at 14, Gordon Square, London, W.C.1, on Friday, March 19, at 5 PM.

**Middlesex County Medical Society**

The next meeting of this society will be held at 3 PM on Wednesday, March 17, at the North Middlesex County Hospital, Silver Street, Edmonton, N.18, when cases will be shown and discussed.

**Socialist Medical Association**

At a meeting of this association on Feb. 28 the following resolutions were unanimously adopted:—

1. The SMA reiterates its welcome to the Beveridge report as an effort to deal with two factors in the causation of ill health: the existence of poverty and the absence of an organised health service. It views with regret, therefore, the failure of the Government to implement the report. It wishes to emphasise that from the health point of view the provisions of the report, based as they are on subsistence and not on optimum dietary standards, cannot be lowered.

The acceptance of Assumption B is warmly welcomed. We urge that "the restoration of the sick is a duty of the state and the citizen, prior to any other consideration," as suggested in the report, should be accepted as the keynote of the service which the Minister of Health is discussing. The efficiency of that service in the care of health and not a doctrinaire belief in the necessity of preserving the voluntary hospital principle or any other existing service, must be the basis of a comprehensive National Medical Service.

2. This meeting believes that there should be one standard of medical service for all beneficiaries in a comprehensive National Medical Service and that doctors employed by this service should not be permitted to accept private fees.

**Royal Society of Medicine**

The section of pathology of this society will meet on Tuesday, March 16, at 4.30 PM, for short papers and demonstrations. At 4.30 PM, on March 18, the sections of dermatology and physical medicine are holding a joint meeting when Dr. Rupert Hallam and Dr. William Beaumont are opening a discussion on the application of physical methods in the treatment of skin diseases. At the same hour in the section of neurology Major Edgar V. Kahn, USAMC, will speak on the use of contrast media in cystic lesions of the brain; Lieut.-Colonel Loyal Davis, USAMC, on experimental studies upon peripheral nerve lesions, and Major John E. Scarff, USAMC, on recovery of speech following evacuation of subcortical blood clot from the left temporal lobe in three patients. On March 19, at 3.30 PM, short communications will be read at the section of obstetrics and gynaecology and afterwards Dr. B. E. Ebdon will describe obstetric practice in Nigeria. On the same day at the section of radiology Major P. J. Kenley will read a paper on the aetiology of erythema nodosum, Mr. Geoffrey Todd on the chest clinician's viewpoint of radiograms of the chest, and Mr. K. I. Nissen on epiphysitis of the lumbar spine.

**A Factory Health Centre**

A new welfare building and a food-research department attached to the canteen was opened at Morris Motors Limited, at Oxford, on Feb. 24, by Sir Miles Thomas, vice-chairman of the firm. The medical centre of the factory has taken up well-equipped quarters in one of the new blocks, provided with ultraviolet and infrared lamps, an electrocardiograph and an X-ray plant. It is hoped by means of mass radiography to detect early cases of tuberculosis among the workers. Dental and eye services are also provided; Dr. Ernest Mallam, the medical officer, and his staff intend by degrees to add a rehabilitation centre to the welfare services of the factory. It is stated that the workers pass aptitude tests before taking on a new job, and are thus employed on work for which they are fitted and can enjoy.

The canteen of the factory is run by Barkers (Contractors) Ltd. and they have introduced the food-research department, with a small but well-equipped laboratory in charge of a biochemist and a dietitian. The meals served not only in the Morris canteen but also in the canteens of upwards of 600 factories catered for by Barkers will be analysed in this laboratory, and the dietitian will advise on ways in which they can be modified to ensure a balanced diet. An experienced chef sees to it that the meals served in the Morris canteen are palatable as well as nutritious.

**Medical Casualties**

The following RAMC casualties have been announced: *Wounded*.—T/Major C. B. Jagger, MB BIRM; Captain G. M. Jolly, MB EDIN; Captain J. H. Keesey, MB CAMB; Captain G. O'Donnell, MB; and T/Major Peter Spence, MB GLASG. *Prisoner of War*.—Captain J. G. Jesson, MB LOND; and Captain A. J. N. Warrack, MB LOND.

The following RAF officers are now officially reported as prisoners of war in Java:

Wing-Commander C. W. Coffey, LROPI; Squadron-Leader J. A. McCarthy, GM, MB NUI; Flight-Lieutenant R. F. Braithwaite, MRCS; and Flight-Lieutenant N. J. W. Thompson, MB BELF.

**London County Council**

The following medical men and women have been appointed to the standing committees of the LCC:

*Civil defence and general purposes committee*.—Mr. Somerville Hastings.

*Evacuation committee*.—Dr. J. A. Gillison and Dame Barrie Lambert.

*Hospitals and medical services committee*.—Dr. S. Monckton Copeman, Mr. Somerville Hastings, Dame Barrie Lambert, †Dr. E. P. Hulbert, and †Dr. Stark Murray.

*Mental hospitals committee*.—Dame Barrie Lambert and †Dr. Doris Odum.

*Parks committee*.—Dr. S. W. Jeger.

*Supplies committee*.—Dame Barrie Lambert.

*Special committee on staff (appeals)*.—Dame Barrie Lambert.

† Co-opted.

The hospitals and medical services committee have recommended the council to adopt the proposals of the Rushcliffe Committee. This will mean an additional expenditure of £68,000 in 1943-44 of £114,000 in 1944-45, and ultimately an average of £117,000 a year. Half of this expenditure will be met by a grant from the Government.

**Appointments**

SMALL, CHRISTINA, MB LOND.: house-surgeon at Great Ormond Street Children's Unit, Base Hospital, Hemel Hempstead.

*Surrey County Council*.—The following appointments have lately been made:

BABER, MARGARET, MD LOND., MRCP, DCH: asst. res. physician, St. Helier County Hospital, Carshalton;

O'REILLY, J. N., DM OXF, MRCP: paediatrician, St. Helier County Hospital;

GORDON, F. W., MD ABERD., MRCP: part-time physician, Warren Road Hospital, Guildford;

HARWOOD, H. F., MD LPOOL: asst. MO (Chest Block), St. Helier County Hospital;

ROBERTS, ERICA, MB WALES: asst. RSO, St. Helier County Hospital; and

LISTER, URSULA, MRCS: asst. MO (obstet. gynec.), St. Helier County Hospital.

The following examining factory surgeons have been appointed:

SMITH, A. F., MD EDIN., for Ulverston, Lancs;

YATES, FRANK, MB MANC., for Hanley, Staffs;

FITZPATRICK, E. D., MRCS, for Alcester, Warwickshire; and

WALKER, GERALD, MRCS, for Holbeach, Lincs.

**Births, Marriages and Deaths****BIRTHS**

GLEADOW.—On March 3, at Southbank, the wife of Dr. E. F. Gleadow, of Worcester—a son.

KING LEWIS.—On March 3, at Worcester, the wife of Dr. P. C. King Lewis—a daughter.

SCOTT.—On March 2, at Speen, Newbury, the wife of Dr. T. G. Scott—a daughter.

SEYMOUR-JONES.—On March 3, the wife of Lieutenant Anthony Seymour-Jones, FRCS, RAMC—a daughter.

**MARRIAGES**

MURPHY—McHUGH.—On Feb. 20, 1941, at Wolverton, Graham Edward Murphy, FRCS, to Mary Patricia McHugh, MB, of Birmingham.

POOLEY—BROOKS.—On March 6, in London, Stewart Pooley, surgeon-lieutenant RNR, to Jeanne Brooks.

PRITCHARD—WITHERBY.—On Feb. 27, at Chobham, Peter Michael Maddock Pritchard, lieutenant RAMC, to Daphne Witherby.

RETTIE—STURGES.—On Feb. 27, in London, George Kelly Cargill Rettie, MB, RAMC, to Joan Sturges.

**DEATHS**

DWYER.—On March 2, in London, Walter James Ignatius Dwyer, MRCS, formerly of Ladbroke Gardens, W.11.

GOLDIE-SCOT.—On March 3, at Parkstone, Dorset, Thomas Goldie Goldie-Scot, MB EDIN., JP.

HOPE.—On March 6, at St. Leonards-on-Sea, George Hope, MRCS, DPH, formerly of Hanwell.

HUGO.—On Feb. 28, at Guildford, James Henry Hugo, DSO, MB LOND., DPH, lieutenant-colonel IMS, ret'd.

SWAN.—On March 2, in London, Russell Henry Jocelyn Swan, OBE, MS LOND., FRCS.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

## EARLY DIAGNOSIS OF WOUND INFECTION

WITH SPECIAL REFERENCE TO GAS-GANGRENE

D. McCLEAN, M B LOND      H. J. ROGERS, B SC LOND  
OF THE LISTER INSTITUTE OF PREVENTIVE MEDICINE,  
ELSTREE, HERTSB. W. WILLIAMS, B M OXF, F R C S  
EMS SURGEON, ST. THOMAS'S HOSPITAL

With a technical section by C. W. HALE

THE case-mortality from wound infections due to the gas-gangrene organisms remains obstinately in the region of 30-60 per cent. In the early stage of infection when the tissues are still capable of recovery the clinical changes are so slight that, even with considerable experience, the surgeon can seldom form a definite opinion as to the presence of an anaerobic infection. In view of the difficulty of rapid bacteriological diagnosis, it seemed worth while to explore the possibility of detecting the presence of actively proliferating pathogenic organisms at a stage when the infection cannot be recognised by clinical or ordinary bacteriological examination. The methods put forward in the following communication depend upon the detection of enzymes produced by bacteria in the wound exudate. These enzymes are apparently produced by a large proportion of wound-infecting organisms and can be detected by simple tests. The methods advocated are most likely to be useful in *Cl. welchii* infections which are clinically the most rapid and most common cause of gas-gangrene.

It has been known for some years<sup>1, 2</sup> that organisms of the gas-gangrene group, staphylococci, streptococci and pneumococci produce, in addition to their recognised toxins, substances which cause an immediate increase in the permeability of the connective tissues.

Substances with similar diffusing properties have been obtained from mammalian testis,<sup>3, 13, 14</sup> extracts of malignant tissues,<sup>1, 4</sup> snake and spider venoms<sup>5</sup> and from leeches.<sup>6</sup> Chain and Duthie<sup>7</sup> reported that purified diffusing extracts of testicular and bacterial origin exhibit a remarkable mucolytic activity characterised by a rapid fall in the viscosity of the mucopolysaccharide of synovial fluid and vitreous humour and the liberation therefrom of reducing substances.

Subsequent work<sup>8, 15, 19, 20</sup> has shown that the diffusing or spreading factors are very closely associated, if not identical, with a group of enzymes that hydrolyse the mucopolysaccharide known as hyaluronic acid which is widely distributed in the connective tissue. The enzymes are therefore called "hyaluronidases."

It has been shown that the inclusion of hyaluronic acid in the culture medium of *Cl. welchii* or of streptococci greatly increases the production of hyaluronidase by these organisms,<sup>16, 17, 18</sup> and this observation has a bearing on the pathology of infections by organisms that produce these enzymes. For example, gas-gangrene spreads rapidly through the tissues; as soon as *Cl. welchii* starts to proliferate in the tissues hyaluronidase is produced, the hyaluronic acid there is attacked, the permeability of the tissues is thus increased and more of the substrate then becomes available. The presence of hyaluronic acid causes the infecting organisms to produce an increased amount of the enzyme and a vicious circle is set up which promotes the extension of the infection. Other components of the toxins of wound-infecting organisms such as the various haemolysins, leucocidin of staphylococci and the lecithinase of *Cl. welchii* and the toxin of *Cl. oedematiens* are also liberated in the tissues and their spread may be promoted by hyaluronidase.

Macfarlane and Knight<sup>11</sup> demonstrated that there is an enzyme in *Cl. welchii* toxin which hydrolyses lecithin. This lecithinase differs from those in snake and wasp venoms in the manner in which it splits the substrate, whilst it differs only in immunological specificity from that present in small amounts in *Cl. oedematiens* toxin.<sup>10</sup> Macfarlane and Knight showed that the lecithinase of *Cl. welchii* is almost certainly identical with the  $\alpha$  toxin. That of *Cl. oedematiens* is not identical with its lethal toxin.

It was of interest to determine how early in an infection these bacterial enzymes could be detected in the oedema fluid or wound exudate, the distribution of these substances in the body fluids and their correlation with

the progress of infection. If these enzymes could be detected at an early stage, the knowledge might be of assistance to the surgeon in providing a rapid means of early diagnosis. The earlier recognition of anaerobic infection may also result in more-vigorous and objective antitoxin therapy and less extensive operative excision with a consequent reduction in both mortality and mutilation. This paper contains a brief summary of the results of these experiments and descriptions of the tests which it is recommended should be tried in the early diagnosis of infection in wounds.

## Experimental Methods

Groups of guineapigs were infected intramuscularly in the thigh with washed 18-hour cultures of the organism under test.

The cultures were made in Robertson's heart medium; the organisms were centrifuged, washed once in saline and taken up in either saline or CaCl<sub>2</sub> solution. The cultures were washed in order to avoid, as far as possible, the injection of preformed toxin or hyaluronidase. In those experiments in which CaCl<sub>2</sub> was used the concentration of this salt in the suspending solution was 8 mg. in the dose of 0.1 ml. In other experiments the calcium was omitted and, in order to simulate in some degree the naturally occurring trauma, the muscles were crushed with artery-forceps immediately before injection of the culture in saline.

The guineapigs were killed in pairs at intervals after infection varying from 2 to 24 hours. Immediate post-mortem examinations were made, the macroscopic appearance noted, films made from the oedema fluid (when present) for microscopical examination, and samples of oedema fluid, heart blood, injected muscle and urine collected for examination. The excised muscle was minced and extracted with a volume of distilled water equal to the weight in grammes of muscle tissue; films of the muscle extract were also made for microscopical examination. The samples of oedema, blood, muscle extract and urine were tested for the presence of hyaluronidase and lecithinase or for haemolysin in those infections in which lecithinase is not produced.

The hyaluronidase present in the samples was estimated either by its viscosity-reducing activity and the result expressed in viscosity-reducing units<sup>19</sup> or by the mucin-clot prevention test which depends upon the power of hyaluronidase to destroy the capacity of the mucopolysaccharide to form a typical "mucin clot" on the addition of acetic acid. The highest dilution of the enzyme sample under test which will inhibit this clot-formation after incubation with a standard substrate mixture for a fixed time is proportional to the potency of the original sample. A description of the influence of in-vitro environmental factors on this manifestation of enzymic activity is in the press,<sup>18</sup> but a description of the method of performing the test is given later in this paper.

The lecithinase potency of the samples from *welchii* infection experiments was determined by the egg-yolk method described by van Heyningen.<sup>22</sup> When the enzymic potency was very low, as in experiments using *Cl. oedematiens*, estimations were made using the liberation of acid-soluble phosphorus from lecithin, as described by Macfarlane and Knight.<sup>11</sup> Dilutions of standardised glycerinated *Cl. welchii* toxin were used for comparison, and results were expressed as "egg units" where one egg unit is equivalent to one mouse MLD.

In experiments with *Cl. septicum* (*vibrio septicum*), which produces no lecithinase, the body fluids were tested for haemolysin. These tests were performed in saline without buffer, with McIlvaine's phosphate-citric acid buffer at pH 6.0 and in the presence of thioacetic acid.

The titres of the various enzymes present in the samples from the infected animals were recorded and compared as the infection proceeded; the correlation of the appearance of these enzymes in the oedema fluid and muscle extracts with the presence of organisms in the stained films from these fluids was noted.

Infection experiments were made with representative strains of *Cl. welchii*, *Cl. septicum* (*Cl. oedematis maligni*) and *Cl. oedematiens*. In addition, a survey was made of strains of all three species for their capacity to produce hyaluronidase in culture in the presence of hyaluronic acid. In our experience this is the best method of

testing whether any strain can produce this enzyme in a suitable environment. We are indebted to Dr. Muriel Robertson and Mr. Keppie of the Department of Animal Pathology, Cambridge, and to Prof. A. A. Miles and Dr. Nancy Hayward of University College Hospital for many representative strains of these organisms.

**Results**

The results of the infection experiments will be described in full elsewhere. Our present purpose is to give the broad conclusions drawn from our experiments and to indicate how our experience can be applied to the examination of exudates from either civil or military wounds. All our evidence has been obtained from animal infection experiments and we have not, so far, had the opportunity of examining wound exudates. This report is being published in the hope of obtaining clinical material for examination and in order that those in contact with casualties may themselves test the application of our experimental findings to the early diagnosis of wound infection.

**GENERAL OBSERVATIONS**

If the infecting strain was capable of producing hyaluronidase, whether it was *Cl. welchii*, *Cl. septicum* or *Cl. oedematiens*, the enzyme could be detected in the oedema fluid as soon as the infection was sufficiently advanced to produce enough fluid for examination. In infection experiments with *Cl. welchii*, the lecithinase could be detected in the oedema fluid very soon after the infection had progressed far enough to produce any fluid. In the *oedematiens* experiments lecithinase was only detectable in small quantities in the muscle at a very late stage in the infection. The highest value obtained was 5 units, using a strain known to produce relatively large amounts of lecithinase in culture. The relative concentration of enzymes in the muscle extract and the oedema fluid varied with the species of the infecting organisms and with the individual strains of each species. The relation between the time of appearance of organisms in the stained films from both muscle extract and oedema and the detection of the enzymes in these fluids also varied with the species and strain of the infecting organism. Neither hyaluronidase nor lecithinase could be detected in the urine at any stage of the infections. Neither enzyme was ever detected in the circulating blood; this raises an interesting question as to how the toxins are disseminated in the body and is the subject of further work which will be fully described elsewhere. A comparison of the results obtained in those experiments in which the organisms were injected together with CaCl<sub>2</sub> and in those in which the muscles were crushed and no calcium chloride used, indicated that there was no significant difference in the relation between the appearance of the enzymes and the stage of the infection; in our hands, however, the crushed muscle technique resulted in less regularity in the rate at which the infection established itself.

*Cl. welchii* INFECTION

In all *welchii* experiments the infection developed rapidly, oedema fluid in quantity sufficient for collection was usually present after 4 hours, it increased rapidly and became generalised throughout the body. The organisms appeared in the oedema fluid relatively late in the infection, after the enzymes could be detected and considerably later than they could be seen in the films from the muscle. This is in contrast to our experience with *Cl. septicum* and *oedematiens*. There was considerable variation between the different strains of *Cl. welchii* in the relative titre of both enzymes that developed in the muscle and in the oedema as the infection proceeded and also in the amount of muscle digestion and the extent of the oedema. It is not, however, proposed to discuss here the differences in individual infections. Table I shows the upper and lower limits of both enzymes detected at the stated periods after infection and is based upon the result of several experiments with different strains.

It will be seen that there is a very wide variation in the potency of both enzymes in the tissues of individual animals at all stages of the infection, but the steady increase in enzyme activity as the infection proceeds is

also apparent. At 2 and 3 hours after infection, when there is no detectable free fluid, both enzymes can already be detected in the infected muscle.

The result of infection with a strain that produces no hyaluronidase should be referred to here. Although this strain was toxigenic, virulent and produced marked digestion of muscle, the oedema fluid was much more circumscribed to the infected area; this fluid was strikingly viscous, having the consistency of honey, and when the infected muscle was minced, it was found to be dripping with viscous fluid. This viscosity was due to hyaluronic acid, since it was immediately destroyed by the addition of hyaluronidase from a culture of another strain of *Cl. welchii*. The cause and source of this extraordinary quantity of hyaluronic acid is of great interest and is the subject of investigations which will be reported elsewhere.

TABLE I—HIGHEST AND LOWEST TITRES OF HYALURONIDASE AND LECITHINASE DETECTED IN MUSCLE EXTRACTS AND OEDEMA FLUIDS AT DIFFERENT PERIODS AFTER INTRA-MUSCULAR INFECTION WITH *Cl. welchii*

Hours after infection	Tissue	Hyaluronidase		Lecithinase
		MCP titre	VRU	EU
2	Muscle	1:4 -1:5	0.5	Nil-6
	Oedema	.. ..	..	..
3	Muscle	1:4	..	4
	Oedema	..	..	..
4	Muscle	1:4 -1:30	0.5-2.0	1-21
	Oedema	Nil -1:5	Nil-3.0	Nil-21.5
6	Muscle	1:4 -1:125	0.5-10	1-35
	Oedema	1:5 -1:120	0.5-20	0.5-5
12	Muscle	1:8 -1:240	..	0.8-46
	Oedema	1:10-1:240	..	0.5-9
18	Muscle	1:4 -1:320	0.5-70	8.0-60
	Oedema	1:4 -1:2500	1:0-350	5.0-23
24	Muscle	1:4 -1:625	0.5-22	1:0-75
	Oedema	1:16-1:1000	5.0-200	2.5-17

Hyaluronidase .. MCP = mucin-clot prevention test. Figures indicate highest effective dilution of enzyme.  
 VRU = viscosity-reducing units.  
 Lecithinase .. EU = egg units. Figures indicate units of enzyme per gramme of muscle.

*Cl. septicum* (VIBRION SEPTIQUE) INFECTION

In our experiments with *Cl. septicum* the infection developed more slowly than with *Cl. welchii*. It was unusual to detect any macroscopic signs until 6 hours and oedema fluid was not usually present in sufficient quantity for examination until 12 hours after infection. The first sign of infection was the hæmorrhagic appearance of the muscle. As the infection proceeded, the quantity of oedema fluid increased rapidly and the distribution of this fluid throughout the body was a marked feature. There was a rapid increase in the concentration of hyaluronidase in the oedema fluid compared with that in the muscle. This appeared to be correlated with the early appearance of organisms in the oedema fluid and their rapid increase in numbers which exceeded those seen in the fluid from the muscle extracts.

In culture *Cl. septicum* produces much less hyaluronidase than *Cl. welchii* and, therefore, it was not surprising to find that in the body fluids of the infected animals the potency of this enzyme was considerably lower than in the *welchii* experiments. It could, nevertheless, be detected both by the mucin-clot prevention (MCP) test and by viscosimetry from about 6 hours in the muscle and about 12 hours in the oedema fluid, increasing in quantity more rapidly in the latter.

Our experience indicates that in the oedema fluid the enzyme increases from less than 0.5 viscosity-reducing units (VRU) at 12 hours to about 2.0 VRU at 24 hours and in the muscle from less than 0.5 VRU at 6 hours to about 1.0 VRU at 24 hours. If the MCP test is used the final figure for oedema fluid corresponds to activity at a dilution of about 1:40 and for muscle a dilution of 1:20. There are some *Cl. septicum* strains with an abnormal capacity to produce hyaluronidase and in infections with these strains the titre of enzyme in the oedema fluid may rise as high as 10 VRU (MCP about 1:100) 12 hours after infection.

TABLE II—HYALURONIDASE-PRODUCTION BY ORGANISMS OF THE GAS-GANGRENE GROUP CULTIVATED IN 0.5 PER CENT. HYALURONIC ACID

Hyaluronidase	<i>Cl. welchii</i>		<i>Cl. septicum</i>		<i>Cl. oedematiens</i>	
	No. of strains	Remarks	No. of strains	Remarks	No. of strains	Remarks
Positive	12	11 were toxigenic strains, of which 10 were derived from gas-gangrene cases. Hyaluronidase (MCP titre): 1:800-1:3000	20	4 strains derived from gas-gangrene cases; 7 strains apparently harmless contaminants of wounds. 9 stock laboratory strains, of which 4 are good toxin-producers. Hyaluronidase (MCP titre): 1:5-1:125	7	6 stock laboratory strains; 1 strain from toxæmia in sheep. Hyaluronidase (MCP titre): 1:2-1:8
Negative	20	11 toxigenic strains, of which 2 were derived from gas-gangrene cases and 2 from peritonitis. 16 strains, apparently harmless contaminants, of which nevertheless 7 were toxigenic	0	—	8	5 strains derived from gas-gangrene cases. 3 stock laboratory strains
Total	32		20		15	

No hæmolysin was detected at any time in either the œdema fluid or muscle of the infected animals.

#### *Cl. oedematiens* INFECTION

The early stages of infection with *Cl. oedematiens* also developed more slowly than with *Cl. welchii*. The first macroscopic signs were visible after about 6 hours, but œdema fluid could not be collected for examination until about 12 hours. Once established, the infection proceeded very rapidly with marked digestion not only of the muscle initially infected but of all muscles throughout the body, and with copious generalised production of œdema fluid. In infections with strains producing hyaluronidase, the organisms appeared in the œdema fluid from 6 hours onwards and increased rapidly in numbers; this fluid did not clot on standing. When strains were used which did not produce hyaluronidase, the œdema fluid was gelatinous, more localised to the infected area, and no organisms could be seen in it until the terminal stages of the infection. This gelatinous fluid has not the viscous character of the fluid produced in the corresponding *welchii* infection nor was its gelatinous character destroyed by hyaluronidase.

*Oedematiens* infections are the least satisfactory of the gas-gangrene group from the point of view of the detection of enzymes in the body fluids since, as will appear later, a large proportion of strains produce no hyaluronidase and those that do produce this enzyme secrete it in even lower titre than *Cl. septicum*. A lecithinase is also produced in very low titre by this organism. If, however, infection is caused by a hyaluronidase-producing strain this enzyme can be detected in the œdema as soon as sufficient can be collected for examination—i.e., after about 12 hours.

At this stage there is less than 0.5 VRU present and by the MCP test the enzyme can be detected in a dilution of 1:4 to 1:8. By 18 hours the titre of the enzyme rises to about 1.0 VRU or a MCP dilution of about 1:16. In the muscle the enzyme is just detectable by both methods at 6 hours and the titre increases slowly to about 0.5 VRU or 1:8 MCP dilution at 18 hours.

Using a strain of *Cl. oedematiens* known to produce a relatively high lecithinase titre in culture this enzyme could only be detected in the œdema fluid about 25-29 hours after infection. The titre was then only about 1 unit per ml. of fluid. In the muscle the titre was somewhat higher and appeared earlier, being about 2-3 units per gramme after 18 hours rising to 6-7 at death. With other strains no lecithinase could be detected at any stage.

#### HYALURONIDASE-PRODUCTION IN CULTURE

If the detection of these enzymes in the body fluids is to be of any diagnostic value it is necessary to know that most of those organisms likely to infect wounds do, in fact, produce hyaluronidase. To this end representative strains of the three main gas-gangrene-producing species were cultivated in medium containing 0.5 per cent. hyaluronic acid. The result is shown in table II.

It will be seen that with regard to *Cl. welchii* and *Cl. septicum* the position is quite satisfactory. Of 12 hyaluronidase-producing *welchii* strains, 10 were derived

from clinical gas-gangrene; only 2 out of 20 strains that do not produce this enzyme were obtained from gas-gangrene cases. All the strains of *Cl. septicum* that have been examined produce some hyaluronidase. *Cl. oedematiens* presents a less satisfactory picture: only 7 out of 15 strains produce the enzyme and there is no suggestion that this property is associated with the capacity to cause gas-gangrene. When examining table II it must be remembered that the organism finally isolated from a wound may not be the one that was actually responsible for the gangrene.

Other organisms besides the gas-gangrene group are liable to cause wound infection and they may produce hyaluronidase. Many strains of staphylococci, especially those that elaborate potent hæmolytic toxin, and many strains of hæmolytic streptococci of various Lancefield groups also produce enzymes of this type which, however, are antigenically distinct. Therefore infection by these organisms may also cause the appearance of hyaluronidase in the wound exudate, and in any diagnostic procedure based upon the detection of this enzyme it will be desirable to determine which of the possible bacterial species are producing it in the wound. This can be done by specific neutralisation of the hyaluronidase by appropriate antisera and a simple rapid method of performing this test will be described in the next section.

#### Methods for Detection of Enzymes

Hyaluronidase may be detected either by the MCP test<sup>18</sup> or by the viscosity-reducing activity<sup>18,19</sup> of the enzyme. The MCP test can be carried out in any laboratory with ordinary equipment, but viscosimetric assay of the enzyme normally entails somewhat specialised equipment and technique. Mr. C. W. Hale, working in this laboratory, has, however, elaborated a method whereby an ordinary Thoma-Zeiss leucocyte-counting pipette may be used as a primitive viscosimeter, and a description by him of this method will be included in this section. With a few simple technical precautions, the use of this pipette makes it possible to carry out a rapid test under field conditions for the presence of this enzyme. Furthermore, this technique can be used to detect the specific neutralisation of the enzyme by appropriate antisera and thus to diagnose the nature of the infecting organisms that have produced the hyaluronidase.

In the early stages of any investigation as to the application of these methods to the diagnosis of wound infection we hope to be able to supply limited quantities of the test substances—hyaluronate and egg-yolk (lecithin) emulsion—but the methods of preparing this material are included here so that those who are able may prepare their own material.

#### PREPARATION OF HYALURONATE FOR USE AS SUBSTRATE

Fresh umbilical cords are squeezed as free of blood as possible and rinsed in tap water. They are stored in acetone until collection and subsequent processing.

The partially dehydrated cords are minced (through a household mincer) as finely as possible. To 500 g. of minced material is added 1 litre distilled water. Add  $\text{CHCl}_3$  to saturate and store in cold with occasional stirring. After 24 hours the juice is squeezed through a piece of good cloth (e.g., twill) and to the mince a further 1 litre of water is added.

This is similarly extracted. The first and second squeezings are pooled and centrifuged for ½ hour at 3000 r.p.m., or passed through the Sharples super-centrifuge. (This is better than filtering which is a very slow and laborious process.) The supernatant fluid, which should be almost clear and very viscous, is adjusted to pH 9-10 with KOH.

Absolute alcohol (or absolute methylated spirit) is saturated with potassium acetate; 1½ volumes (or not more than 1½ volumes) of this alcohol is added to the supernatant fluid with shaking. The potassium salt of the polysaccharide comes out of solution as a characteristic clot. The clot is separated on a Buchner funnel and is broken up with the fingers and washed once or twice with pure alcohol (or absolute methylated spirit). It is finally washed with ether and dried over P<sub>2</sub>O<sub>5</sub> in vacuo. The white (or almost white) material is like asbestos and may be ground to a powder in a mortar and used as required. About 2-3 g. of powder are obtained from 500 g. of minced cord.

Great care should be exercised in the preparation of the polysaccharide to prevent contamination either with organisms or with hyaluronidase. Water solutions should always be saturated with CHCl<sub>3</sub> and work with dry hyaluronidase should not be carried out in the same room.

Where a centrifuge and adequate supplies of methylated spirit are not available the following alternative methods may be used:—

EXTRACTION OF UMBILICAL CORD

After mincing the acetone-soaked cords the mince is spread out on paper for a few hours to evaporate most of the acetone.

About 1 litre of water is added to about 500 g. of mince and this is left to stand for 1 or 2 hours, with occasional stirring. It is then carefully brought to boiling with constant stirring and boiled for not more than 3 min. The tissue thus shrinks and extrudes the hyaluronic acid. While still hot it is filtered through glass wool—the filtration being repeated until a reasonably clear solution is obtained. This solution is cooled and precipitated; it should be very viscous when cold.

PRECIPITATION WITH MINIMUM OF INDUSTRIAL SOLVENTS

30 ml. normal horse serum is added to 1 litre of crude solution of hyaluronic acid, however prepared. This is mixed and the mixture cooled. When cool (<10° C.) 75 ml. 2 N. CH<sub>3</sub>COOH is added and the mixture shaken. A voluminous clot separates leaving a clear non-viscous fluid. The clot is gathered together on a glass rod and squeezed as free of fluid as possible. It is broken up by hand and dropped into acetone and may then be dried for storage or the next stage may be undertaken without further delay. The precipitate is broken as finely as possible, ground in a mortar to a powder if dried—and suspended in water 1/5 volume of original extract. A few drops of KOH solution (about 5N) are added and the mixture shaken until dissolved. More KOH may be added if necessary. The final solution should be pH 9-10 and very viscous. The solution is then precipitated with 1½ volumes of methylated spirit saturated with potassium acetate and it is then washed with a little acetone (or preferably ether) and dried in vacuo over P<sub>2</sub>O<sub>5</sub>.

By using the above method only about one-third of the volume of solvents is required, but it is not claimed that the final preparation is as pure as in the method of direct precipitation without the addition of serum proteins.

MUCIN-CLOT PREVENTION (MCP) TEST

This test depends upon the fact that hyaluronidase from all sources so far tested destroys the capacity of a protein-hyaluronic acid complex to form a typical "mucin clot" on the addition of acetic acid. The highest dilution of the enzyme sample under test which will inhibit this clot-formation after incubation with a standard substrate mixture for a fixed time is proportional to the potency of the original sample.

SERUM-SUBSTRATE MIXTURE

*Substrate.*—A solution of potassium hyaluronate (see accompanying description of preparation) in distilled water is made and stored in the cold under toluol or with the addition of a little chloroform as a preservative. Solution is facilitated if the bottle is placed in a 37° C. incubator for 2-3 hours and shaken occasionally. The strength of the solution is determined by comparative test with a standard preparation and is usually from 0.15 to 0.25%.

*Serum.*—Normal horse serum has been used by us but it is probable that rabbit serum would be equally suitable. It is

important that the serum should be from a healthy animal which has not been immunised with any antigen that might contain hyaluronidase and that it should be stored with aseptic precautions. The serum may be kept under toluol, or chloroform may be added as a preservative.

*Preparation of mixture.*—Each tube put up in the test will require 1 ml. The required volume is made up in the following proportions:—

- 10 ml. hyaluronate solution.
- 10 ml. of a 1:10 dilution of serum in saline.
- 20 ml. of distilled water.

This serum-substrate mixture will keep for a few days in the refrigerator, but if it is not used on the day of preparation it is wise to make sure that it will still clot on the addition of acetic acid both before and after incubation at 37° C. for 20 min.

SETTING UP THE TEST

1. *Dilutions of the enzyme samples.*—This test can be used to assay potency to 20% differences, but it is usually unnecessary to test closer than twofold differences. If there is no knowledge of the approximate potency of the sample under test a preliminary titration in tenfold dilutions may be made, followed by a test at twofold differences.

The appropriate dilutions of the exudate or muscle extract to be tested are made in a final volume of 0.5 ml. of distilled water. In order to obtain reproducible results if a final test at 20% differences is made, it is necessary to make these dilutions in bulk, say 10 ml., and to transfer 0.5 ml. amounts of the dilutions to the tubes for test.

2. *Addition of substrate.*—1 ml. of the substrate-serum mixture is added to each tube, including the control, starting from those containing the highest dilution of enzyme. The contents are mixed by inverting the tubes; it is our practice to place a small piece of scrap paper between the finger and the mouth of the tube when inverting to avoid transferring material from one tube to another.

3. *Incubation.*—As soon as mixing is complete the tubes are placed in a water-bath at 37° C. for 20 min.

4. *Clot-production and reading results.*—The rack of tubes is removed from the bath and rapidly cooled by immersion in ice-cold water in the refrigerator for 5 min. This stops the enzymic action and improves the quality of the clot formed on subsequent addition of acetic acid and thus facilitates determination of the endpoint of activity. It is as well not to add the acetic acid to more than two rows of titrations at a time to avoid prolonged contact of the acid before the tests are read. After the addition of the acid it will be noticed that a layer of precipitate forms at the junction of the acid and the test mixture in all tubes; this is of no diagnostic significance. The tubes are now held up to the light and gently shaken. The control and those tubes containing insufficient enzyme show the development of the characteristic stringy clot which contracts on standing. One or two tubes near the endpoint may show a few threads of precipitate. Those tubes in which the enzyme has attacked the substrate show no clot or precipitate and those in which the enzyme is present in excess show clearing of the solution. The results are expressed as follows:—

No clot or threads of precipitate ..	Enzyme present.
Threads of precipitate ..	±
Clot ..	No enzyme.

The highest dilution showing no clot or threads is taken as the highest effective dilution of the enzyme. We have expressed our results in terms of the original dilution of enzyme in 0.5 ml. and have disregarded the subsequent dilution with substrate mixture. It is emphasised that, as a precautionary measure, it is always wise to make sure that the serum-substrate mixture will clot on the addition of acetic acid before setting up the tests. This may save a considerable waste of time in the event of this mixture having been contaminated from any cause. Serum should never be used from an infected animal nor any animal that has been immunised as this may contain anti-hyaluronidase.

5. *To indicate the bacterial source of the hyaluronidase.*—This can be done by specific neutralisation of the MCP activity described above, using the same antisera as those supplied for the viscosimetric test (vide infra). The method recommended for diagnostic purposes is as follows:—

Mix 0.25 ml. of ascending dilutions of wound exudate or muscle extract with 0.25 ml. of a 1:10 dilution in saline of the appropriate antisera. Allow the exudate-serum mixture to stand at room temperature for 15 min., then add 1 ml. of



substrate mixture to each tube and test for clot prevention in the usual way. Inhibition of enzyme activity by any one of the antisera as compared with the activity of a control test without antiserum indicates the source of the hyaluronidase.

For this neutralisation test, as the antiserum dilutions are made in saline, the substrate mixture is prepared without any saline (i.e., serum dilution for this is made in distilled water).

#### TESTS FOR VISCOSITY-REDUCING ACTIVITY OF HYALURONIDASE (C. W. HALE)

Two methods will be described. The first is designed for use in a laboratory, where pipettes and water-baths are available, and requires the following apparatus and reagents:—

Thoma-Zeiss leucocyte pipette.

Water-bath at 37° C.

A large test-tube; some small dilution tubes.

10 ml. and 1 ml. graduated pipettes.

A clock and a watch with second hand, preferably a stop-watch.

Buffer solution as follows:—

Disodium phosphate (Na <sub>2</sub> HPO <sub>4</sub> anhydrous) ..	12.75 g.
Citric acid ..	2.02 g.
NaCl ..	3.50 g.
Water to ..	1 litre

Reaction should be pH=7.0. Hyaluronate solution.

To be prepared according to instructions accompanying dry sample (usually about 0.5% solution).

#### TECHNIQUE

One volume of the buffer solution is mixed with 4 volumes of hyaluronate solution and stood in a water-bath at 37° C.

Pipette 0.1 ml. saline into a small dilution tube and place in the water-bath. Leave for 5–10 min. Add 0.9 ml. of buffered hyaluronate solution (substrate) and mix by stirring and sucking up and down with a leucocyte pipette. Holding the tip of the pipette just under the surface of the fluid, suck up to the "11" mark and allow the fluid to flow out until the meniscus reaches the "1" mark. Time the rate of flow between these two points. Repeat once or twice and take the mean of the readings. This gives the flow-time for the untreated substrate. If hyaluronate solution is kept under toluol in a refrigerator the flow-time need only be checked every week or two.

Pipette 0.1 ml. of wound exudate into a small dilution tube. When warm add 0.9 ml. warm buffered substrate. Mix with the tip of a clean dry pipette by stirring and sucking up and down several times. Holding the tip of the pipette just under the surface of the fluid, suck up to the "11" mark, release, and allow the fluid to flow out until the meniscus reaches the "1" mark; note the time in seconds taken to flow from "11" to "1." Repeat every few minutes during 20 min. A substantial and steady fall in flow-time indicates the presence of hyaluronidase.

**Important points.**—(a) The pipette should be warmed before each reading by sucking the fluid up and down once or twice. (b) Bubbles in the pipette should be avoided as these may give false readings. (c) The tip of the pipette should be immersed below the surface of the fluid in the tube to avoid surface-tension effects. (d) The tip of the pipette should be immersed to some constant depth in all tests to secure a constant pressure head. This is best achieved by immersing only the first 4 or 5 mm. (e) The pipette should be held upright for the same reason.

#### TO INDICATE THE NATURE OF THE BACTERIAL SOURCE OF HYALURONIDASE

0.1 ml. of wound exudate is pipetted into each of a number of tubes. To each of these is added 0.1 ml. of an appropriate antiserum.\* Shake to mix and place in water-bath for a few minutes to warm. When warm add to the first tube 0.8 ml. of warm buffered substrate and mix with a fine glass rod. After 5 min. add substrate to the second tube and mix, and so on, each tube receiving substrate 5 min. after the preceding tube.

30 min. after adding substrate to the first tube take the flow-time reading of the contents of this tube, repeating once or twice and taking the mean. Wash and dry pipette with water followed by acetone and 5 min. later take a reading of the second tube, and so on, with each tube 5 min. after the preceding one. Thus each tube is incubated with substrate for 30 min. before reading.

\* **Antisera.**—Commercial antitoxins have been found to contain varying quantities of the specific anti-hyaluronidase. It is hoped to issue these sera for diagnostic use with particulars as to their potency.

The time of incubation may be reduced to 20 min. if the substrate has been added to the last tube within this time.

#### EXAMPLE

Antiserum ..	<i>Cl. welchii</i>	<i>Cl. septicum</i>	<i>Cl. oedematiens</i>
Mean flow-time (sec.)..	32	72	33
Antiserum ..	Strep. Gp. A.	Strep. Gp. C.	Staph.
Mean flow-time (sec.)..	32	31	35

In this sample it is clear that only *Cl. septicum* antiserum has neutralised the enzyme and therefore hyaluronidase in the wound exudate is from *Cl. septicum*.

The second method can be used in casualty-clearing stations or other places where pipettes, water-baths, &c., are not readily available, or when the supply of wound exudate is limited. The technique is the same except for the following modifications:—

The water-bath may be replaced by a beaker or jug of about 1 pint capacity filled with water at about 45° C. (113° F.). The wound exudate is allowed to stand for a few minutes after collection to enable it to coagulate. The clot is removed and the remaining fluid is drawn up to the "1" mark on the Thoma-Zeiss pipette. Buffered substrate is then drawn up to well beyond the "11" mark, twisting the pipette while doing so to ensure mixing. A wide rubber band is then fixed lengthwise around the pipette and the whole placed in the jug of warm water for 20 min.

The pipette is removed from the warm water and cooled to room temperature. Remove the rubber band and carefully fit the mouth tube. The fluid is then allowed to flow out into a small tube keeping the tip of the pipette immersed in the first few drops that flow out. The time of flow between the "11" and "1" marks is noted. Repeat the flow-time once or twice and take mean. This mean flow-time compared with that of the normal for the sample of substrate with saline instead of exudate under similar conditions at room temperature gives an indication of the presence or absence of hyaluronidase. A shortening of the flow-time indicates the presence of the enzyme in the wound exudate.

The same precautions should be observed as in the first method with the following additions:—

(a) Since the time of flow is to be observed at room temperature and temperature has a marked influence on viscosity, care should be taken not to warm the pipette in the fingers; it should be held upright with the fingers above the bulb.

(b) When adding the substrate the mixture should be drawn up well beyond the "11" mark, making a dilution of about 1:13 instead of 1:11. This enables a few drops to be run out into a tube before taking the first reading and into this fluid the tip of the pipette may be immersed as before.

#### PROVISIONAL METHOD FOR THE DETECTION OF LECITHINASE IN WOUND EXUDATES

This method has been designed primarily to detect *Cl. welchii* actively proliferating in a wound, by means of the lecithinase it produces. This lecithinase is identical with the toxin. *Cl. oedematiens* also produces small quantities of a lecithinase immunologically distinct from that of *Cl. welchii*. It is unlikely that lecithinase found in wound exudates will originate from *Cl. oedematiens*, since the amounts produced are usually smaller than will be detected by the test described. Adequate controls, however, have been added to avoid any possible confusion between these two lecithinases.

#### MATERIALS REQUIRED

1. **Borate-calcium buffer.**—0.3184 g. borax; 2.061 g. boric acid; 0.487 g. sodium chloride. Make to 1000 ml. with 0.1 M calcium chloride. This buffer might be obtained from a chemical firm.

2. **Normal saline.**—0.85% sodium chloride.

3. **Egg-yolk substrate.**—It is hoped to provide ampoules of dried substrate eventually, together with the necessary directions. Meanwhile, the following is a description of the method for making it from fresh eggs: Take one hen egg, separate the yolk from the white, and wash it with saline. Then mix it thoroughly with 250 ml. of saline, add about 10 g. of kieselguhr and filter through a hardened filter paper. Add merthiolate to the filtrate (1:10,000 final concentration). This will keep for 7–14 days at refrigerator temperature.

4. **Welchii antiserum (W.A.).**—Any ordinary *welchii* antitoxin of about 300–500 units per ml. diluted 1:40.

5. *Oedematiens antisera* (O.A.).—Any suitable *oedematiens* serum of about 300–500 units per ml. diluted 1:40. We hope to supply this serum.

METHOD AND INTERPRETATION OF RESULTS

The exudate is allowed to clot, the clot removed and the remaining liquid measured into tubes with the other reagents as follows:—

I	II
0.5 ml. of buffer (1)	0.5 ml. of buffer (1)
3.3 ml. of saline (2)	2.3 ml. of saline (2)
0.2 ml. of exudate	0.2 ml. of exudate
1.0 ml. of egg-yolk substrate (3)	1.0 ml. of W.A. (4)
	1.0 ml. of egg-yolk substrate (3)
III	IV
0.5 ml. of buffer (1)	0.5 ml. of buffer (1)
2.3 ml. of saline (2)	3.5 ml. of saline (2)
0.2 ml. of exudate	1.0 ml. of egg-yolk substrate (3)
1.0 ml. of O.A. (5)	
1.0 ml. of egg-yolk substrate (3)	

Incubate for 20–40 min. at about 37° C.; the temperature need not be accurate and may be judged by the finger. The results are interpreted as follows:—

	I	II	III	IV
Actively proliferating		0	trace to +	0
<i>Cl. welchii</i> ..	trace to +			
Actively proliferating		0	trace	0
<i>Cl. oedematiens</i> ..	trace			
Other infections ..	0	0	0	0

† = turbidity; trace = very faint turbidity; 0 = no change.

All four tubes must be inspected side by side in a rack and not individually; otherwise small amounts of turbidity will be overlooked.

Discussion

Although the results reported in this paper indicate that enzymes of bacterial origin can be detected in the tissue fluid at an early stage of infection and may be of diagnostic significance, it must be emphasised that they have all been obtained from infection experiments in animals with what we believed to be "pure" cultures; these infections must differ in many respects from those resulting from civil or military wounds which are usually contaminated with a mixed bacterial flora. We have not so far had the opportunity of examining any exudate of muscle excised from wounds and can therefore express no opinion as to how far our experimental experience is likely to be confirmed in the field. Although experimental evidence indicates that hyaluronidase and lecithinase can be detected in the oedema fluid as soon as there is sufficient to collect for examination, we do not know how early these enzymes will appear in the infected wound or how the time of their appearance will be correlated with obvious clinical signs of infection. Animal experiments suggest that this is likely to be early in the infective process and before local changes are diagnostic. It remains to be proved whether the fact that the infecting organisms are proliferating in sufficient numbers to produce these enzymes in the tissues is evidence of active wound infection or whether this proliferation can occur when the organisms are only present as apparently harmless contaminants. From our experience with tissue fluids from infected animals we do, however, believe that the methods we have recommended can be applied to the examination of clinical material.

Wounds are usually contaminated with a large variety of organisms, and the mixed nature of the infection may influence its final form and, moreover, complicate the diagnosis from an examination of the exudate. For example, a wound may be contaminated by a hyaluronidase-producing aerobe, such as the staphylococcus, together with a relatively non-invasive member of the gas-gangrene group. What will be the result? Will the action of the staphylococcal hyaluronidases in the tissues enable the gas-gangrene organism to initiate an infection and will the continued presence of the enzyme promote the rapid extension of the gas-gangrene? At any rate, it seems likely that examination of the wound exudate would reveal the presence of hyaluronidase, thus suggesting an infection, but that differential diagnosis would indicate that the enzyme was staphylococcal in origin although the final infection might have the clinical characters of a gas-gangrene. Further work on the

character of mixed infections is obviously necessary and has been planned.

For the present we would suggest that a negative result from the examination of a wound exudate should not induce a false sense of security and should certainly not be allowed to contra-indicate the routine administration of antitoxin or sulphonamide, or both, as a precautionary measure. A negative test may also theoretically be obtained in an obvious case of clinical gas-gangrene in the later stages when the organisms are beginning to retrogress. A positive result should be regarded as a warning of the likelihood of active infection, but too great a stress should not be laid upon the differential diagnosis of the type of organisms from which the enzyme has been derived.

Further experimental work is required to determine the importance of the rôle of hyaluronidase in the infective process and how far an increase in the anti-hyaluronidase activity of sera would enhance their protective action.

Summary and Conclusions

The results of infection experiments with organisms of the gas-gangrene group are described. In infections caused by organisms that produce hyaluronidase, it appears that this enzyme can be detected in the oedema fluid as soon as sufficient can be collected for examination and in the muscle as soon as the earliest sign of infection. Lecithinase ( $\alpha$  toxin) can ordinarily be detected at a similar stage in infections due to *Cl. welchii*.†

A survey of representative strains indicates that a large proportion of *Cl. welchii* associated with clinical gas-gangrene produce hyaluronidase. All the strains of *Cl. septicum* examined produce this enzyme. The position with *Cl. oedematiens* is unsatisfactory; less than half the strains of *Cl. oedematiens* examined produce the enzyme and there is no evidence that this property is correlated with the incidence of gas-gangrene due to this organism. The lecithinase produced by *Cl. oedematiens* is of such low potency that it is unlikely to be of diagnostic significance in the tissue fluids.

Methods for the detection of hyaluronidase and lecithinase which can be used in the field with the minimum of apparatus are described. Simple methods of diagnosing the bacterial source of the enzymes by means of specific neutralisation tests with antisera are also described.

It is suggested that these experimental results should be applied to the examination of clinical material from wounds in the hope that they may furnish useful diagnostic information at an early stage of the infection and thus assist both surgical and ancillary treatments.

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† Since this work was prepared for publication, Weed, Minton and Carter<sup>23</sup> have stated that the production of a turbidity in egg-yolk suspension by *Cl. welchii* culture filtrates is not attributable to the  $\alpha$  toxin. They claim that the reaction is not specific, is produced by the culture filtrates from many organisms and is neutralised by various antitoxins. The evidence in the papers of Macfarlane and Knight,<sup>11</sup> Crook,<sup>7</sup> van Heyningen,<sup>11</sup> Macfarlane, Oakley and Anderson,<sup>12</sup> and Oakley and Warrack<sup>11</sup> is however quite convincing. The conclusions reached by Weed et al. seem to be due, in part at least, to their failure to allow for the activating action of calcium on the toxin or to use buffered solutions in their system when working with undiluted reagents. The non-specific neutralisation is explained by the excessive doses of antitoxin employed.

## PREFRONTAL LEUCOTOMY

## A FURTHER CONTRIBUTION

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In 1941 one of us (G. W. T. H. F.) presented some early results of prefrontal leucotomy<sup>1</sup>; those cases are included in the series published on another page by Hutton and Willway. The present series consists of 15 further cases operated on since then.

## TECHNIQUE

Cases 1 and 2 were both done under a local anaesthetic. The patients found the experience terrifying in the extreme so that local anaesthesia was abandoned. Case 2 said that when the second side was operated on he felt that death was upon him, but then realised that he was still alive; he was, however, not sure for some time afterwards that death would not come. In both patients for months the terror was still a vivid memory.

There was nothing outstanding in the surgical technique additional to what has previously been said. Instead of a leucotome an ordinary ventricular trocar and needle was used. The needle was withdrawn to see if any cerebrospinal fluid was coming out, and if there was none, the blunt trocar was used to divide the white matter on both sides. There was slight bleeding in one or two of the cases, but otherwise the immediate post-operative condition of the patients gave rise to no alarm.

## POSTOPERATIVE CARE

The following instructions are in the hands of the medical officer in charge of the case:

Patient remains on the operating table until fully conscious and the pulse, respiration and blood-pressure are satisfactory. He may then, when permission has been obtained from the surgeon, be moved to bed. During this time the pulse and respiration rates shall be taken every 15 minutes, and the blood-pressure every 30 minutes; after return to the ward pulse and respiration rates every 30 minutes, temperature and blood-pressure every hour. After the first 36-48 hours a 2-hourly chart or 4-hourly may be kept according to the surgeon's instructions.

A careful watch must be kept on the patient to see whether the state of consciousness is improving or regressing, and for movement of the face and limbs, the presence of abnormal movement in the form of muscular twitching or actual convulsion, speech, and the size of the pupils.

Intravenous saline, if required, is to be kept running at 30-40 drops per min., the container receiving alternately 250 c.cm. of normal saline and 5% glucose in saline. Note should be taken of the state of the limb into which the cannula is inserted and any evidence of swelling or redness reported to the surgeon. Fluids to be given very sparingly by the mouth for the first 12 hours, but frequent mouthwashes are desirable. Small amounts of fluid, about 1 oz. at a time, may be given every 15-30 min. if the patient is not vomiting or appearing likely to vomit. On the morning after operation 2 oz. of magnesium sulphate in 2 oz. of water to be given per rectum and the patient encouraged to retain it for as long as possible. This will probably have to be repeated the same evening and possibly twice daily for several days.

The patient should be kept lying on the back. If temperature rises to 102° F. or over first remove the blankets, then give a tepid or alcohol sponge and, if this does not prevent the temperature rising still further, remove night-gown, cover the patient only with a sheet and turn on the electric fan so that it plays directly on him. If the temperature continues to rise after this inform the surgeon and be prepared to give a cold tap-water enema. Gradually elevate the head of the patient after the first 8 hours and continue for some hours until the patient is sitting almost upright and is comfortable.

**Bladder:** if the patient has not passed urine at the end of the first 8 hours inform the surgeon. Prepare catheters.

**Drugs:** soluble phenobarbitone by intramuscular injection is given in doses of gr. 1½ for restlessness and, if not effective in 1 hour, the surgeon must be told. The dose may be

repeated 4-hourly with safety. Codeine phosphate by subcutaneous injection in doses of gr. 1 4-hourly may be given for severe headaché. A solution of 50% sucrose, 100 c.cm., should always be ready for intravenous injection, but may only be given after the surgeon has been informed.

*Morphia must never be given to any patient with an intracranial lesion or after craniotomy.*

In the event of any complication arising it is most important to get into immediate touch with the neurosurgeon.

## CASE-HISTORIES

1. Housewife, aged 50. Involuntal melancholia for 27/12 years. Leucotomy on Aug. 23, 1941. She showed some postoperative headaches and impairment of memory for recent events. No rectal or vesical incontinence. Was somewhat depressed for a while and was given amphetamine. Returned home on Oct. 11, 1941, to the care of her husband. Recovery slow, but husband reports on Feb. 6, 1943, that his wife is "very well indeed, but not quite perfect."

2. Works manager, aged 49. Married. Recent melancholia, 10 months' duration. Leucotomy Aug. 23, 1941. No postoperative symptoms but made slow progress, and said he was no better. Subsequently improved steadily and went home to the care of his wife on Dec. 23, 1941. Letter from his father on Jan. 24, 1943, states: "A year has now passed since he came home and started work, and he has not had a day's indisposition; more than that he has been promoted to a highly responsible position as manager of the company's western area office with responsibilities extending to the whole of South Wales and Monmouth. I am told that his energy is boundless and his class of work unsurpassable."

3. A married woman, aged 55. Independent means. Recent melancholia of 1½ years' duration. Leucotomy on Dec. 20, 1941. Postoperative incontinence of urine for some weeks. No improvement whatever shown until spoken to firmly after visit of husband who was anxious to take her home and give her a chance. On being told that if she could behave herself well for a week she could go home, she did so with a struggle and went home on March 24, 1942. When subsequently seen she was perfectly well and running a large country house and grounds with complete efficiency. Still rather inclined to be "difficult."

4. An unmarried woman, aged 53. Independent means. Obsessional state with guilty feelings from masturbation; duration 3 months. Leucotomy on Feb. 7, 1942. No postoperative symptoms. Complete disappearance of obsessional and guilt symptoms. She became rather aggressive and argumentative, but was otherwise very pleasant and did things that she felt she had not been able to do for a long time. Discharged on May 9, 1942. Report from outside psychiatrist on Feb. 5, 1943, that she was very well and working hard for a hospital.

5. A bank clerk, aged 40. Catatonic schizophrenia of 15 years' duration. He had had full course of metrazol convulsions with no improvement. Leucotomy on Feb. 7, 1942. Postoperative incontinence, otherwise nothing abnormal. Is now thought to be less boisterous and more amenable. Has had one seizure since his operation, followed by a period of 6 months without a seizure. He has no neurological signs.

6. An unmarried woman of 61. Retired post-office official. Melancholia of 5½ years' duration. Leucotomy on Feb. 28, 1942. No postoperative symptoms whatsoever. Discharged to her brother on Sept. 11, 1942. Subsequently she wrote and said how satisfied she was and appeared to be doing well and enjoying life. Her brother, a retired admiral, on Jan. 17, 1943, writes: "She is now a lusty trencher-woman, and has put on considerable weight. Is intolerant and lacking in consideration to the domestic staff. She has made a wonderful recovery and is an altered woman, but is not yet perfect. Has occasional bed-wetting which she is rather unconcerned about."

7. An unmarried woman of 65. Independent means. Melancholia of 11 years' standing. Leucotomy on April 25, 1942. Postoperative incontinence. Slight improvement.

8. A married woman, aged 70. Independent means. Involuntal depression of 10 years' duration. Leucotomy on April 25, 1942. No postoperative symptoms of note. Subsequently said she was no better and began to stay in bed. Spoken to firmly and after a visit from her husband who had not seen her for 3 years and said quite plainly that

1. Hutton, E. L., Fleming, G. W. T. H. and Fox, F. E. *Lancet*, 1941, ii, 3.

he did not want her at home as she was, she improved steadily, took an interest in outside events and subsequently went home on Dec. 1, 1942. She did very well at home and from reports was cheerful, active and taking her share in social activities. Died of a coronary thrombosis on Jan. 24, 1943.

9. An unmarried woman, aged 59. Independent means. Manic-depressive of 4 years' duration with paranoid background. Leucotomy on May 9, 1942. No postoperative symptoms except slight memory impairment which soon cleared up. Discharged to an old doctor friend on Aug. 15, 1942. Subsequently reported to be free from any depression but to be rather difficult to live with. On Jan. 20, 1943, reported to be still rather "difficult and garrulous."

10. A married woman, aged 44. Independent means. Melancholia of 5 years' duration with constant hallucinations. Made an attempt at suicide by taking gr. 750 of aspirin. Was very ill for a few days but recovered. High blood-pressure (240 mm. Hg). Leucotomy on Oct. 3, 1942. No postoperative symptoms. Hallucinations completely disappeared. Recovery gradual. Leaving to go home with husband on Feb. 2, 1943, and had a seizure on bus. Brought into hospital—had 13 seizures altogether, possibly due to her hypertension?; subsequently went home with husband.

11. A married woman, aged 70. Milliner. Recurrent melancholia of 5 years' duration. Leucotomy on Nov. 22, 1942. Postoperative incontinence, very noisy, severe insomnia, headaches and some confusion. Less depressed. On Feb. 5, 1943, still confused, rambling in conversation, considerable insomnia. She developed a tremor of parkinsonian type in both arms and in her lips.

12. A retired ironmonger, aged 62. Melancholia of 5 years' duration. Had 15 electric shocks with no result and one prolonged shock of 20 sec. with no result. Leucotomy on Nov. 22, 1942. Postoperative lack of symptoms, but was very aggressive at times, using foul language which he had not done previously. No improvement.

13. A housewife, aged 43. Melancholia of 5 months' duration with a paranoid background. Leucotomy on Nov. 22, 1942. Postoperatively very aggressive, completely degraded in habits, sustained conversation badly. Has gained some weight. Some improvement.

14. A retired bank manager, aged 64. Melancholia of 2 years' duration with paranoid background. Had a series of 15 electric shocks with no result and one prolonged shock of 20 sec. duration with no result. Leucotomy on Dec. 6, 1942. Postoperatively very confused with irregular temperature. Considerable improvement but he is inclined to conceal his symptoms possibly with some ulterior motive.

15. A married woman, aged 29. Independent means. Melancholia of 9 months' duration. Leucotomy Jan. 17, 1943. No postoperative symptoms. Went home recovered Feb. 5, 1943, 19 days after operation. Reported on by parents-in-law as better than she had been for years.

#### DISCUSSION

Of our present series of 15 cases, 12 are cases of melancholia of varying age and duration, and different types (9 involuntional, 1 melancholic with severe hypertension, 1 reactive depression and 1 a paranoid syndrome with depression); of the remaining 3, 1 is an obsessional, 1 a schizophrenic and 1 a manic-depressive. Most of the melancholics were of good prognosis; of the 12, 7 have made a complete recovery, 1 has shown considerable improvement and will probably be well enough to go home and the other 4 have so far shown little improvement. The obsessional case has completely recovered, but the schizophrenic remains much the same although quieter, while the manic-depressive is improved.

Two cases which were of involuntional type and were not doing at all well suddenly began to improve after being spoken sharply to and told that they must "pull themselves together to go home." Both did well at home, although one died of a coronary thrombosis. After the operation 5 cases were wet. We have the impression that the more severely mentally affected the patient is before the operation the more likely he is to be wet after it.

One patient, the schizophrenic, has had a single seizure since the operation, and one had a series of 13 seizures, but as her blood-pressure was 240 mm. Hg it is possible that the seizures were of hypertensive origin.

Several of the patients have themselves stated that they have found complete "peace of mind" after the operation, and this does appear to us to be an outstanding fact about it, and a very important one in patients who for years have been suffering torment.

The operative risk seems to be small. There have been no deaths in this series of 15 cases.

Of the involuntional melancholics, 2 had had 15 electric shocks followed by a prolonged shock of 20 sec. with no clinical improvement. One of these has shown no improvement after leucotomy, the other a moderate degree of benefit.

#### RESULTS OF PREFRONTAL LEUCOTOMY

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In July, 1941, a preliminary report was published on the early results obtained in 8 patients treated by the operation of prefrontal leucotomy. The results were sufficiently encouraging to warrant the further adoption of this method of treatment, and the present paper records the results in the first 50 patients so treated.

The most important data are briefly recorded in the table, from which it will be seen that the fatality-rate is low (4%). The 2 deaths occurred early in the series; only one of these could be directly attributed to the operation. It was due to cerebral hemorrhage caused by accidental section of the anterior cerebral artery. The other death was due to cardiac failure and occurred in a patient who had suffered from auricular fibrillation before operation, but whose mental condition was so pitiable that it was considered justifiable to operate in spite of the cardiac condition. This opinion would seem to have been well founded, for the mental relief produced by the operation was profound until his death two days later.

In most of the patients the postoperative course has been uneventful; enuresis, usually transitory, has occurred in several cases, but other neurological complications have been rare as will be seen from the table. An epileptiform attack developed in case 33 about five months after the operation.

In view of the radical nature of the treatment, it has only been advocated in cases where the prognosis was poor, and in which other methods had been tried and had failed to procure permanent improvement, or in cases where no benefit was to be expected from current methods of treatment.

Considering the chronicity of many of the cases the results are extremely encouraging. Moreover, there is no record of any deleterious effect; not a single patient is recorded as being worse after the treatment than before; and even in the least satisfactory cases the patient is usually found to be quieter, less impulsive, more amenable, easier for the nursing staff to manage and less disturbing for the other patients.

The treatment has been tried in varying forms of mental disorder—namely, schizophrenic, depressive, obsessional and anxiety states—and improvement has been obtained in every type. Results seem to be most successful where there is a very strong negatively-toned emotional factor, such as apprehension, anxiety, inadequacy or guilt. Conversely, the least successful results have been obtained in cases of dementia simplex characterised by emotional apathy and general mental reduction.

In spite of the relative uniformity of the operative procedure, there is considerable variation in the subsequent characters of the patients so treated. This is almost certainly due to the wide variations obtaining in the prepsychotic and preoperative personalities, and is dependent upon the individual's total constitution. Consequently in the postoperative as in the preoperative stage there are to be found different levels of intelligence, different degrees of initiative and different social adaptations. Nevertheless there are certain characteristic tendencies to be traced in them all. Complacency is one of the most outstanding features of these patients after the operation; they are self-satisfied and easily pleased with their environment and, though they may be irritated with things which conflict with their wishes or interfere with their comfort, they are not readily disturbed nor

## RESULTS OF PREFRONTAL LEUCOTOMY IN 50 CASES

Case	Sex and age	Diagnosis and previous breakdowns (PB)	(a) Admission (o) Operation	Mental state before leucotomy	Previous treatment	Results of operation
1	F 25	Schizophrenia, 2 years	(a) Nov., 1938 (o) Dec. 11, 1940	Resistive, negative, destructive, rapidly deteriorating	Insulin. Endocrine. ECT with temporary remissions	Discharged Feb. 15, 1941. Rather childish and dependent, but rational and able to earn some of own living. Occasional anuresis
2	F 37	Schizophrenia	(a) Feb., 1937 (o) Feb. 19, 1941	Catatonic stupor with occasional outbursts of impulsiveness and maniacal excitement	1939, ECT: remission for 11 months. Nov., 1940, ECT: remission for 1 month	Discharged April 2, 1941. Quiet, well behaved in sheltered environment with regular routine. Takes part in social family life
3	M 42	Neurosis	(a) Feb. 15, 1941 (o) Feb. 19, 1941	Nervous wreck since 1914-18 war. Often off work, reserved, solitary, self absorbed. Acute attacks anxiety precipitated by air raid. Confused, depressed, unable to concentrate, unable to do anything	—	Indifferent to air raids. Content, cheerful! working as general labourer
4	M 53	Hypochondria	(a) Sept., 1940 (o) March 12, 1941	Severe hypochondriasis. Severe pain lower abdomen and penis. Agitated, restless, noisy, incontinent with bedsores. Myocardial degeneration with auricular fibrillation	1930, bilateral chordeotomy, but pain returned within 3 days. Sept., 1940, ECT with temporary remission	Operation under local anaesthetic. Patient continually complaining of his pains until actual section of the prefrontal tracts. Free from pain, but later had severe heart attack and died after 2 days
5	M 58	Depression. PB, 1928	(a) 1935 (o) April 9, 1941	1928, two suicidal attempts; 1935, attempted cut throat. Depressed, agitated, restless, tearful. Requiring tube-feeding	—	Could be discharged but home conditions not suitable. Some slight dementia but quite well behaved and taking part in social life of the hospital
6	M 31	Catatonic schizophrenia PB from 1930	(a) 1931 (o) April 9, 1941	Catatonic with periodic attacks of excitement when noisy and destructive, requiring padded room	Endocrine. Leptazol. ECT	Rather more manageable but no significant improvement
7	F 32	Catatonic, 4 years	(a) June 7, 1940 (o) April 9, 1941	Catatonic: hallucinations; impulsive, persecuted, homicidal	—	Little change; hallucinations less evident, but still impulsive
8	M 40	Catatonic	(a) Feb., 1922 (o) April 16, 1941	Catatonic. Complete mental deterioration; inaccessible, hostile, noisy, violent, restless	1938, 10 injections placental blood. Leptazol	Rather quieter but otherwise not much change
9	F 27	Schizophrenia	(a) Nov., 1938 (o) April 25, 1941	Irrational, incoherent, impulsive	—	Died from cerebral hemorrhage
10	M 59	Obsessional	(a) April 22, 1941 (o) May 21, 1941	Agitated, depressed, almost suicidal; severe obsessions and feelings of guilt	—	Cheerful, content, leading normal social life. Unable to find satisfactory work on account of age
11	F 20	Schizophrenia	(a) April, 1933 (o) Aug. 14, 1941	Hallucinative, dangerously impulsive. General deterioration; very destructive, often requiring padded room	Insulin: no effect. 1939, ECT with temporary remissions	Slow but progressive improvement. Discharged July, 1942. Rather lazy but helping with poultry and in garden. Simple but quite sensible and well behaved.
12	F 28	Schizophrenia, 3-4 years	(a) Aug., 1941 (o) Sept. 4, 1941	Hebephrenic, passively resistive, timid, shy, uncoöperative and unemployable	1940, ECT with temporary remission	Discharged Nov., 1941. Travelled home by herself. Shortly after her return nursed her mother through a severe illness. Joined the WAAF. Now teaching in an infants' school
13	M 36	Paraphrenic PB, 1931-1932; 1938	(a) Oct., 1940 (o) Oct. 14, 1941	Aggressive, homicidal; had actually killed a friend some years before. Messianic delusions; believed he was sent to avenge the persecutions of the Jews	1935, insulin: considerable success. 1940, ECT: result indefinite	Considerable improvement during the first 2 months, worked well; then became hallucinated and aggressive. ECT: little or no improvement. After prolonged ECT became more amenable and pleasant but remains unstable and potentially dangerous
14	F 26	Catatonic schizophrenia PB, March-Oct., 1934; April, 1937, to March, 1938; June, 1938, to July, 1940	(a) Nov. 1, 1940 (o) Dec. 9, 1941	Noisy, restless, mischievous, unemployable; conversation incoherent	Nov. 15, 1940, ECT temporary remission	Discharged March 19, 1942. Working; gets on well at home; somewhat self-centred and irritable at times
15	F 32	Schizophrenia PB, April, 1937, to Jan., 1938	(a) Nov. 27, 1939 (o) Dec. 12, 1941	Asocial, seclusive, resentful, mildly persecuted, blames her husband for her condition; unstable, non-coöperative	—	Sept. 7, 1942: discharged to care of parents; well behaved, helping at home and in father's business. Quite content, somewhat lacking in initiative
16	M 32	Catatonic schizophrenia PB, Aug., 1935	(a) May 21, 1936 (vol. pt.) (o) Dec. 19, 1941	Solitary, disoriented, sometimes catatonic, sometimes impulsive, chattering incoherently, unemployable, degraded	—	Fatuously cheerful and content. At first very adverse to work but now working in tailor's shop. Reads, listens to the wireless but takes little interest in anything outside his limited environment
17	M 34	Anxiety neurosis	(a) Aug., 1940 (o) Jan. 16, 1942	Unable to work for past 9 years, anxious, apprehensive, worrying over trifles, depressed, introspective worrying about his health; emaciated, difficult with food	—	June 13, 1942, now working as clerk on GWR. Good-humoured, sociable, fond of practical jokes. Considerable increase in weight
18	F 23	Schizophrenia	(a) Feb. 8, 1940 (o) April 3, 1942	Mute, impulsive, restless, degraded, mischievous. Conversation incoherent and irrelevant	Feb. 28, 1940, ECT	Improved for a while, began to knit, read, write; conversed sensibly then began to relapse, and is again inclined to be mischievous, idle and rather silly

## RESULTS OF PREFRONTAL LEUCOTOMY IN 50 CASES—continued

Case	Sex and age	Diagnosis and previous breakdowns (PB)	(a) Admission (o) Operation	Mental state before leucotomy	Previous treatment	Results of operation
19	F 34	Schizophrenia. PB, 1939 (vol. pt.)	(a) Sept. 11, 1940 (o) April 9, 1942	Vol. pt. Restless, erotic, talks incessantly; aurally hallucinated; unemployable; threatened to kill husband and children with a hatchet	ECT stopped because of vertebral fracture	June 9, 1942, discharged; a little irresponsible and inconsequent, but looking after her home and children. Self-centred, talkative, rather self-satisfied but otherwise well
20	M 24	Schizophrenia	(a) June 2, 1934 (o) April 16, 1942	Tremulous, hallucinated, believed he had V.D., attempted suicide, sullen, morose	—	Slightly improved; works well, does not give any trouble
21	F 29	Schizophrenia, 10 years	(a) Nov., 1941 (o) April 25, 1942	Surly, destructive, impulsive, grossly hallucinated	ECT: slight improvement	July, 1942, discharged; helps in household duties and has part-time work outside
22	F 27	Schizophrenia, mentally defective	(a) Sept. 2, 1938 (vol. pt.) (o) May 1, 1942	Dull, apathetic, faulty, requires supervision, unemployable	1938, leptazol: considerable anxiety and impulsiveness	No change
23	F 56	Melancholia	(a) July 5, 1939 (vol. pt.) (o) May 1, 1942	Depressed, dull, often mute, talks of being dead; unemployable, suicidal	—	June 15, 1942, discharged; very well, cheerful; leading a normal life at home but not capable of great activity because of physical ill health
24	F 44	Paraphrenia	(a) Feb. 28, 1938 (o) May 3, 1942	Many delusions of persecution and ideas of reference; aurally hallucinated, very restless, uncoöperative, unemployable	—	Settled and gives no trouble; interests limited to her immediate surroundings. Clean, tidy, does a little sewing; aurally hallucinated at times
25	F 35	Schizophrenia. PB, 1931	(a) Aug. 17, 1938 (o) May 15, 1942	Restless, irresponsible, mischievous, destructive, impulsively violent, uncoöperative, incoherent	1938, leptazol	A little less restless and mischievous
26	F 51	Depression	(a) April 28, 1930 (o) May 22, 1942	Depressed, restless, agitated; complains of ill-treatment and regards this as punishment for her misdeeds	Nov. 3, 1941, ECT	On the whole less agitated; noisy and resistive if interfered with; no attempt to occupy herself
27	M 55	Depression. PB: manic-depressive attacks over 20 years	(a) Feb., 1941 (vol. pt.) (o) May 28, 1942	Depressed, agitated, actively suicidal	First course ECT: good remission; relapsed 10 days after discharge. Second course: remission, but relapsed quickly	Discharged 2 weeks after operation. Returned to his prewar civilian job 4 days after this and is doing splendidly. More general interest, has apparently lost his egocentricity and self-reproach
28	M 52	Depression. PB, 1936	(a) Jan. 11, 1940 (o) May 29, 1942	Attempted suicide, 1936. Depressed, hypochondriacal, insomnia, unable to face life outside	—	June 27, 1942, discharged. Working, feeling much better, sleep normal. Is "sure the operation was a big success"
29	F 30	Schizophrenia	(a) March 28, 1933 (o) June 5, 1942	Dull, apathetic, mute, impulsive, unemployable	March, 1938, Leptazol: temporary remission	No change
30	F 65	Depression	(a) July 25, 1936 (o) June 8, 1942	Restless, agitated, hypochondriacal, alleges ill-treatment, slovenly, dirty, degraded	ECT: no improvement	Improved, pleasanter, coöperative, less complaining; occasionally irritable and spiteful
31	F 39	Schizophrenia. PB, 1923 for 24 weeks; and 1935-36	(a) Feb. 22, 1937 (o) June 16, 1942	Incoherent, extremely violent, restless, quarrelsome, unemployable	—	Some slight improvement; more amenable, requires personal supervision, but will violently resist interference
32	F 38	Schizophrenia	(a) March 29, 1938 (o) June 19, 1942	Restless, confused, childish, hallucinated	Considered unsuitable for leptazol	More amenable, lacks initiative, has little to say; not so violent
33	F 28	Schizophrenia, 2 years	(a) Oct., 1941 (o) June 25, 1942	Confused, surly, resistive	ECT, three courses: good remissions, but always relapsed	July, 1942, discharged. Much improved, not so harassed, happy, helps in the house; had a possible petit mal attack soon after the operation and a major attack Nov., 1942, EEG normal. No fits since
34	F 51	Agitated melancholia	(a) Sept. 14, 1936 (o) June 30, 1942	Extremely agitated, unable to conduct any normal conversation, faulty, unemployable	—	Extremely good remission; went out on leave and relapsed on return; not quite so agitated as before
35	M 42	Paraphrenic. PB, June, 1937; Dec., 1939	(a) Dec. 14, 1939 (o) July 7, 1942, right side; Nov., 1942, left side	Suspicious and persecuted; aggressive at times, deteriorating mentally; uncoöperative	Feb., 1941, ECT: slight remission	Lost his delusional idea almost immediately after the operation; discharged. Began work in Sept. Auditory hallucinations recurred about the end of Oct. Now very well. Working, no hallucinations
36	F 32	Schizophrenia	(a) July 7, 1938 (o) July 7, 1942	Incoherent, continually asking to be chopped and burnt; aurally hallucinated, uncoöperative	March, 1937, leptazol	More amenable; rather solitary
37	F 37	Schizophrenia, from adolescence	(a) June, 1942 (o) July 14, 1942	Resistive, faulty, emaciated; spoon-fed, requiring constant attention	—	No longer restless, took food well and gained 1 st. in a fortnight; some enuresis; no marked intellectual improvement, but patient is now being cared for at home

RESULTS OF PREFRONTAL LEUCOTOMY IN 50 CASES—*continued*

Case	Sex and age	Diagnosis and previous breakdowns (PB)	(a) Admission (o) Operation	Mental state before leucotomy	Previous treatment	Results of operation
38	F 42	Depressive, 20 years manic depressive	(a) June 26, 1942 (o) July 28, 1942	Manic-depressive attacks since aged 22. On admission profoundly depressed, suicidal; later became maniacal	ECT produced a very brief remission	Continues to have brief manic episodes coincident with the menstrual periods
39	M 37	Schizophrenia, 10 years	(a) July 29, 1942 (o) Aug. 14, 1942	Negativistic, hallucinative, inclined to be impulsive; catatonic	—	Discharged 2 weeks after operation. Slight relapse end of Sept., lasting 1 week. Helps in house and garden though lazy, and disinclined to do much active work
40	M 41	Depressive. PB, Feb., 1938, to Jan., 1939	(a) Aug. 12, 1940 (o) Aug. 15, 1942	Vol. pt. Suspicious, hypochondriacal; thinks people deliberately try to upset him; fits of depression	—	Discharged Dec., 1942. Better, but lacking in initiative; still preoccupied with his health; helps his wife in the house
41	F 34	Schizophrenia	(a) Aug. 15, 1940 (o) Aug. 18, 1942	Emotional, unstable, aurally hallucinated, ideas of reference, uncoöperative	—	Improved considerably but subsequently relapsed, though more coöperative and now working
42	F 70	Depressive	(a) Nov., 1938 (o) Sept. 10, 1942	Agitated melancholia, difficult to nurse, apparent progressive mental deterioration	ECT: temporary remission	Immediate improvement; discharged 18 days after operation; leading normal social life
43	F 28	Schizophrenia. PB, recurrent attacks since aged 17	(a) Oct., 1941 (o) Sept. 12, 1942	Recurrent attacks of depression since 17. Mental condition aggravated by riding accident March, 1942. Suicidal, apprehensive, dependent, childish	ECT: partial remission	More amenable and cheerful but still childish and irritable, especially when menstruating
44	M 29	Schizophrenia, 3 years	(a) Sept., 1942 (o) Sept. 19, 1942	Confused, restless, inclined to wander	ECT: good remission followed by relapse	Discharged, Oct. 12, 1942; reports of progress satisfactory
45	M 28	Schizophrenia, 1 year	(a) July, 1942 (o) Sept. 19, 1942	Semi-stuporous, confused, impulsive	—	Discharged 3 weeks after operation; progress satisfactory
46	M 52	Depressive, 15-20 years	(a) Nov., 1941 (o) Dec. 3, 1942	Admitted with acute hypochondriacal depression, severe physical debility, ECT produced a hypomanic phase, petulant, irritable, expansive	Modified insulin therapy. ECT	Cheerful, carefree, no longer petulant and irritable
47	F 51	Hypochondriac. PB, Nov., 1939	(a) July 4, 1940 (o) Oct. 21, 1942	Hypochondriacal, continually worrying about her pains, somewhat apprehensive and agitated, difficult with her food	—	A little less hypochondriacal
48	F 32	Defective	(a) Jan., 1938 (o) Oct. 23, 1942	Mental defective with a predominating factor of fear; apprehensive, restless, agitated; voracious appetite; unemployable	—	No great change but is not so apprehensive and fearful as before
49	M	Schizophrenia	(a) Sept., 1941 (o) Nov. 6, 1942	Sullen, bad tempered, asocial, disagreeable, prone to neglect himself, negativistic, many delusions of unworthiness	—	Jan., 1943, granted leave of absence with view to discharge; still seclusive, does not take much interest in things, but amenable, obedient, looks after himself; delusions have disappeared
50	M	Syphilophobia; depression PB, July, 1941	(a) July, 1942 (o) Nov. 6, 1942	Depressed, complains of general weakness. Syphilophobia, unable to work. Always excessively polite, and very worried about himself	Aug., 1941, ECT	No longer talks about having syphilis. Rational but not as polite as he was; inclined to be lazy

ECT = electrical shock treatment.

Vol. pt. = voluntary patient.

easily upset. They are not incapable of taking thought for the morrow should anything stimulate them to do so, but they are quite content for the morrow to take care of itself.

The amount of stimulation which they receive from their environment will largely depend on the range of their interests before operation, and the extent to which stimuli are forcibly obtruded on them. Those patients who were intelligent, active and industrious before their breakdown, will ipso facto have acquired conditioned responses to a large variety of objects and events, and after operation may appear even more intelligent, active and industrious when their reactions to these well-discriminated stimuli are no longer inhibited by doubts, fears and indecisions. On the other hand, the patient of limited intelligence, if left to his own devices, will show definite apathy, idleness and lack of initiative, due to inability to be stimulated except by a very narrow range of almost vegetative interests. If however he is not left to himself, but is made to attend to events happening around him and to take his share in such events, the degree of re-education and resocialisation which can be achieved is both surprising and gratifying. This is well illustrated by the following case.

CASE 11.—This girl had probably never been of very high intelligence, and after her admission to hospital in 1933 she

showed progressive mental deterioration, accompanied by violent and dangerous outbursts and extreme destructiveness. Shortly after the operation she became more amenable and coöperative, though there were occasions when the shadow of her previous disorder appeared, and she would become negativistic and surly. Gradually she began to take part in the life of the hospital. Though at first when given a brush to use in the verandah she monotonously brushed the same patch endlessly, by gradual coaxing and re-education she became more progressive in her work. After six months she was quite reliable, used her own initiative, and became a useful worker. She was discharged in July, 1942, and has written comprehensive and interesting letters about her activities in the garden and in looking after poultry, but she is apparently still somewhat lazy.

This rehabilitation after the operation is of the utmost importance; adequate personal attention and encouragement are essential, and where these are lacking the results tend to be somewhat disappointing.

The greatest success is obtained in patients of good intelligence whose relatives have sufficient interest, affection and understanding to help in this process of re-education. Under such circumstances the results are often astounding, and both the patients and their relatives are enthusiastic in their praise. Many of the discharged patients are back at work and in most cases are

reliable and efficient workers. Though wide variations in intelligence are to be found, routine testing indicates that no gross alteration occurs as a result of the operation.

In a proportion of the patients physical alterations develop concomitantly with the emotional changes after operation. The most obvious of these is increase of weight; the thin harassed agitated patient becomes fat at the same time as he becomes placid and contented. Often during the first few months the patient has a voracious appetite, but gradually this diminishes, and there is no further increase in weight. Several of the women patients who suffered from amenorrhoea during their illness have menstruated regularly since, though in one or two cases it is reported that menstruation which was regular before operation has ceased since. In some of the male patients libido has returned after the operation.

In conclusion it may be said that by means of this method of treatment many patients who were suffering from extremely distressing and often supposedly hopeless and incurable mental disorders are now contented and useful members of society.

All the above patients were operated upon by Mr. Wilfred Willway.

### PULMONARY TUBERCULOSIS AS DISCOVERED BY MASS RADIOGRAPHY

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A SERIES of 200 consecutive cases of active pulmonary tuberculosis in males are analysed in this paper. They were all discovered as a result of mass radiography of Royal Air Force personnel. The diagnosis in every case depended on a review of clinical, radiological and pathological findings and was not made on the X-ray appearances alone.<sup>1</sup>

Sputum examinations had to be confined to the examination of three smears, using the Ziehl-Neelsen method of staining. In the 200 cases the sputum was positive for acid-fast bacilli in 61. The type of disease discovered was as follows: Assmann's focus, 12 cases; true apical tuberculosis,<sup>2</sup> 10 cases; the usual fibrocaceous type of tuberculosis, 178 cases. In this last group 2 were associated with pleural effusion and 1 with a spontaneous pneumothorax.

The ages of the patients fall between 18 and 42, the age-distribution being as follows: 18-19, 69 cases; 20-24, 73 cases; 25-29, 13 cases; 30-34, 19 cases; 35 and over, 20 cases.

#### HISTORY AND SYMPTOMS

In discussing the history and symptoms it must be emphasised that the information is based on the patients' answers to direct questions concerning each point. A statement that there were no symptoms was not accepted without detailed questioning.

A history of pulmonary tuberculosis in a near relative (father, mother, brother, sister, wife or child) was given by 33, and 37 admitted contact with such a relation or with another individual suffering from pulmonary tuberculosis. In 41 cases there was a history of previous illnesses which may have had a tuberculous basis. These were as follows: bronchitis, lasting for periods of from two months to eight years, in 15 cases; hæmoptysis within the previous three years, in 15 cases; pleurisy, in all but one case within the previous five years, in 9 cases; observation by a tuberculosis officer or treatment in a sanatorium in the past, in 3 cases (2 within the previous two years and 1 twelve years before); fistula in ano (possibly ischio-rectal abscess), in 2 cases; and tuberculous elbow, in 1 case.

In no case had the patient considered any symptoms that he may have had sufficient grounds for troubling his medical officer. In all, 51 subjects denied any contact with tuberculosis, any previous illness that may have had a tuberculous basis and any symptoms whatever, on direct questioning; a further 8 denied any previous illness of note, or any present symptoms, while admitting to contact with a case of pulmonary tuberculosis; a total of 70 denied the presence of any symptoms even on direct questioning, and yet 10 of them proved to have positive sputa in spite of their denial of the presence of a cough.

Any symptoms except cough (which they said had been present for only a few days unaccompanied by phlegm) were denied by 29, of whom 2 were found to have positive sputa. It is doubtful if a cough only admitted on direct questioning, said to have been present for only a few days, unaccompanied by phlegm and attributed to a slight cold or to smoking, really warrants the title of a symptom. If we accept this argument for the moment, there are, among the 200 cases, 99 who deny symptoms, 12 of whom proved to have positive sputa.

A cough with sputum was admitted by 39 who denied any other symptom; of these, 18 had a positive sputum. 54 admitted cough with sputum, accompanied by other symptoms, as follows: shortness of breath on exertion, 29 cases; lassitude or being easily tired, 22 cases; loss of weight, 13 cases; sweating at night, or sweating readily, 12 cases; pain in the chest, 10 cases; and indigestion or loss of appetite, 2 cases.

Another 8 cases denied any cough while admitting the presence of other symptoms as follows: shortness of breath, 5 cases; fatigue, 2 cases; pain in the chest, 2 cases; sweating at night, 1 case.

Physical signs have here been divided into two classes. The first class, referred to as non-adventitious signs, includes the presence of the sternomastoid sign,<sup>3</sup> deficient movement over any part of the chest, or an impaired percussion note. The second class, referred to as adventitious signs, includes the presence of râles or sibili. It must be emphasised that in most cases these signs were minimal.

In 184 cases there were detectable physical signs in the chest. Non-adventitious physical signs were present in the absence of adventitious signs in 38 cases, and in 15 cases adventitious signs were present in the absence of non-adventitious signs. Of the 16 cases without physical signs, the diagnosis rested on a positive sputum in 4, and in 12 on radiological evidence supported by the history and such investigations as the temperature, blood-sedimentation rate, &c.

#### CONCLUSIONS

The importance of contact with a case of pulmonary tuberculosis, and of previous attacks of bronchitis or of hæmoptysis or pleurisy are well known as ætiological factors in the development of pulmonary tuberculosis. These factors are present, as one might expect, in tuberculosis as discovered by mass radiography. Usually the disease is diagnosed as the result of a patient feeling unwell and consulting his doctor, but mass radiography can lead to its discovery at a stage when there are, from the patient's point of view, no symptoms worth bothering about. It is interesting to note that an individual may have a positive sputum even though he considers that he is not suffering from a cough. In other words, his impressions are likely to be most misleading, and it seems that little reliance must be placed on his statements.

From this series of cases it seems likely that, at first, the disease is present in the lung but gives rise to no symptoms; later it produces a cough, at first dry but subsequently accompanied by sputum. Still later, systemic symptoms appear. The earliest is likely to be dyspnoea on exertion followed by lassitude, loss of weight and then night sweats as the temperature-regulating mechanism becomes disturbed. Indigestion was another symptom in the same category which might occasionally occur. Some cases developed pain in the chest, but as this was usually present on inspiration, it seems likely that it occurs only when the disease has spread to the extent of involving the pleura. A very small number of cases showed symptoms due to systemic disturbance or pleural involvement before the development of a cough.

Physical signs appeared in the chest quite early in the disease; they are likely to be minimal and require careful examination to discover them. It should be noted that non-adventitious physical signs seem to be, if anything, more likely to be present than adventitious signs in the earlier stages; their importance cannot be stressed too strongly.

The presence of a cough, even if dry and present for only a short time, should always be regarded as warrant-

1. Trall, R. R. *Lancet*, 1942, i, 609. 2. Trall, R. R. *Ibid.*, 1942, ii, 413.

3. Trall, R. R. *Brit. med. J.* 1941, ii, 601.



ing a full investigation—physical examination, X-ray and sputum examination. Otherwise, cases of tuberculosis are likely to be missed. Even so, owing to the symptomless character of early tuberculosis, the only practicable method of detecting the disease in its first stages is not to wait for the appearance of this early symptom, but to examine the apparently healthy population by mass radiography.

## PRIMARY PNEUMOCOCCAL PERITONITIS

### TWO CASES WITH RECOVERY

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IN children primary pneumococcal peritonitis is uncommon but often fatal, while in adults it is even rarer and more dangerous. For this reason I ventured to record two cases with recovery. They were treated with sulphapyridine and it is to be hoped that this drug will lessen the mortality-rate of this disease.

#### CASE-HISTORIES

**CASE 1.**—A married woman, aged 22, was brought to St. Giles' Hospital on Dec. 1, 1941 with a diagnosis of gastro-enteritis and hyperpyrexia. She gave a history of having been suddenly seized, 9 days before while at work as a shop assistant, with violent gripping pains in the abdomen and profuse and uncontrollable diarrhoea. She was able to get home and vomited several times during the first night, the diarrhoea continuing until admission. She again vomited several times during the day and night before admission. She was tired and ill-looking. Temperature 98.6° F., pulse-rate 90, respirations 20. Her tongue was somewhat dry; her abdomen, seemed a trifle distended. There was generalised abdominal tenderness with some muscle guarding but no rigidity. Rectal examination was negative; no abnormality to be found in the chest or elsewhere. Micturition throughout had been natural. Her last menstrual period had ended 14 days before admission. She had never been pregnant and had never had a vaginal discharge. A provisional diagnosis of gastro-enteritis was made. High colonic lavage with saline was given and morphine sulphate, gr.  $\frac{1}{4}$ , injected subcutaneously, as a result of which she slept all night and felt and looked very much better in the morning. While she was in hospital the diarrhoea and vomiting ceased, though until shortly before discharge the stools were rather loose and at first offensive. Her temperature varied between 102.4° F. in the evenings and 99° F. in the mornings, and the pulse-rate between 100 and 120. She was given a bismuth and opium mixture three hourly for the first 6 days after admission. Blood-count on Dec. 3: red cells 4,500,000; Hb. 84%; white cells 24,000; polymorphs 80%. Three examinations of the faeces showed no pathogenic organism and the urine grew no organism. Despite the swinging temperature, the patient felt quite well and complained of only slight general pains in the abdomen. Daily examination revealed no change in the physical signs described, until on Dec. 8, the presence of free fluid in the abdominal cavity was detected. A diagnosis of pneumococcal peritonitis was then made and sulphapyridine was given to the patient in tablet form by mouth. During the next 4 days 25 g. of the drug was taken and on Dec. 10 her temperature fell to 98.4° F. for the first time since admission. By Dec. 12 she was slightly cyanosed and nauseated and the temperature had not been above 99° F. since Dec. 9, so the administration of sulphapyridine was stopped. Her condition otherwise was good and the physical signs found on examination of the abdomen were unchanged. On Dec. 14 the temperature was 101.6° F. and for the next week it varied between 100° F. and 102° F. Blood-count on Dec. 16: red cells 3,710,000; Hb. 63%; white cells 24,800; polymorphs 88%. Since her general condition remained good and there were no signs of localisation of the peritonitis, a laparotomy was not thought advisable. A blood-culture was done on Dec. 20 but there was no growth after 6 days' incubation. Her temperature remained high and swinging reaching 103.4° F. on Dec. 27 when there were signs of a localised abscess in the pelvis. At laparotomy, Mr. J. L. Stephen found a large pelvic abscess in the pouch of Douglas walled off from the general peritoneal cavity by coils of small intestine lightly adherent to each other. He emptied the abscess and, after sprinkling about 5 g. of sulphapyridine powder in the cavity, closed the wound around a drainage-tube. Culture of the pus from this abscess gave a pure growth of pneumococci. After

this operation there was considerable discharge from the tube for 3 or 4 days, but the temperature continued to swing, reaching 104.2° F. on Dec. 5. The tube was removed on Jan. 3, 1942, as the discharge had almost ceased but on Jan. 6 there was a profuse discharge from the wound which continued in lessening amounts for another week or so. The temperature did not finally settle until Jan. 15. The patient was transferred to a base hospital on Jan. 19 where she stayed 3 weeks, being then discharged home feeling well and beginning to regain the weight (2 st.) which she had lost during the illness.

Reviewing this case after the diagnosis of pneumococcal peritonitis had been made on Dec. 8 and particularly after it had been confirmed at laparotomy on Dec. 27, I felt the diagnosis should have been made earlier. The chief signs pointing to a diagnosis of pneumococcal peritonitis on admission were: the profuse diarrhoea, vomiting, generalised abdominal pains without definite rigidity and the history, given by her own doctor, of hyperpyrexia. At the time peritoneal infection was considered, and dismissed mainly on the ground that the patient, though obviously tired and ill, did not have the peritonitic facies and had such scanty signs of an intra-abdominal lesion. A further reason for dismissing pneumococcal peritonitis from the diagnosis was its extreme rarity in adults. The high white cell count of Dec. 3 (24,000) should have caused a thorough revision of the diagnosis of gastro-enteritis, but at this time the patient was looking and feeling so much better that I thought that the disease, whether correctly diagnosed or not, was about to subside. When, however, free fluid, which could only be due to an inflammatory process, was found in the abdominal cavity the diagnosis of pneumococcal peritonitis seemed the only one which would explain the course of the patient's illness.

**CASE 2.**—The patient was a girl of 16 months who was brought to hospital at 3.30 PM on May 20, 1942, with a history of screaming for most of the previous 48 hours, during which time she had vomited seven times and had passed 6 loose offensive stools. On admission the temperature was 101° F., pulse-rate 140 and respirations 60. The child was slightly cyanosed and the *alae nasi* were working. The chest had a slightly impaired percussion note with harsh breath sounds at the right apex. The abdomen was distended but no definite tenderness could be elicited and there was no rigidity. Rectal examination was negative. The diagnosis seemed to rest between early pneumonia and early pneumococcal peritonitis. The child was given sulphapyridine in tablet form by mouth, 0.5 g. four-hourly for the first 3 days and 0.25 g. four-hourly for 2½ days thereafter. Intramuscular injection was substituted for oral administration when the child was vomiting for a short time after the laparotomy. On May 21 her temperature was 98° F. and she remained afebrile for the rest of her stay in hospital. She had had, by noon on May 21, 9 loose offensive stools since admission. The respirations had fallen to 30–40, the pulse-rate to 120–130, and there was on this day no evidence at all of a developing pneumonia. The condition of the abdomen was unchanged. Blood-count: red cells 350,000; Hb. 90%; white cells 26,000; polymorphs 84%. It was considered that a small exploratory laparotomy to clinch the diagnosis of pneumococcal peritonitis should be performed and this was done in the afternoon of May 21 under general anaesthesia. The small gut was found to be considerably distended, with inflammation of the peritoneum. There was some fibrinous lymph here and there but no free fluid. Nothing abnormal was felt in the caecal area or in the pelvis. The wound was closed around a small tube leading to the pelvis. The tube was removed after three days, there having been no drainage. Culture of some lymph from the peritoneal cavity gave a growth of pneumococci. Blood-count on May 26: red cells 4,500,000; some punctate basophilia; Hb. 57%; white cells 19,000; polymorphs 71%; lymphocytes 26%. The administration of sulphapyridine was stopped when the child had had a total of 12 g.

On the day after operation the child was a little fretful and had a slight cough but this did not develop into anything serious and she made a straightforward recovery.

I wish to thank Dr. W. Allen Daley, medical officer of health to the London County Council, for permission to publish the notes of these cases.

## Reviews of Books

### Order and Chaos in the World of Atoms

B. C. SAUNDERS; R. E. D. CLARK, department of chemistry, University Chemical Laboratory, Cambridge. London: English Universities Press. Pp. 266. 8s. 6d.

THERE must be many people, even among chemists, who will welcome a clear and connected account of what modern chemistry has revealed as happening in the course of chemical reactions. The authors of this book set out to provide this kind of information, without the use of technical terms, equations or formulæ, so that it may be read and understood by any intelligent layman possessing that slight knowledge of elementary chemistry which in these days is (or ought to be) common mental property. They bring to this task a keen historical sense, a wide knowledge of oddments of literature, a flair for apt verbal and pictorial illustration, and a thorough knowledge of their subject. An attractively simple style is enlivened here and there by dry humour. About half the book is devoted to describing the atom inside and out, the way in which atoms are held together, the methods by which chemists sometimes succeed in building up molecules more or less answering foreseen requirements, the ingenious methods now available for "winnowing particles, molecules and atoms," and lastly the intimate structure of crystals. The rest of the book is a nearer approach to the kind of volume chemists are apt to write for popular instruction; but even in dealing with rubber molecules, the chemistry of the photograph, and "foods of the future," the authors stimulate interest in the fundamental problems of applied chemistry. This book will appeal to anyone who wants to know what atoms and molecules are like, what forces control them and what can and cannot be done with them.

### The Adolescent Criminal

*A Medical Sociological Study of 4000 Male Adolescents.* W. NORWOOD EAST, MD Lond., FRCP, in collaboration with PEBBY STOCKS, MD Camb.; H. T. P. YOUNG, MB Edin. London: J. & A. Churchill. Pp. 327. 45s.

PSYCHIATRY and criminology have a great deal in common; they are both concerned with the adjustment of the individual to his social environment, and they both suffer from having to deal with and study such complicated influences that they either cannot see the wood for the trees or cannot see the trees for the wood. Statistical treatment of accurate data about many individuals may be the best corrective for this difficulty in perception; it certainly corrects any tendency to irresponsible generalisation. Dr. Norwood East is notably free from this tendency, but he has recognised the positive scientific value of an investigation which would eliminate much of the subjectivity that creeps into any unchecked impressions. The inquiry here so fully documented was concerned with 4000 lads, having their homes in London, who were admitted to the boys prison at Wormwood Scrubs between 1930 and 1937. Their homes were visited and their relatives interviewed. Careful medical and psychological examination, and inquiries directed to schoolmasters, employers and probation and police officers, elicited a mass of data which were analysed. The results are given in a series of 112 tables which are the backbone of this monumental study. Dr. Norwood East provides an illuminating commentary on the findings, arranged in twelve chapters. The analysis is concerned with hereditary and familial factors, home, school, occupation, physical constitution and disease, mental condition and personality traits. In the final chapters the nature of the youths' offences and the administrative steps taken to deal with them are reviewed. The book is a landmark in the development of scientific criminology in this country.

### Return to Reason

GEOFFREY BOURNE. London: Hutchinson and Co. Pp. 64. 2s. 6d.

Dr. Bourne suggests that though man has developed higher cerebral faculties of reason he relies too much on thalamic emotional reactions in his national and international life: hence party strife and world war. The

world's ills, he believes, are due to emotion, and the solution is for politicians to be scientifically trained and for citizens to be reasonable. "It would not be beyond the powers of an intelligent and kindly conservative, an intelligent and kindly liberal, an intelligent and kindly labour man, and an intelligent and kindly communist to sit down and agree upon a political programme which would rapidly and greatly benefit the country and the world." Admittedly political issues lead to emotional reactions among citizens, but the emotion is possibly a symptom of the underlying disorder rather than its cause. A scientific understanding of the fundamental causes of present-day political problems would be welcome, but in this book the author does not go deep enough. In practice little benefit can be expected from the diagnosis "just nerves," or the exhortation "pull yourself together—return to reason."

### Minor Surgery

CHARLES M. OMAN, MD, FACS, rear admiral, Medical Corps, U.S. Navy; commanding officer, Naval Medical Center, Washington, D.C. London: Humphrey Milford, Oxford University Press. Pp. 165. 12s. 6d.

Admiral Oman has tabulated information about almost all minor surgical conditions and their treatment. This method of writing is useful for standardised descriptions and procedures which require little or no discussion, and enables him to give details overlooked in many more ambitious works. The chapter on hand infections, however, is incomplete and the treatment suggested for Pott's fractures is scarcely worthy of the rest of the book. In a short work on a wide subject there must always be omissions, but it is surprising that varicose veins, apart from the complication of hæmorrhage, are not discussed, and he does not mention the injection treatment of hæmorrhoids. Methods described are up to date, and the chapters on the treatment of open fractures and on chemotherapy pack in a lot of information. The book is a handy and reliable work of reference for anyone unaccustomed to the pitfalls of minor surgery.

### Halliburton's Physiology and Biochemistry

(37th ed.) R. J. S. McDOWALL, MD, DSc Edin., FRCPE. London: John Murray. Pp. 977. 21s.

DESPITE the war, the thirty-seventh edition of this familiar handbook appears on time. The regularity of its revision reflects its popularity, which is great because it effects a compromise between bulk and the amount of physiological and biochemical knowledge the medical student is supposed to have. The publishers frankly advertise its suitability for examinations, and several diagrams—now encroaching on the blank leaves inserted for notes—are good aids to memory, while significant data are picked out in heavy type. All this helps the student to learn; but whether it helps him to think physiologically is another question. As a guide to revision the book is good; but those who rely on it for second MB must have the bones of their knowledge well covered by more thorough and reasoned treatment of various parts of the subject in lectures or supplementary books.

### How do I Stand?

R. W. HARRIS, OBE, formerly assistant secretary to Ministry of Health. London: Wells Gardner, Darton and Co. Pp. 152. 1s.

THE author of this useful little book is the chairman of the London Medical Service Subcommittee, chairman of an appeal tribunal (Unemployment Assistance and Supplementary Pensions) and joint author of *Medical Insurance Practice*. He discusses, mainly by way of question and answer in homely language, the effect on the citizen in national health insurance, unemployment benefit and allowances, and old age and widows' pensions. Officers of the various Government departments concerned have examined the book in proof, so that, though it is in no sense official, it should be reliable. There must be few general practitioners who are not from time to time asked for advice and assistance in connexion with one or other of the various acts relating to social insurance. This book will enable them to give an intelligible answer to any question of general interest, and to advise on the person to be approached when official information is needed. A very useful shillingsworth.

# THE LANCET

LONDON: SATURDAY, MARCH 20, 1943

## A MATTER OF PRINCIPLE

In the past month the Government's active interest in the medical profession has aroused some apprehension. While reserving judgment on many of the other recommendations of the Beveridge report, they have decided to go ahead with plans for a comprehensive medical service; and it has been feared that their desire to produce some major measure of social reform might lead them to introduce legislation which the profession as a whole could not approve. This apprehension, however, will be largely allayed by the announcement from the British Medical Association which we publish today. The arrangements made between the BMA and the Ministry of Health do in fact provide every reasonable opportunity for full discussion before action or commitment. Especially we welcome the statement that the representative committee meeting the Minister will be able to consider the whole problem "from the ground," and not merely the Government's tentative proposals. On p. 373, for the convenience of readers, we have briefly set out these proposals, their implications, and some of the arguments that have inspired them. In the same way we have indicated the main arguments in favour of a whole-time salaried State Medical Service, on the one hand, and a National Medical Corporation on the other. A medical corporation is the project favoured in the interim reports of the BMA Medical Planning Commission and of Medical Planning Research; it was approved by the BMA's representative meeting. We believe that a corporation run by representatives of the public (as consumers) and representatives of the medical and allied professions (as producers) is more likely than any other body to preserve the tradition by which the doctor exists to help his patient and makes his patient feel that this is so. In theory, the family practitioner is one of the last members of the community who should become directly an officer of the State or municipality, which inevitably have coercive as well as benevolent functions. In practice, it is not just an accident that medicine has hitherto flourished best in voluntary hospitals; and we are convinced that the management of a comprehensive medical service by the local authorities would be tolerable only if certain features of voluntary hospital organisation were adopted by them. On p. 375 we mention four points that we regard as fundamental to the success of any service; and the two most vital are derived from the experience of voluntary hospitals. They are, first, that clinicians must be equal in status and salary with administrators; second, that health centres, hospitals and health authorities must have medical staff committees in a position of influence. It is, we believe, against the public interest to limit the personal responsibility properly accepted by medical men both in groups and as individuals, and we count on our representatives to make it clear that this is a matter of principle rather than privilege.

## DRUG-RESISTANCE TO SULPHONAMIDES

THE phenomenon of pathogenic organisms becoming resistant to the drug employed to annihilate them was first observed by EHRLICH when he found trypanosomes becoming resistant to arsenical compounds. This arsenic-resistance has been studied intensively as a clue to the mode of action of such compounds, and it is also of practical importance in the treatment of sleeping-sickness in Africa. During the last two years it has gradually been realised that a similar state of affairs may arise when bacteria are treated with sulphonamide compounds. In laboratory experiments resistance has been developed by growing the organism, *in vitro* or *in vivo*, in contact with subeffective concentrations of the drug. In this way resistance has been produced in pneumococci, staphylococci, streptococci, gonococci, *Bact. coli*, and dysentery bacilli, and it probably occurs also in brucellæ.

Organisms made resistant *in vitro* are resistant *in vivo*, and vice versa. It has usually been found that an organism resistant to one sulphonamide is resistant to comparable concentrations of the others, and this has been confirmed by KIRBY and RANTZ,<sup>1</sup> working with *Bact. coli*. They have shown that this organism can rapidly be made resistant to sulphanilamide, sulphapyridine, sulphathiazole or sulphadiazine by growing it *in vitro* in the presence of these compounds. Whichever compound was used for the purpose, the resultant resistance was apparently identical and applied to all the four compounds. It was never complete, and with the more active compounds, such as sulphathiazole, only small concentrations could be resisted. KIRBY and RANTZ conclude that the resistance is directed against the chemical group common to all the sulphonamide compounds—namely, the *p*-amino-benzene nucleus. Once maximal resistance has been produced it seems to persist for a very long time.

The origin of this resistance is not clear: it might result from the selection of more resistant individuals, or from modification of the organisms in the period between their subdivisions. Similarly its nature is uncertain: the most attractive hypothesis is that the resistant organisms have learnt how to manufacture additional quantities of *p*-amino-benzoic acid, which thus neutralises the sulphonamide inside or outside the cell; but the experimental evidence for this explanation is still scanty.

The practical importance of this acquired resistance in clinical practice is also unknown. Resistant strains certainly occur and cause much damage. Thus FRANCIS<sup>2</sup> described a series of wound infections due to a sulphonamide-resistant streptococcus, which delayed healing and caused deaths; but it is not known whether this organism acquired its resistance from contact with sulphanilamide. HAMBURGER and co-workers<sup>3</sup> described a case of pneumococcal endocarditis treated repeatedly with sulphapyrazine; the organism eventually became sulphonamide-resistant, but this did not happen until the treatment had continued for some months. Failure of sulphonamide treatment, because of the presence of resistant

1. Kirby, W. M. M. and Rantz, L. A. *J. exp. Med.* 1943, 77, 29.
2. Francis, A. E. *Lancet*, 1942, i, 408.
3. Hamburger, M., Jun., Schmidt, L. H., Rueggsegger, J. M., Sosler, C. L. and Gruben, E. S. *J. Amer. med. Ass.* 1942, 119, 409.

strains, has been reported in pneumonia, gonorrhœa, and infections with *Bact. coli*, but such cases form only a small proportion of the total. Resistance of the organism can be demonstrated, for example, by the ditch-plate method,<sup>2</sup> and when a resistant strain is found associated with an intractable infection it may be advantageous to change from a less active sulphonamide to a more active one—e.g., from sulphanimide to sulphathiazole; but any success that may follow this manoeuvre is due to the greater activity of the latter compound and not to specificity of the resistance. If sulphathiazole or sulphadiazine is unsuccessful, it is unlikely that any other sulphonamide will give better results, and in such a case some antibacterial agent other than sulphonamides must be used. Organisms with acquired resistance to sulphonamides are not resistant to penicillin, gramicidin, or propamidine.

### STERILITY

As doctors, we should do all in our power to help those anxious to achieve a fertile mating. Failure to produce children is often a major cause of unhappiness and should be taken correspondingly seriously by the practitioner consulted: the customary reassurance, though useful, is not enough now that effective aid is possible. By careful inquiry the practitioner may discover faults in marital technique on which he can advise; for example he can explain that the most likely time for conception is some 10–14 days after a period, and he may be able to ensure that diet and general health are satisfactory. If so disposed, he may carry his investigation further by special examinations. But unless he is particularly interested in sterility, a time may come when he will be glad to refer the patients to a clinic where their case can be studied more fully. In any reorganisation of medical service provision should be made for the specialist treatment of sterility; and since it seems undesirable to segregate this problem, such treatment might well be given at marriage clinics, to which people could be referred by their doctors for advice not only on sterility but also on fitness for marriage, the desirability of having children, and contraception.

In the full investigation of a sterile marriage, the husband—not the wife—should be examined first, and the seminal fluid should be studied by someone conversant with upper and lower variations from the normal in the behaviour, number and appearance of spermatozoa. POLLAK and JOEL<sup>1</sup> in semen studies in 400 sterile marriages found normal spermatozoa in only a third of the men; and in about half of the cases the man was either responsible for the sterile marriage, or jointly responsible with his wife. It is noteworthy that two-thirds of the men with normal semen had wives in whom no cause of sterility could be found;—this phenomenon of sterile mating of apparently fertile individuals evidently needs further study. If treatment of the male is advisable it should be undertaken at once, and the results should be checked by serial observations on the semen. If on the other hand no cause of sterility can be found in the husband the wife may then be referred to a gynaecologist for pelvic examination and treat-

ment of any such gross defects as myomata, uterine retroversion, ovarian cyst, cervical erosion or laceration, or polypus. The patency of her fallopian tubes should next be estimated by insufflation, and this should be done by an expert, since errors of technique have sometimes led to a mistaken diagnosis of blocked tubes. The operation is probably best carried out in an outpatient department, and should be undertaken during the early phase of the menstrual cycle before ovulation. Carbon dioxide is the safest gas to use and the apparatus should be connected to a kymograph, whose tracings will show such functional behaviour of the tube as good normal contractions, spasm, or failure to contract. Patency of the tubes is checked by auscultation of the abdomen and confirmed by the complaint of pain, diaphragmatic in origin, referred to the shoulder. Further information—for instance about the exact site of tubal obstruction—can be obtained by injection of iodised oil and radiography; but whereas carbon-dioxide insufflation, properly done, is perfectly safe, iodised oil occasionally has an irritant effect. When ostial obstruction is discovered, salpingostomy may be advised. With a cornual obstruction it is questionable whether tubal implantation, in the present state of operative technique, is justified—though in BONNEY'S hands it has given good results.<sup>2</sup>

Assuming that nothing abnormal has so far been discovered in either partner the next step is to assess the wife's endocrine activity from examination of a biopsy specimen of her endometrium. This can be obtained by outpatient procedure.<sup>3</sup> One specimen should be taken about the 10th day of the cycle, at the end of the oestrogenic phase and before ovulation, and the other about the 25th day. These may give evidence from which it can be assumed that the ovary is functioning properly. A second method is biological assay, which is not yet accurate apart perhaps from the assay of urinary pregnandiol during the secretory phase. An adequate quantity and concentration of pregnandiol is strongly suggestive of corpus-luteum formation, and so (by inference) of ovulation; but the argument is a little shaky from lack of well-attested work. Failure of proliferation of the endometrium, and inadequate luteinisation, call for endocrine therapy. Stilbœstrol in the early phase and progesterone in the secretory phase are effective, and progress can be checked by biopsy. Gonadotropic hormones may soon be equally successful, though at present many preparations fail to produce histological results or to raise the excretion of pregnandiol.

If the man is persistently infertile, and if the woman shows no bar to conception, artificial insemination may be considered. Many couples would prefer to have a child at least half their own than to adopt another's. The medicolegal issues are nice, and will certainly be set on a sure footing in time. Both parties must of course be willing and must be prepared to signify as much in writing, and a properly drawn legal document is essential to safeguard both doctor and patients. The donor must be of good physical stock and free from transmissible disease, and his anonymity should be absolute.

1. Pollak, O. J. and Joel, C. A. *J. Urol.* 1942, 47, 531.

2. Bonney, V. J. *Obstet. Gynaec.* 1937, 44, 1.

3. Howkins, J. *Lancet*, 1941, ii, 599.

## Annotations

## SOCIAL CONDITIONS AND RHEUMATIC HEART DISEASE

It has long been known that juvenile rheumatism is much more prevalent among the poor than the well-to-do. Evidence has, however, been put forward by a number of workers to show that the incidence falls more heavily on the artisan class than on the very poor. This observation is not easy to explain: for instance it is clearly difficult to fit it in with the decline in mortality from rheumatic fever that has accompanied for many years the general rise in the standard of living. Such a distribution, too, was not confirmed by the statistical study made by Morris and Titmuss<sup>1</sup> which showed that regionally and in the large towns the death-rate rose steadily with the degree of poverty. More direct evidence to this effect has now been published by Daniel.<sup>2</sup> In the summer of 1937 the University of Bristol, in conjunction with the Colston Research Society, investigated the circumstances of a random sample of the Bristol working-class population—the manual workers and black-coated workers with incomes below £5 per week. The opportunity was taken of collecting the same information about Bristol families with children suffering from rheumatic heart disease.

The data thus made available for analysis were particulars of 341 families containing children of 5–14 years of age suffering from rheumatic heart disease and of the 1424 families with children in the same age-groups which were found in the sample survey of the whole working-class population. The particulars collected for both sets of families, which appeared likely to be related to the incidence of rheumatic disease, were income, housing accommodation, membership of a doctor's club, and the receipt of meals or milk at school. In dealing with income it is, of course, income in relation to needs that matters. The minimum needs according to the age and sex of the members of a family were, therefore, calculated on reasonable standards and the net income was expressed as a percentage of these needs. In this way a conspicuous relationship between income and incidence of rheumatic heart disease is found; families, for instance, with an income providing less than 100 per cent. of their minimum needs had an incidence of disease 40 per cent. above the average rate and those with an income providing 200 per cent. or more of their minimum needs had an incidence 25 per cent. below the average rate. In other words after this necessary adjustment has been made for needs, there is a simple inverse relation between incidence and the income left after paying for rent, rates, travelling and other fixed expenses and there is no evidence of a lower rate in the very poor compared with the less poor.

The standard of housing, as measured by rooms per person, also shows a close relationship to the incidence of the disease, families with less than 0.6 of a room per person having almost four times as high an incidence as those with 1.8 rooms or more. This relationship might clearly be due to the association between overcrowding and poverty, but Daniel's analysis suggests that the two factors contribute independently to the increased susceptibility. There is also an indication, though the results are not statistically significant, that families which lived or slept in basement rooms included more cases of the disease than other families. No clear association was apparent between the disease and the receipt of school meals or milk.

There is no obvious reason why the findings of this very careful work should be confined to Bristol, and in keeping with the general fall in the death-rate it seems that a considerable reduction in the incidence of rheu-

matic heart disease would follow an improvement in living conditions. Daniel estimates from his data the possible effects of raising the net income and increasing the housing accommodation of the poorer families, and concludes that if the standards of the lowest 30 per cent. were raised to the average level of the remaining families, a decrease of 21 per cent. in the number of cases of rheumatic heart disease could be hoped for. If the standards were raised to those of the 10 per cent. best off, the incidence might be halved.

## HERPES SIMPLEX INFECTIONS OF THE CORNEA

THE virus of herpes simplex can cause a variety of corneal lesions, dendritic ulcer, superficial punctate keratitis, and marginal ulceration being the most usual forms. It is usual to find that the infection of the cornea follows a period of pyrexia, especially pyrexia due to influenza or pneumonia. It is also the commonest ocular complication of malaria,<sup>1</sup> and may follow an injection of TAB. Neame<sup>2</sup> found that 8 out of 17 patients attending his clinic in one year with dendritic ulcer had a concurrent herpetic affection of the face, while 17 patients with dendritic ulcer and herpes facialis were seen between May, 1939, and July, 1941. He found that there was a peak in February, 8 cases being seen in this month. This was to be expected since herpes commonly follows infection of the respiratory tract. Bruce Hamilton<sup>3</sup> has examined a large number of Australians in the Middle East, and in his opinion over half the cases of keratitis among them are due to the virus of herpes simplex. In most of them he found that the condition succeeded a pyrexia but in a few it followed a gross change of climate—from Russian snows to desert heat.

Treatment in the past has been confined to atropine and steaming for mild cases, and to this is added rest and painting the ulcer with carbolic acid or iodine when it is severe. Hamilton is against the use of heat, since pyrexia favours the growth of the virus; he has not found it necessary to use atropine, because these patients do not usually develop iritis. He finds that silvering the conjunctival sac, and if necessary the ulcers themselves, with 2% silver nitrate is effective though there is no evidence at present to show whether this is more beneficial than the older treatment.

## CASUALTIES OF THE MIND

GERMANICUS, the famous Roman general, had hallucinations, Hotspur developed a typical war neurosis, Mesmer cured three soldiers of tremor: Dr. P. R. Bolus, of the Ministry of Pensions, cited these and other examples of mental and emotional casualties of war at the annual conference of the Ex-Services Welfare Society held on March 11 at which Lord Horder took the chair; but added that it was not until the twentieth century that the doctors could be persuaded to take much interest in such manifestations. They have made up for that neglect in the last forty years. Surgeon Captain Desmond Curran had been struck by the small numbers of men who broke down in the Navy, even after being adrift for days in an open boat; Air-Commodore H. L. Burton had likewise found the incidence of mental breakdown in air crew personnel to be surprisingly low; and Lieut.-Colonel J. I. Russell, speaking of the resistance of the general population, remarked that people seldom broke down in a situation which offered some chance of personal satisfaction: monotony and unemployment are more productive of neurosis than is danger. Among negroes the proportion returned to duty in the Services was estimated at 75–80% and Dr. W. S. Maclay said that even at an EMS

1. Duke-Elder, W. S. *Textbook of Ophthalmology*, London, 1939, vol. II, p. 1984.
2. Neame, H. *Trans. ophthal. Soc. U.K.* 1941, 61, 91.
3. Hamilton, J. B. *Brit. J. Ophthal.* 1943, 27, 80.

1. Morris, J. N. and Titmuss, R. M. *Lancet*, 1942, ii, 59.  
2. Daniel, G. H. *J. R. statist. Soc.* 1942, 105, 197.

hospital which received the most unfavourable cases it was possible to return 50% to duty. Inability to adapt to Service life is only one factor precipitating breakdown. Constitutional predisposition, of course, weights the patient's chances heavily. Colonel Thomas Tennent said that among Service women over 20% of those admitted to a mental hospital had had treatment for a major psychosis before being conscripted. Pathological homesickness is a common cause of neurotic breakdown among Service men, especially when their wives write them distracted letters; and Colonel A. A. W. Petrie had found that war widows and grass widows are liable to develop anxiety neuroses usually lasting 3 or 4 months. In industry, overlong hours aggravate incipient neuroses, and some folk, he finds, are in a state of unconscious unwillingness to do the job assigned them; he thinks there is more conscious unwillingness, too, than there was in the last war. Air-Commodore R. D. Gillespie distinguished between elimination of unpromising candidates at the start, and selection for special tasks of those admitted to a Service. But intelligence tests do not test everything, and he reminded the meeting that a low grade man may excel in a simple task. In this he was borne out by Brigadier J. R. Rees, who said one man gave endless trouble until put on to peeling potatoes; he did  $4\frac{1}{2}$  cwt. a day and when he went on leave two or three skilled men had to take over his job; he spent his leave peeling a ton for a friend.

The escape motive is evidently not the chief factor in the production of war neuroses, since—as Dr. Aubrey Lewis pointed out—the neurosis does not as a rule disappear when the man is returned to civilian life. Many men indeed have become unfitted for work which they were capable of doing before entering the Services. He thought the psychiatric care of such men was essential not only on their own account but on behalf of their children; after all, much of the work of a child-guidance clinic is adjustment of the home environment. He believes psychiatrists should have more opportunity to advise these men, on their return to civil life, and that this need is urgent: procrastination here will be the thief of mental health. Dr. Doris Odium and Dr. W. J. T. Kimber would like to see opportunities for graded and part-time work in industry for such patients. Lieut.-Colonel P. K. McCowan is anxious that military hospitals should be allowed to keep patients up to 6 months, and that insulin treatment should be considered in such hospitals for cases of early schizophrenia; at present treatment may be delayed beyond the critical first 4 months, and many, he fears, will spend their lives in mental hospitals as a result of this omission.

#### DIAGNOSIS BY ENZYMES

EARLY diagnosis is particularly important in gas-gangrene because the disease develops so quickly that death may follow within a few hours of the onset. Yet even the experienced surgeon may sometimes find it difficult to make the diagnosis in time for effective treatment, and he has hitherto had comparatively little help from the bacteriologist. The identification of clostridia in a film from the wound may confirm a clinical diagnosis, but since these bacteria are often found in wounds that never show any sign of gas-gangrene, the knowledge that they are present does not answer the critical question, is the anaerobic infection insignificant or will it develop into true gas-gangrene?

The characteristic features of gas-gangrene are due to the production by the pathogenic clostridia of toxins which cause local necrosis and eventually general toxæmia. The presence of these toxins in infected tissues should therefore indicate imminent danger of gas-gangrene; and elsewhere in this issue McClean, Rogers and Williams show that it may be possible to detect them by biochemical methods before their presence is otherwise apparent. This work has so far

been confined to experimental gas-gangrene, but it is to be hoped that its practical value will soon be assessed with clinical material. McClean and his colleagues suggest that active infection can be recognised by the presence in the infected muscle, wound exudate or œdema fluid of certain enzymes which are characteristic products of the bacteria in vitro—the lecithinase of *Cl. welchii* and the hyaluronidases of *Cl. welchii*, *Cl. septicum*, *Cl. œdematiens* and many streptococci and staphylococci. Compared with cultural methods, the advantage of this technique is its rapidity; these enzymes can be demonstrated within an hour by methods which, though at first sight formidable, are simple in practice and have a high degree of chemical and immunological specificity. The validity of these tests in the diagnosis of gas-gangrene, as distinct from a mere infestation with anaerobes, will depend, however, on how closely the production of the enzyme is correlated with production of the lethal factor or factors.

The mode of action of the various components of the bacterial toxins belongs to a chapter in chemical pathology scarcely yet begun; but it is established that the lecithinase of *Cl. welchii* is identical with the predominant lethal and necrotic factor, the  $\alpha$ -toxin. The presence of this enzyme, especially in infected muscle, should therefore be a reliable warning of a dangerous infection. The importance of hyaluronidase as an index of danger is less clear. McClean holds that this enzyme may be a factor in the extension of infection by streptococci and other bacteria, as well as in gas-gangrene, but urges a distinction between the virulence of an organism and its local invasiveness. Whether the bacterial hyaluronidase, by extending the spread of the infecting bacteria, enhances the severity of the infection, and to what extent the hyaluronidase of a contaminant harmless in itself can potentiate the establishment of a heterologous infection, are matters still to be investigated. In a wider biological sense hyaluronidase cannot be classified as a toxic enzyme, for it may be an arbiter of growth as well as of decay. The diffusing properties of mammalian testicular extract are due to the hyaluronidase present in the spermatozoa, and (in the rat at least) this enzyme appears to play an essential part in fertilisation by disintegrating the gel in which the ovum is embedded and thus permitting the access of the sperm.<sup>1</sup> Still, its dramatic qualities should not obscure the fact that it is only one of many enzymes excreted by bacteria. A fuller knowledge of their nature and interplay along the lines indicated by McClean and his colleagues should throw much light on the economy of wound infections.

#### RCS COUNCIL ELECTION

FIVE vacancies on the council of the Royal College of Surgeons of England are to be filled by election on July 1. These vacancies have occurred owing to the death of Mr. L. R. Braithwaite, the resignation of Mr. Sampson Handley and Sir Hugh Lett, and the retirement in rotation of Sir Cuthbert Wallace and Prof. Seymour Barling. The last-named is seeking re-election and there are 12 other duly nominated candidates whose names and seniority will be found on p. 20 of our advertisement columns, along with a list of the council as at present constituted. The candidates are Prof. Seymour Barling, Sir Lancelot Barrington-Ward, Major-General P. H. Mitchiner, Mr. A. Tudor Edwards, Mr. L. R. Broster, Mr. John B. Hunter, Prof. J. Paterson Ross, Mr. Arthur Dickson Wright, Prof. P. J. Moir, Air-Commodore Stanford Cade, Mr. R. Watson-Jones, Mr. R. Milnes Walker, Surgeon Captain Lambert Rogers.

Sir Charles Wilson, PRCP, has taken the title of Baron MORAN, of Manton in the county of Wilts.

1. McClean, D. and Rowlands, I. W. *Nature, Lond.*, 1942, 150, 627.

## Special Articles

## NATIONAL HEALTH SERVICE

## THE GOVERNMENT'S PROPOSALS

In the House of Commons on Feb. 16 Sir John Anderson, speaking for the Government, said:—

"May I deal first with the problem of a comprehensive medical service? . . . By 'comprehensive' I mean first a service covering the people as a whole, and secondly the inclusion of institutional treatment. . . . The Government welcome this conception of a reorganised and comprehensive medical service. . . . The object is to secure, through a public, organised and regulated service, that every man, woman and child who wants it can obtain, easily and readily, the whole range of medical advice and attention, through the general practitioner, the consultant, the hospital, and every related branch of professional up-to-date methods."

In reply to a question by Dr. Haden Guest, asking whether the service was to be available to all members of the community, irrespective of income, Sir John Anderson went on:

"That is what I said. I said it was to be comprehensive in two senses; it would cover all forms of treatment and it would extend throughout the community. That is the intention of the Government."

On Feb. 18, Mr. Herbert Morrison said:

"There was one recommendation—I called it a detail, but that is quite wrong—in favour of a comprehensive health service. That has been accepted and that is a big thing to accept. It is a great and significant social change; it is on the basis of universality, free benefit, no means test, medical reorganisation, free hospital treatment, and so on."

These extracts contain the specific pledge of the Government to implement Assumption B of Sir William Beveridge's report. There is to be a complete medical service, domiciliary and institutional, *available free to everyone without means test*. The outlines of the structure of the service were also given in the Government speeches:—

1. The ultimate responsibility will be on the local authorities—often working over larger areas than the present authorities.
2. The voluntary hospitals and other voluntary "agencies" will be incorporated in the service.
3. The interests of the medical profession will be "safeguarded."
4. Free choice of home doctor will be retained; there will be the least possible disturbance in the doctor-patient relationship; and group practice at well-equipped clinical centres will be encouraged.
5. Those who wish to make private arrangements for treatment will be permitted to do so.

## Corollaries of the Proposals

If the picture of the new National Health Service is to be seen clearly, it is necessary to examine what effect these changes will produce on general practice, hospital practice, the work of the medical officer of health, and the financial structure of the present health services.

## GENERAL PRACTICE

1. We may assume that "free choice of home doctor" and "safeguarding the interests of the profession" will lead to a method of payment of general practitioners on the lines advocated by the British Medical Association's Medical Planning Commission (*Brit. med. J.* 1942, i, 743) and Medical Planning Research (*Lancet*, Nov. 21, 1942). This means that there is likely to be a combination of basic salary plus capitation fee.

2. If every patient is entitled to choose his own general practitioner, and to be seen by him free of charge, it is doubtful if more than a small proportion of the

public will elect to pay private fees. We may expect, therefore, a supersession, either gradual or rapid, of private general practice.

3. Since local authorities are to be ultimately responsible, general practitioners will receive their salaries and capitation fees from them. Such salaries and fees will almost certainly be on a nationally agreed basis.

4. The local authorities will either gradually set up health centres for group practice, or take over existing private centres, from which general practitioners will operate.

5. The sale of practices will cease; compensation for capital investment will have to be given; pension schemes will be set up; vacancies will be advertised; and appointments made by some kind of board or committee.

## HOSPITAL AND CONSULTANT PRACTICE

1. Hospital savings associations, and patients' contributions and treatment payments will no longer be necessary to the public, and will soon cease to exist. As a result, more than half the present income of voluntary hospitals will vanish. This will be made good by payments by local authorities, who will themselves be paid by the Exchequer.

2. Since the state will be making good the incomes of the voluntary hospitals, it is likely that charitable contributions, other than for specific purposes, will decline, and in due course cease. The voluntary hospitals will then be left with their income from capital endowments only, and the remaining (say) nine-tenths of their income derived from the state via the local authorities.

3. The local authorities will then be in a position to plan the hospital services so as to prevent overlapping, and to suppress or combine small inefficient voluntary hospitals.

4. Since a comprehensive consultant and specialist service is to be available free to all, few people will elect to obtain these services privately. More may, however, elect to do so than in the case of general practice, since the free choice of specialist in a comprehensive hospital service is bound to be limited by physical facts—such as allocation of beds.

5. Most consultants and specialists will thus become part-time or whole-time salaried servants of their hospitals, with their salaries coming, directly or indirectly, from the local authorities and the Exchequer. It is to be hoped that the terms of service will be uniform in both voluntary and local authority hospitals.

## THE MEDICAL OFFICER OF HEALTH

1. The medical officer of health, as the local authority's medical adviser, will come to occupy a key position. On him will fall the real responsibility of planning health centres and organising hospital coördination. He will be brought for the first time into really intimate contact with the general practitioners and consultants and specialists of his area.

2. This will add greatly to his duties and interests, and also increase his value to his colleagues. It will raise his status, and make the work attractive to the best type of doctor, trained in social medicine.

## FINANCE

1. The cost of the health service in a local authority's area will be related to the number of people in that area, and not to the rateable value of the property in the area.

2. If the service is to be uniform and comprehensive, much; if not most, of the cost—particularly in poorer-class residential areas—will have to be met by block grant from the Exchequer.

3. The block grant will provide the Ministry of Health with a means of ensuring that unsatisfactory local authorities improve their services, and that services

are coördinated. This power will, however, have to be used rather more vigorously than in the past.

### Alternative Proposals

Two main alternative proposals have been put forward. The first is the establishment of a national corporate body to control the health services; this was recommended by the BMA conference of representatives and the interim report of Medical Planning Research. The second is the setting up of a complete whole-time salaried medical service, working through the local authorities; this has been put forward by the Society of Medical Officers of Health and the Socialist Medical Association.

In setting these proposals against those of the Government, it is necessary to look behind each and see what prompted them.

#### ARGUMENTS FOR A NATIONAL CORPORATION

1. A centrally controlled state salaried service would take on the worst features of the Civil Service—timidity, lack of enterprise, and the tendency always to play for safety.

2. Such a service would be liable to continuous short-term examination and inquisition by Parliament, even on trivial details of individual cases.

3. The local authorities are so unequal in administrative capacity that no service run by them would be comprehensive and uniform. Sometimes their members are more concerned with the burden of rates than with the efficiency of the social services, and where this attitude prevails health might be sacrificed to parochial parsimony. Further, regional planning is essential for an efficient and comprehensive health service, and local authorities have set their faces against regionalisation. If they were entrusted with the health services, a regional authority would find itself continuously balked.

4. Local-authority hospitals are apt to rate their clinicians below their administrators, alike financially, medically, and administratively. The best men in them are thus encouraged to turn from clinical medicine to administration, and clinical practice suffers in consequence.

5. At least in general practice there is much to be said for retaining some relationship between number of patients and payment received. If free choice of home doctor continues—and it should continue—then the doctor who is liked by his patients will have more work than the doctor who is not. Though popularity may not be a measure of skill, it is at least a measure of capacity for human relationship, which must remain the basis of medical practice. A financial stimulus may, in fact, make the difference between a doctor who tries and one who does not.

6. The doctor must be the servant of his patient. This he cannot be if he is also the servant of the local ratepayers, at the mercy of local politics. The voluntary hospitals have successfully maintained the patient-doctor relationship, because ultimately their only purpose is the service of their patients. If some third party, with interests—however benign—other than the patient's welfare, is always liable to come between the doctor and the patient, medicine will be reduced from a personal to an impersonal service and the whole community will suffer in the long run.

7. The organising body of the health services must be concerned only with health. Its ultimate authority must spring from Parliament, and its power must be vested in wise men and women, themselves representative of the patients, the officers of the health service, and the state. Such a body would be in no sense undemocratic, but it would avoid the evils associated with multiple local democracy.

8. The setting up of such a National Health Corporation would meet with intense opposition from the local authorities. But it is the duty of the Government to govern for the good of the community as a whole.

#### ARGUMENTS FOR WHOLE-TIME SALARIED STATE SERVICE

1. The admitted deficiencies of the Civil Service are not inherent, but spring from its present structure—which needs reform—and from its non-universality. At present it attracts those who want, and play for, safety and security. If all doctors (or almost all) belonged to a universal service, the enterprising would still show enterprise even within such a service.

2. Unless the service is organised by the state, it will never be uniformly efficient and comprehensive.

3. The financial incentive to efficiency is greatly over-rated in medicine. Most people practise medicine because they like practising it, and will continue to do so for this reason.

4. Free choice is at present largely illusory. Most patients choose for reasons bearing no relation to medicine. The abolition of free choice would not really be resented by the public.

#### ARGUMENTS ATTRIBUTABLE TO THE GOVERNMENT

Finally, the views behind the Government's decisions may be surmised to be something like this:—

1. The public needs and wants a comprehensive health service. It shall have it.

2. It is wrong to add financial burden to the burden of ill health. So the service shall be paid for by everyone, while they are well and earning, through insurance contributions, taxation and rates.

3. The doctors themselves are urging a national health service. But most of them appear to want free choice of home doctor to continue. Since British people dislike regimentation, it is probable that most of the public agree with them. It shall therefore continue.

4. Many of our voluntary hospitals are great institutions with great traditions. They shall be preserved as semi-autonomous bodies, just as we preserve our independent universities by Exchequer grants.

5. The health service must be properly organised in each locality. It could be done by a new national body—a corporation—with regional units; and no doubt the new broom would sweep very clean. But that would mean splitting off the personal health services from the environmental health services under the local authorities. It might mean outraging the feelings of every large local authority in the country. And, if applied logically to other services, it would whittle away the work of the local authorities until little or nothing remained.

6. Some local authorities are bad. But many are good. And all have had some experience of running health services. Let us avoid the dangers of a corporation. Let us avoid direct Government administration. Let us avoid the splitting of the health services. The local authorities shall do the administration, though some of them will have to be enlarged. And we must hope to see a steady increase in interest in local government, and an increase in its efficiency. In the last resort, by financial sanctions, we shall be able to coerce the recalcitrant.

7. As the service develops and become efficient, private medical practice will gradually vanish away. But Britain is a democracy. There is no reason why those who want to go on making private arrangements should not do so. We will not coerce them.

#### Assurances Required

Whether the Government's decisions prove to be final, or whether the advocates of a National Medical Corporation or a whole-time State Medical Service



make their case successfully, there are four points on which the medical profession will do well to insist:—

1. Capitation fees, salaries, and conditions of service for general, specialist, and consultant practice, for medical officers of health, and for medical administrators must be nationally agreed and universally enforced. We may hope that similar steps will be taken for other health officers—in particular, nurses.

2. Clinicians must be equal in status and salary with administrators. The parallel or democratic system of voluntary hospital staff organisation must be extended to municipal hospitals.

3. Health centres, hospitals, and health authorities must have medical staff committees—and we hope also nursing, pharmaceutical, and other staff committees. These committees should, *inter alia*, advise on all professional appointments.

4. There must be real planning of the health services on a major scale.

Effective planning demands units far larger than the largest local authorities—regions or provinces—and each region will require an investigating, research, and planning staff, to review continuously the needs of the area. It should be the duty of such staffs to see that the health services everywhere are maintained at a *maximum*—and not a *minimum*—degree of efficiency.

## THE GOVERNMENT AND THE PROFESSION

STATEMENT BY THE BRITISH MEDICAL ASSOCIATION

THIS announcement is of importance to every member of the medical profession. It was made clear on behalf of the Government in the recent Parliamentary debate on the Beveridge report that the object of the Government is to organise publicly for the first time a unified and comprehensive health service to cover the whole range of medical service, special and general, institutional and domiciliary, this service to be universally available to every member of the community.

At the Minister of Health's invitation representatives of the main bodies of the medical profession, including the British Medical Association, met him on March 9 to consider his suggestions on the procedure to be adopted for consultation between the Minister and the medical profession in the months ahead. The Minister has asked that there shall be set up a committee, representative of the medical profession as a whole, to consider with him and his officers the many and important problems and difficulties involved. It was agreed that this committee would have no power whatever to commit the medical profession either in principle or in detail. Further, an undertaking has been given that the discussions will take place not on the basis of any pre-conceived plan of the Minister, but "from the ground." It is contemplated that when the stage is reached that the Government, after consultation with the medical profession, is ready to indicate in general terms the measures the Minister has in mind to submit to Parliament on behalf of the Government, those proposals will be submitted, before any final decision is reached as to what is to be put before Parliament, to the various medical bodies represented in the discussions with the Minister, for their full consideration and expression of their views.

In the case of the British Medical Association this will mean that at the appropriate time the Government's provisional proposals will be considered by the council and all association committees affected, including group committees, by the divisions and by the representative body. Divisions will be requested to ascertain the views of non-members as well as members of the association. After decision by the representative body, and only then, will the association be asked to commit itself to decisions. Similar considerations apply to the other co-operating medical bodies.

The Minister's assurance is set out in the following official communication addressed by the secretary of the

Ministry of Health to the secretary of the British Medical Association:—

10 March, 1943.

Dear Dr. ANDERSON,—Following the preliminary meeting which took place on Tuesday last between the Minister and representatives of the medical profession it may be useful if I set out shortly what we conceive to be the scope and purpose of the discussions of the proposed national health service which, as has been agreed, will now take place.

I need not tell you that the establishment of a health service on the lines envisaged by the Government would constitute the greatest single step forward in public health in the history of this country, nor that the working out of the scheme will throw up a mass of novel and difficult problems. Moreover, the scheme will of necessity affect deeply the structure of the medical profession. These considerations alone would make it incumbent on the Minister and his advisers to seek all possible help and guidance from the profession; and, so far as the department is concerned, this is the primary object of the proposed discussions.

The Minister appreciates, of course, that views expressed on your side must not be taken as committing the profession as a whole, and similarly he does not contemplate announcing in the course of the discussions any final conclusions on the part of the Government. What he desires is a frank expression of the opinions of those best qualified to judge both on issues of a technical and professional kind and—what is no less important—as to the probable attitude of the profession towards any proposals that may be put forward.

We contemplate that at some stage it will no doubt be convenient to the profession and, indeed, to all concerned, if a statement is published indicating in general terms the kind of measures which the Minister would have in mind to submit to Parliament on behalf of the Government. This will afford your group ample opportunity for further deliberation and reference back to the constituent bodies; and in framing any time table we shall not lose sight of the fact that so many of the profession are serving overseas.

As you will understand, the same considerations will apply to the discussions now about to begin with representatives of the local government organisations and of the voluntary hospitals.

I am authorised to say that the Secretary of State for Scotland has seen this letter and agrees that its terms represent the basis on which any discussions which may take place with the profession on problems that have special reference to Scotland will proceed.

I may add that you are at liberty to bring this letter to the notice of the profession by publication in the medical press or otherwise as you think fit.

Yours sincerely,  
(Sgd.) E. J. MAUDE.

Consultations have been proceeding between the association, the three royal colleges and the Society of Medical Officers of Health as to the composition of the representative committee to take part, though not as plenipotentiaries, in the discussions with the Minister and his officers on the position in England and Wales. It is anticipated that the general discussions on the main fabric of the proposed scheme will cover Scotland, and for this purpose special representatives of Scotland are added. It has been agreed that a body of the following composition can be regarded for the purposes of these discussions as adequately and properly representing the medical profession. The representative body of the association at its meeting on March 31 will be asked to endorse this view.

The association fully recognises that as far as is humanly possible every step should be taken to give members of our profession on Service an opportunity of expressing their views on any new plan put forward by the Government. When proposals are put forward by the Government for examination by the medical profession, machinery will be set into motion for communicating individually with Service men and women

whose views cannot be ascertained through the normal machinery, for the assessment of those views and for their presentation to the representative body.

Now, as perhaps never before, there is a need for unity within the medical profession. The present phase is one of consultation without commitment, and the various bodies within the profession, notably the association and the royal colleges, have agreed to coöperate in one representative committee. It is inevitable that any scheme of reorganisation deeply affecting the structure of the medical profession should be the subject of discussion, difference and controversy. What is necessary now is that the medical profession should have confidence in those who will represent them in preliminary discussion, awaiting the time when, through its own organisations, it can examine concrete proposals and express its considered views thereon.

#### REPRESENTATIVE COMMITTEE

Chairman of council, BMA	..	Mr. H. S. SOUTTAR.
Chairman of representative body, BMA	..	Dr. PETER MACDONALD.
2 Representatives of Royal College of Physicians	..	Lord MORAN ( <i>president</i> ).
2 Representatives of Royal College of Surgeons	..	Dr. H. E. A. BOLDERO.
	..	Sir ALFRED WEBB-JOHNSON ( <i>president</i> ).
	..	Sir GIRLING BALL.
2 Representatives of Royal College of Obstetricians and Gynaecologists	..	Sir WILLIAM FLETCHER SHAW ( <i>president</i> ).
	..	Mr. W. GILLIATT.
2 Representatives of Society of Medical Officers of Health	..	Dr. G. F. BUCHAN.
2 Representatives of Medical Women's Federation	..	Dr. H. M. C. MACAULAY.
	..	Dr. DORIS ODLUM.
	..	Dr. MARY ESSELMONT.*
1 Representative of Provincial Teaching Staffs Association	..	Prof. T. H. OLIVER.
Chairman of Conference of Local Medical and Panel Committees	..	Dr. J. A. BROWN.*
Prof. R. M. F. PICKEN	..	Chairman of public health committee, BMA; professor of preventive medicine, Welsh National School of Medicine.
Mr. R. L. NEWELL	..	Chairman of hospitals committee, BMA; honorary assistant surgeon, Manchester Royal Infirmary.
Prof. HARRY PLATT	..	Member, special practice committee, BMA; professor of orthopaedic surgery, University of Manchester.
Prof. HENRY COHEN	..	Professor of medicine, University of Liverpool.
Dr. H. GUY DAIN*	..	Member of council and former chairman of representative body, BMA.
Dr. E. A. GREGG*	..	Chairman of Insurance Acts committee, BMA.
Dr. S. WAND*	..	Chairman of general practice committee, BMA.
Dr. A. S. WIGFIELD*	..	Honorary secretary East Herts. division, BMA; physician, Royston Cottage Hospital.
Dr. S. A. WINSTANLEY*	..	Member Insurance Acts committee, BMA; honorary medical officer, Urmston Cottage Hospital.
Dr. F. GRAY*	..	Member of council and Insurance Acts committee, BMA.
Dr. P. V. ANDERSON*	..	Member of Insurance Acts committee, BMA; honorary secretary, Bishop Auckland division.
Dr. O. C. CARTER*	..	Member of council, BMA; honorary secretary, Bournemouth division; honorary anaesthetist, Royal Victoria Hospital, Bournemouth.
Dr. D. J. B. WILSON*	..	Member of Insurance Acts committee, BMA; chairman, Buckinghamshire division; honorary medical officer, High Wycombe and District War Memorial Hospital.

#### REPRESENTATIVE COMMITTEE (*continued*)

Dr. J. A. L. VAUGHAN JONES*	..	Member of council, BMA; honorary secretary, Leeds divisions.
Dr. A. TALBOT ROGERS*	..	Member of Insurance Acts committee, BMA; honorary medical officer, Bromley and District Hospital.
Dr. W. V. HOWELLS*	..	Honorary anaesthetist, Swansea Hospital.
To be appointed	..	One member of staff of provincial non-teaching hospital.

#### SCOTTISH REPRESENTATIVES

Royal College of Physicians, Edinburgh	..	Prof. C. McNEIL ( <i>president</i> ).
Royal College of Surgeons, Edinburgh	..	Mr. H. WADE ( <i>former president</i> ).
Royal Faculty of Physicians and Surgeons, Glasgow	..	Dr. J. H. MACDONALD ( <i>president</i> ).
Dr. J. B. MILLER*	..	Deputy chairman of representative body, BMA.
Dr. A. F. WILKIE MILLAR*	..	Chairman of Scottish committee, BMA.
Dr. J. F. LAMBIE*	..	Chairman of Scottish Insurance Acts subcommittee, BMA.

\* General practitioner.

#### OTHER CONSULTATIONS

ON March 11 the Minister of Health met representatives of voluntary hospitals for preliminary consultations. The representatives present were:

*Nuffield Trust*.—Sir William Goodenough, Sir Farquhar Buzzard, FRCP, and Mr. W. Hyde.

*King Edward's Hospital Fund for London*.—Lord Donoughmore, Lord Dawson, FRCP, Sir Ernest Pooley, Sir Hugh Lett, FRCS, Sir Alan Anderson, Sir Edward Peacock, General Sir Kenneth Wigram, Capt. J. E. Stone, and Mr. A. G. L. Ives.

*British Hospitals Association*.—Sir Bernard Docker, Sir William Goschen, Sir Walter Cobbett, Mr. R. Morrison Smith, Mr. S. Clayton Fryers, Sir George Aylwen, Mr. J. G. Pickard, Colonel Sir Bertram Ford, Lord Southwood, Mr. W. H. Harper, Mr. S. R. C. Plimsoll, Lord Horder, FRCP, Dr. G. C. Anderson, and Mr. J. P. Wetenhall.

Lieut.-Colonel the Hon. J. J. Astor was unable to be present.

#### NATIONAL WAR FORMULARY

THE National War Formulary now includes a formula for medicated (lethane) hair-oil used for the destruction of head-lice. Three other formulæ have been amended.

*Medicated (Lethane) Hair Oil*.—The Minister of Health set up an expert committee to consider methods of eradication of the head-lice. Of all the substances tried the medicated (lethane) hair-oil has proved most successful, without causing any undesirable secondary effects. The preparation consists of equal parts of lethane 384 special and a white oil of high boiling-point. If desired, a suitable perfume, not in excess of 2%, may be added.

To secure a thoroughly effective application, the instructions for use should be rigidly followed, but the quantity to be applied should not be increased. In general one application only is necessary, especially if the hair is not washed for one week afterwards.

A uniform pack of medicated (lethane) hair-oil with the correct instructions will be available at all pharmacies throughout the country. It is hoped that supplies will shortly be adequate.

*Capsula Liquoris Vitaminorum A et D Concentrati*.—A reduction in strength has been made necessary by the world shortage of vitamin A. Each 3-minim capsule now contains 4500 units of vitamin A and 450 units of vitamin D.

*Lotio Calaminæ Oleosa*.—Wool fat and oleic acid have been added. It is important to observe the order of compounding given with the formula.

*Mistura alba*.—The dose of sodium sulphate has been reduced to 40 grains.

An amendment slip which can be gummed into the formulary will be available for all users of the NWF from HM Stationery Office and all booksellers.

## In England Now

### A Running Commentary by Peripatetic Correspondents

A few days' leave and a desire to breathe a little fresh country air took me into the wilds of Marlshire (and when I say "wilds" I mean wilds). I paid a visit to an old friend who has made her house a centre for all the war-time activities of the tiny village and neighbouring farm community. Besides national savings, ARP, evacuation and the like, she has set up quite the most efficient first-aid post of its kind that I have seen, and she has trained a remarkably skilled group of first-aiders. To date there has been no war emergency to test the post but I was shown a case-book with no less than 186 cases that had received first aid since the beginning of the war, and this list did not include minor cuts and scratches for which a little water and spot of strapping sufficed. The list ranged from major accidents such as fractures and extensive wounds due to agricultural machinery to treatment of streptococcal cellulitis and dressing of varicose ulcers. These activities of the post are undertaken with the approval and, one may say, enthusiastic co-operation of the nearest doctor who lives some eight miles away. Should my friend be faced with an accident where she has the slightest doubt as to treatment, a word over the phone clears up the position. The elderly practitioner—one of the noble band who have come out of retirement to help the war effort—has learned to have such confidence that he can advise first-aid treatment over the phone, and he knows that when he is asked to come out his visit will not be an unnecessary one.

Now my friend made an interesting suggestion for times of peace. There are many parts of the country far from doctors, hospitals and pharmacies, and in many such places first-aid posts similar to her own have been established. Surely sufficient skilled enthusiasts might be found to keep these posts on as a permanency? They would be run in conjunction with the nearest doctor or doctors and would have many advantages. Farm workers would be saved long and often awkward journeys to the doctor for minor cuts and injuries, or having been once, they could have dressings done at their aid-post instead of repeating the journey. The doctor, too, would often be saved the time consumed on an unnecessary call. Then when he did come to attend to an accident he would have a convenient place to put in a few stitches and one where he could count on hot water, nail brushes and the like.

I have no experience of rural medicine and do not feel qualified to judge the practicability of the scheme, except that I can say that from my own observation and from a chat with the doctor it does work well in this instance. I asked if it did not cut across the work of the district nurse but was assured this was not the case, that the district nurse was overworked anyway, and that she was an enthusiastic supporter of this scheme. So I thought I would pass it on. It is easy enough to see difficulties in setting up such rural surgeries, but if nothing was done when difficulties were foreseen progress would be much slower than it is.

He was an unqualified practitioner, and yet I had called him in as a consultant, and now was about to assist him with an operation for acute intestinal obstruction. What would the Royal Colleges say if they heard about it? My consultant seemed a little nervous too, he had never before been called in by a qualified doctor. He was, as a matter of fact, the local butcher, and my mother, with whom I was staying the week-end, had recommended him as a pretty sound man on hens. I had been asked for an opinion on the hen, and had suggested that it might be crop bound. I found a midline swelling in the neck (or was it chest?) but the trouble was that I didn't know the feeling of an ordinary healthy hen's chest (or was it neck?). And not being used to hens, I had underestimated the difficulties of catching and thoroughly palpating a healthy hen. They don't relax as well as humans. Having made my tentative diagnosis, I carried the hen under my arm through the village as far as the butcher. When he agreed with my diagnosis, I was as proud as if Lord Moynihan had agreed with my opinion on a rare abdominal tumour. He explained that the operation was illegal (though there is no law

against leaving a hen to die of obstruction). One may get the vet, but then it is cheaper to kill the bird and sell it. However, I encouraged him to perform the illegal operation. We operated on the chopping block in his back yard. His wife did the instruments: one pen-knife, one needle and cotton. I held the patient, who seemed to feel no pain though there was no anaesthetic. The feathers were parted in the midline, and a central incision was made. After going through several layers a bluish egg-shaped thing popped out. This was the crop. He incised it, and putting in his finger and thumb, pulled out whorls of tangled fibre and grass, matted together with grit and pultaceous chicken food. There was a surprising amount. His method of closure seemed original to me; one purse string suture through the whole bag of tricks: skin, superficial fascia, query platysma myoides, and the crop itself. He brushed the feathers back over the incision and set the patient on the ground; he advised a few days light diet. His fee was one packet of "Players" if the hen recovered, otherwise no charge. A doctor charging in this way would get had up for champerty or something, but I suppose a butcher is not liable. The patient made an uninterrupted recovery, and was laying again in a week.

\* \* \*

One of the great results of the war may be the tonic impact of the Slav mind on western traditionalism, acting rather in the same way as the stimulation of the English by the invasion of Scottish thought, keened by elemental northern needs. For some time I had the privilege of playing bridge with Paderewski, and often after a hand he would say: "The pivotal card there was —" (say) the King of Clubs. "If you had not finessed you would not have got your contract." (Once he beautifully rebuked my over-calling: "The doctor has a flair for difficult propositions.") That seems to me to be the key-note of the Slav mind, the urge to understand mechanism, the delving down to bed-rock, the search for primary causes. Its aura will probably probe many of our traditions, obscurities and inequalities—hereditary legislation, class privilege, religious nebulousity and so on. It will be like the invasion of case law by equity—a cold bath which will do us good.

\* \* \*

The horses had been brought up from grass when the fields were cool with dew, but the day promised to be hot. Most of the men had gone shocking corn at seven o'clock and were soon wet through where they carried the sheaves by their sides. The head team-man prepared the binder for its day's work.

At ten o'clock the first team of three Suffolk punches, two of them only youngsters, were yoked, ready and eager to start work. Horses and wagons had been brought into "John-Mans Piece" to cart a fine crop of wheat, the sheaves were well tied and clean but they were heavy. By eleven o'clock it was becoming hot and instead of the dew the men's shirts were wet with sweat, but they moved steadily from shock to shock to the accompaniment of the hold-yea boy's warning shouts. As each wagon was loaded the loaders slid down the sides, the trace horse was hitched on and the load taken to the stack where the elevator was soon in use. At intervals everyone drank copious amounts of cold tea or some stronger beverage and Dewin walked round his stack to see that "she did not lay over" too far in any direction. By mid-day the women and children arrived with dinner and everyone sat at their ease on the shady side of a bank, the talk was of many things—how long the harvest would last, horses and livestock, previous harvests and yields of corn, the number of rabbits that would be killed in the field where the binder was working and how they would be shared out. The horses had been unyoked and watered, they were now contentedly eating vetches and swishing flies from their flanks. After an hour's respite, work began again, a fresh team in the binder. It was one of those hot, still afternoons, when the straw crackles with dryness, and sweat runs off horses and men as they work, but no one is oppressed by the heat. Old Billy the elevator horse was fairly cool in the shade of the stack. At four o'clock the women and children arrived again, and the brief half-hour of "fourses" provided a welcome rest. Except for a short interval of rabbit chasing as the

binder finished cutting in the neighbouring field work was continued until eight-thirty. It was now cool again and the oncoming dew could be felt in the air, the sweat was drying on men and horses. Billy was unyoked from the elevator, Dewin had put up one good stack, that would provide a hard day's threshing in the winter, and started on another. Men, women and children climbed into the wagons and the boys rode the horses. The harvest moon was up as they returned home along the cool lanes, a slight mist lay low over the fields half hiding the cows in the meadows. The horses drank greedily from a stream and then continued on their way. The men and boys had that feeling of well-being which is only experienced after a day of hard muscular effort; they would have laughed at the term but had the sensation so aptly described by Pavlov as "muscular gladness."

The horses were quickly unyoked and walked into the stable where Borwin had their feed ready. The lamp-lit stable was soon filled with the pleasant sound of horses crunching oats and chaff; the smell of drying sweat mixed with the acrid fumes of dung and urine; that night the horses were turned on to a particularly good meadow. The men went home for supper, a drink and sleep. There is an old saying in the country that at harvest and hoeing wives receive scant attention.

The combine harvester was ready for work by ten o'clock. A lorry had rattled up the rough farm lane with a load of petrol-tins and water-cans. The tractor and threshing motor were started, and the roaring, rattling machine moved slowly round the field belching out straw behind and at intervals dropping off sacks of corn. In the next field Tom Purdy was mowing a heavy crop of barley with a scythe. The lorry and its crew of three had been carting straw, and when they returned at eleven-thirty there was a large load of corn to be carted to the station; they swore at the boy on the combine who had dropped the sacks in awkward places. The lorry just pulled the heavy load out of the field, negotiated an awkward gateway and was soon in the station yard where it was unloaded. The barley—badly wanted by the brewers—was weighed in sixteen-stone sacks and loaded into railway trucks. This was continued all day; the combine did not stop for lunch. By the afternoon the station yard was hot and dusty, the inside of the box trucks was like an oven, the men sweated, occasionally a porter came and watched them—it appeared to give him some satisfaction. By the evening twelve tons of barley had been put on rail; the roar of the combine ceased, it was covered up for the night. Empty petrol-cans were flung on to the lorry and the crew clambered in with their bicycles. The lorry clattered and rattled down to the farm. The men cycled off. The corn had been cut and was already on its way to the maltster, there would be no stack to thresh, labour had been economised and the country was being fed. But to one person at least it was not a real harvest.

\* \* \*

Today is pay day. I shall take the pay 'parade. Having presented this tempting bait to my victims I keep them waiting for their miserable francs while I give them a 20-minute lecture on malaria. I talk to the men in the wards; that is to say, I am giving a course of lectures to the orderlies on the mysteries of medicine and the art of nursing. True this orderly was a miner in "Civvy Street," that man a postman, and the fellow at the back of the group with a far-away look in his eyes was a dock labourer. It is nevertheless essential to promote a lively interest in their war-time work of looking after the sick. Slowly but surely I am becoming a disillusioned man. Only one thing counts with me now and that is native wit. Knowledge is vanity; originality and the ability to adapt oneself to unusual conditions—these are all-important. So you see that I am undergoing the second moulting of socialism, and before the end of the war I should have completed my metamorphosis and become a respectable Conservative. These signs of incipient intellectual atrophy are accompanied by a tendency to obesity. I imagine that I have put on about a stone in weight since I joined the R.A.M.C.

## Parliament

### ON THE FLOOR OF THE HOUSE

#### MEDICUS MP

THE new Speaker has been elected by the House of Commons with traditional ceremony. Yesterday he was Colonel Clifton Brown, whom we all met on equal terms in the smoking-room or the library; today he became "Mr. Speaker," and is inevitably somewhat aloof from the life of ministers and MPs because his impartiality must be guarded with the most scrupulous care. Colonel Douglas Clifton Brown is a Conservative country gentleman who served in a cavalry regiment and there, so his elder brother, General Clifton Brown told us, got his training in service. He is universally liked. Major Milner, who becomes deputy Speaker and chairman of Ways and Means, is a member of the Labour Party, a lawyer and a man with great interest in the Services. The deputy chairman is Mr. Charles Williams, a popular Conservative of 25 years' standing. After these elections our work began again.

In addition to the general debate on Navy and Air estimates there was a special debate, on an amendment, concerned with the conditions and service of the 50,000 or so WRNS who are such a useful addition to the Navy and who are employed in 60 categories: from gun testing and marine engine repairing to typing and cooking. What the Wrens now want is to go afloat. They already go overseas and are serving not only at Home stations, including the Shetlands, but in the Middle East and in South Africa; they were also at the Casablanca conference. The Markham Committee on conditions in the three Women's Services reported that there was only one woman doctor on the staff of the Naval DG. Since then one other has been appointed and the Civil Lord (Captain Pilkington) has promised more. Conditions of the WRNS generally are good, and their addition to the service is a great reinforcement.

The Air Ministry debate was largely technical, but was made the opportunity for announcing the formation of an Air Transport Command with which the British Overseas Airways Corporation will work in close co-operation on the civilian side. The debate made it clear that the bombing of German industries, railway yards, submarine bases and other targets which is proceeding intensively was regarded as a prelude to combined operations of invasion of the continent of Europe. The effect of this bombing has been so great that it can be thought to some extent to have lessened reprisal raids on this country, the reason being that German production has had to switch from bomber production to fighter production to aid in the defence of Germany. Germany is being put on to the defensive, and in the sky, on the sea and on land greater and greater forces pile up for her final defeat. It is not without significance that recently we were warned of the possible need to cut down our ration allowance of meat, and that the United States has just announced large extensions of rationing, including meat, to begin in April. A big strain is coming on the populations of the United Nations in 1943.

#### INDUSTRIAL HEALTH ADVISORY COMMITTEE

On March 11 Mr. ERNEST BEVIN, Minister of Labour and National Service, announced the appointment of an advisory committee to co-ordinate work in industrial medicine and hygiene. The committee, which will be attached to the Ministry of Labour, will be responsible for inquiry rather than research and will not displace the existing Industrial Health Research Board. Its findings will be at the disposal of the minister, acting through his factory and welfare department. The prime purpose of the scheme, Mr. Bevin said, was to make work healthier, safer and pleasanter. In the past doctors, engineers, chemists, physicists and others had helped to detect and remedy injurious conditions or processes. Trade unions should now accept a share of the responsibility for maintaining industrial health and for educating work-people in better practices, even should this mean a break with traditional habits. It would be the duty of the

committee to codify existing knowledge and to keep step with every new discovery.

Of this committee Mr. BEVIN himself will be chairman and Mr. GEORGE TOMLINSON, parliamentary secretary to the ministry, vice-chairman. Among its members are Sir WILFRID GARRETT (chief inspector of factories); Mr. D. L. SMITH (supt. engineering dept., National Physical Laboratory); Brig.-General A. C. BAYLAY (engineering employers fed., member of Factory and Welfare Advisory Board and IHRB); three other members of the advisory board—Miss A. LOUGHLIN (chairman of the TUC), Mr. WILLIAM SCHOLES (allied assoc. dyers and printers), and Mr. J. L. SMYTH (sec. social insurance dept. TUC); Mr. E. C. FUDGE (ministry of fuel and power); Mr. J. FOX, DSc (Government chemist); and Sir THOMAS PHILLIPS (secretary to the ministry). The medical members of the committee are:

A. J. AMOR, deputy chief medical officer Ministry of Supply.  
ARTHUR W. ELLIS, regius professor of medicine, Oxford University.

M. W. GOLDBLATT, chairman of the Association of Industrial Medical Officers.

CHARLES HILL, deputy secretary of the British Medical Association.

Sir WILSON JAMESON, chief medical officer, Ministry of Health.

E. R. A. MEREWETHER, senior medical inspector of factories.  
Lord MORAN, president of the Royal College of Physicians of London.

M. W. PATERSON, secretary of the Association of Certifying Factory Surgeons.

JOHN A. RYLE, Nuffield professor of social medicine, Oxford University.

The secretary of the advisory committee is Mr. D. C. BARNES, of the Ministry of Labour.

To inaugurate the work of the new committee Mr. Bevin has called a three-day conference on industrial health, to be held in London on April 9-11, at which British and Allied government departments will be represented.

## QUESTION TIME

### Children's Allowances

Mrs. CAZALET KEIR asked the Prime Minister what steps were being taken to implement the Government's decision to introduce children's allowances; and which department was dealing with this matter.—Mr. A. EDEN replied: Details of a scheme of children's allowances will be worked out, in consultation with the departments concerned, by the small central staff which, as announced by the Lord President of the Council in the course of the debate on Feb. 16, is being set up under the Minister without Portfolio to coördinate the preparatory work on the proposals contained in Sir William Beveridge's report.

### Nervous Children and School Examinations

Sir ROBERT GOWER asked the President of the Board of Education whether, in view of the number of nervous children, he would investigate the advantages of holding examinations concealed from the knowledge of children.—Mr. R. A. BUTLER: The suggestion presents practical difficulties. Examinations as at present conducted may have unfortunate effects on some children. This is being borne in mind in the consideration at present being given to the future of examinations in grant-aided schools.

### Mental Clinics

Mr. R. W. SORENSEN asked the Minister of Health how many mental clinics for outpatient advice and treatment are being maintained by local authorities in England and Wales; whether he had any approximate figures of the number of patients for the past year; and whether he had given special attention to the need for extending such centres after the war.—Mr. E. BROWN replied: In 1939 there were 177 such clinics and in the previous year approximately 19,000 patients had attended them. I regret that later figures are not available. The question of postwar extensions is receiving consideration. Mr. SORENSEN: In view of the excellent work that these clinics are doing for the benefit of outpatients, will the Minister see that every encouragement is given to them, as far as possible, so that after the war they will be considerably extended?—Mr. BROWN: Certainly.

## Red Cross Ambulances

Sir RALPH GLYN asked the Secretary of State for War (1) on what basis were ambulances of the Red Cross and St. John war organisation used by troops in this country; how many were so employed; what was the number of ambulances as distinct from those belonging to the society; and whether any of the voluntary funds paid to the Red Cross were utilised for the performance of duties which would normally be carried out by service vehicles and (2) whether, as over 3,500,000 miles had now been covered by the ambulances of the Red Cross and St. John war organisation in United Kingdom commands since the beginning of the war, carrying over 400,000 patients, and as the ambulances of the society were now being used at service convalescent homes, he would say what contribution the society received from public funds for the use of these vehicles.—Sir JAMES GRIGG replied: At the beginning of the war the Red Cross and St. John War Organisation, as part of the humanitarian services which it is their purpose to provide, equipped a number of ambulances and provided their drivers. After the evacuation of the BEF from Dunkirk the organisation offered the use of some of these ambulances for the benefit of the officers and men in the Army. This offer was gratefully accepted, but the ambulances remained the property of the Red Cross and there was no question of a contribution from public funds towards the cost of provision. Where however they were solely used for the Army it was considered that the organisation should be relieved of the direct expenses incurred in carrying out this service. At the present time therefore the War Department bears all the costs of running, garaging and repairing, the vehicles concerned, together with liabilities for accident normally covered by third-party insurance. The Army sometimes provide on repayment rations and accommodation for the Red Cross personnel with the vehicles. About 400 ambulances are so employed. This is a small fraction of the number of ambulances in the Army, but I am afraid that it is not in the public interest to say what the number of these is. If the services of the Red Cross ambulances were not available the Army would have to provide such of the services as are essential to the well-being of the troops. This might entail the provision of more War Department ambulances, but without examining every case it is impossible to say how many. These services provided by the generosity of the Red Cross and St. John War Organisation have added very considerably to the comfort and well-being of the troops for three years of war and I welcome this opportunity to say how much these services have always been appreciated by all ranks of the Army.

### Nurses in Private Practice

Sir LEONARD LYLE asked the Minister of Labour if he could define the position of nurses in private practice; whether they were being called up either on a rota system or at short notice to serve in emergency hospitals or kindred institutions; and whether, when unreserved after a certain age, they were being withdrawn with little or no notice from the service of private persons who were temporarily in their charge.—Mr. ERNEST BEVIN replied: The present position is that nurses engaged in private practice are not transferred to work in other forms of nursing if they were born in 1911 or earlier and it is clear that they are reasonably well occupied on their nursing duties and likely so to continue. Other nurses may be withdrawn from private work, but they would not be so withdrawn until they have completed any case on which they may be engaged and fulfilled any commitments into which they have entered for a short period ahead. This practice is, of course, liable to change in the light of any advice which I may receive on the subject from the newly formed National Advisory Council for the Recruitment and Distribution of Nurses and Midwives.

### Domestic Staffs of Nursing Homes

Mr. DAVID ADAMS asked the Minister of Health whether he was aware of the difficulties being experienced by private hospitals and nursing homes in Newcastle owing to the withdrawal elsewhere of essential members of domestic staffs of conscriptible ages; and whether he would arrange that one cook and one head housemaid might be retained by each to enable these sections of the health services of the city to continue.—Mr. E. BROWN replied: I have been informed that a particular nursing home in Newcastle has experienced difficulties as a result of the withdrawal of the cook from their service and that difficulties have been experienced by other

nursing homes there, following the withdrawal of domestic staff. Arrangements have been made by the Minister of Labour and National Service for officers of my department to be consulted before domestics are withdrawn from nursing homes. Each case is considered on its merits.

Miss I. WARD asked the Minister (1) whether, in view of several decisions not to recommend to the Ministry of Labour the deferment for National Service of domestic staff, it was his policy to close down private nursing-homes, and (2) whether, in view of his decision that there were too many private nursing-homes in Newcastle-on-Tyne, he would give a list of other towns which he considered were in a similar position.—Mr. BROWN replied: The fact that applications for deferment in individual cases are not invariably supported by my department does not justify the conclusion drawn. Individual applications must be considered on their merits. Miss WARD: Does the Minister wish to reduce the number of nursing-homes. Mr. BROWN: No; I said that in my reply.

#### Dermatitis in Notts and Derby

Mr. HENRY WHITE asked the Home Secretary how many cases during the last six months, from the counties of Nottingham and Derby, have been referred to Dr. Airey as a medical referee on dermatitis from the mining industry; and the number that had been rejected as non-occupational.—Mr. H. MORRISON replied: The number of cases for the six months ending December, 1942, was 129, in 106 of which the decision was against the workman. The returns do not show how many of these cases were from the mining industry.

#### Care of Mental Defectives

In answer to a question Mr. E. BROWN replied: There were 91,050 mental defectives in England and Wales on Jan. 1, 1942. Of these, 41,982 were not in institutions and no staff was employed to look after them. I have not complete figures of staff for institutions, but at 49 certified institutions from which I obtained particulars in January, 1942, there were 26,385 patients and 2947 charge nurses and nurses.

#### Pasteurisation of Milk

Mr. R. PURBRICK asked the Parliamentary Secretary to the Ministry of Food if he would ensure that no steps were taken towards making the pasteurisation of milk compulsory without consulting the body of opinion of this House.—Mr W. MABANE replied: While I could not give any undertaking in general terms I should welcome whatever opportunity may be afforded to learn the views of the House on this matter.

#### QUININE SUBSTITUTES

THE stringency of the quinine situation has not yet been fully appreciated. The Ministry of Health has sent a circular to all hospital authorities and voluntary hospitals, notifying them that the three BP preparations, mepacrine hydrochloride, mepacrine methanesulphonate, and pamaquin, are now available from the manufacturers in the following forms and packs.

Maker	Drug	Dose (g.)	Bottles or boxes (tablets or ampoules)
M&B	Mepacrine hydrochloride	0.1 (tab.)	25, 100, 500
ICI	"	0.1 (tab.)	15, 100, 300
Boots	"	0.1 (tab.)	25, 100, 500
M&B	Mepacrine methanesulphonate	0.1 & 0.3 (amp.)	6, 25
ICI	"	0.1 & 0.3 (amp.)	6, 25
M&B	Pamaquin	0.01 & 0.02 (tab.)	15, 300
ICI	"	0.1 & 0.02 (tab.)	15, 300

Attention is again directed to the Control of Cinchona and Cinchona Products and Synthetic Substitutes (nos. 1 and 2) Orders, 1942, in which the use of quinidine has been restricted to the treatment of cardiac arrhythmia, and all other cinchona alkaloids are reserved for the treatment of malaria. In case of difficulty in obtaining necessary drugs the Directorate of Medical Supplies, Ministry of Supply, Portland House, Tothill Street, London, S.W.1, is ready to give help.

## Letters to the Editor

### SPECIAL HOSPITALS FOR RHEUMATISM

SIR,—We, the undersigned, members of the council of the Heberden Society, wish to express our appreciation of the careful and lucid presentation of the interim report of Medical Planning Research. It is because we feel that this document will have considerable influence on post-war medical planning that we would draw your attention to the omission in ¶ 156 of any mention of special hospitals for rheumatism and allied disorders in postwar medicine.

Nevertheless, it must be admitted that the general standard of practice and research in Rheumatism and allied disorders is lamentably low; while the degree of injury these maladies continue to inflict on the health of the nation needs no emphasis. It is clear that rheumatology cannot be allowed to die and the rheumatic diseases to dissolve back into the matrix of general medicine or orthopaedic surgery. We offer therefore the following statement of our views in the hope that they will clarify the position of rheumatology in the scheme of medical practice, and lead to a general recognition of the need for national centres devoted to practice, teaching and research in this specialty.

There are certain arguments which can and have been raised against the establishment of special centres for practice, teaching and research in rheumatism. First, there is no accepted definition of the class of disorders known as "rheumatic diseases." It would be unreasonable to establish special centres for a group of disorders which no one can define, provoking a confusing and irritating degree of overlap with other branches of medicine. What are the accepted criteria by which we may know whether a given case of sciatica, lumbosacral pain, gonococcal arthritis or peri-arthritis of the shoulder should be sent to a rheumatic centre or not? There are none; at present rheumatic centres take all of them, whether their origin is "rheumatic," traumatic or neither. Neurologists and orthopaedic surgeons might reasonably demur. Secondly, the accepted rheumatic diseases are, all of them, of obscure aetiology. For this reason, to isolate them in special hospitals would be inherently bad, both for research and practice. Research is essentially a procedure from the known to the unknown. No-one will advance knowledge of articular rheumatism who does not start with a profound and intimate knowledge of joint disorders of known aetiology; or of the non-articular rheumatic disorders; who has no first-hand clinical and pathological knowledge of, for example, peripheral vascular disorders and other affections of the autonomic nervous system. Where shall he obtain this knowledge if his work is confined within a special hospital for rheumatism? How, in the words of a statement of policy recently issued by the Empire Rheumatism Council and the British Orthopaedic Association, shall a man be given "encouragement to make the study of rheumatic diseases a life work" under such conditions? Only a metaphysician can live contentedly in a world of unknowns.

In the section of his *System of Logic* on the requisites of a philosophical language, John Stuart Mill says, "It would be a complete misunderstanding of the proper office of a logician in dealing with terms already in use if we were to think that because a name has not at present an ascertained connotation it is competent to anyone to give it such a connotation at his own choice. The meaning of a term actually in use is not an arbitrary quantity to be fixed, but an unknown quantity to be sought." It is not open to anyone therefore to say what he thinks the name rheumatism ought to mean, giving it a meaning of his own choice; all he may do is to ascertain what the name actually does mean, in its present usage.

Senator came very near to the modern meaning of the name when he wrote, in 1877, in Von Ziemssen's *Cyclopaedia of the Practice of Medicine*, "It thus includes 'all painful affections of the joints, and muscles with their tendons and fascia, which are either due to chill, or to causes which cannot be ascertained and are therefore assumed to be atmospheric.'" The conditions treated in existing rheumatic clinics are, in fact, disorders related solely by the common property of somatic pain



## A EUROPEAN ASSOCIATION

SIR,—It is proposed to form a European Association of Clinical Pathologists among the medically qualified men and women of the various nations of Europe now engaged in this country in any branch of medical laboratory work.

Clinical pathology, although itself a special branch, permeates and establishes contacts with all departments of medicine. Experience has shown those of us who are members that the meetings of the already existing Association of Clinical Pathologists in this country afford peculiarly fruitful occasions for the gathering together of practitioners in the different branches of medicine on a ground of common understanding and interest and thus encouraging the growth of a spirit of fraternity and coöperation. Of the value of the presence of such a spirit among the representatives of the various European nations now sojourning in this country there can be no doubt. It is our hope that on their return to their homelands the members of the European association may in due course initiate branches in their own countries which will retain close touch with each other and with the Association of Clinical Pathologists in this country.

We believe that such a movement, quite apart from its obvious advantage to medical science, would serve to encourage a feeling of accord and comradeship between the European medical communities and thus make a contribution, small perhaps but by no means negligible, to international amity.

We have every reason to believe that the Association of Clinical Pathologists, although it has not yet officially discussed the project, would do all in its power to assist and that it would welcome the members of the proposed European association to its meetings and to an active part in its proceedings.

A meeting for the purpose of discussing the matter and if deemed advisable of inaugurating the European association will, by courtesy of the dean of the medical school, be held at University College Hospital, London, at 2 PM on Saturday, April 3. All medical practitioners, from the continent of Europe and from Great Britain alike, engaged in any form of medical laboratory work will be very welcome. Those who feel interested are invited to communicate with Dr. F. Pick, Department of Clinical Pathology, the General Hospital, Walsall. Those who propose to attend are requested to notify Dr. Pick to that effect.

- E. J. BIGWOOD, MD Brux.
- A. DELIKATOVA, MD Bratislava.
- B. L. DELLA VIDA, MD Rome.
- F. DURAN-JORDA, MD Barcelona.
- S. C. DYKE, DM Oxf.
- S. FRANSMAN, MD Amsterdam.
- J. O. GAVRONSKY (Moscow), MRCS.
- M. MANDELBAUM, MD Munich.
- F. PICK, MD Prague.
- G. POPJAK, MD Szeged.
- F. SILBERSTEIN, MD Vienna.
- G. UNGAR, MD Paris.

## SUPERFICIAL ATRESIA OF THE VULVA

SIR,—I read Miss Ottley's report on two cases of superficial atresia of the vulva with great interest. Both her cases occurred in women during the menopause and must be taken as part of the physiological senile atrophy of the vulva and vagina, a picture not too common but well known to gynaecologists. May I briefly give an account of the continental literature on that subject, in which, since Salmond in 1930 described the condition, several important papers have been published.

Prof. A. Labhardt of Basle (*Zbl. Gynäk.* 1936, 60, 1746) and Prof. J. Novak (*Ibid* 1936, 60, 2653 and 1937, 61, 971) drew attention to the circular stenosis and atresia in the upper part of the vagina as a result of the shrinking process of the perivaginal fibrous tissue in senile women ("kraurosis fornicis vaginae"). The introitus vaginae is often affected too, while the caudal part of the vaginal stenosis is usually of normal width. The cranial pocket of the stenosis shows many crevices, the mucosa is very thin and tender, inflamed, and bleeds easily. Hence the importance of the differential diagnosis from malignancy.

The best description of the superficial atresia of the vulva as the only symptom and sign of senile kraurosis came from the late Prof. Josef Halban of Vienna (*Ibid*, 1937, 61, 194). He described the so-called "Cirrhosis annularis subhymenalis" in 7 cases; 4 were climacteric or post-climacteric women, three were over 42 years old and were still menstruating regularly. Halban suggested that there was a special local condition of the vaginal tissue analogous to a cirrhosis, probably due to insufficient ovarian hormone production. In support of that view are the cases which developed only very shortly after the menopause, or earlier. Why such a superficial atresia of the vulva should occur as the only sign of a physiological atrophy in preclimacteric women is still open to speculation and the histology has not shown any particular clue. The vascular supply of that region (it is on the borderline between the vaginal branches of uterine artery and vaginal arteries) may help to explain it.

Therapeutically, excision and hormone treatment have been advised (Tsutsulopulos, G. and Platz, *J. Ibid*, 1938, 2, 290).

I have seen 4 cases of the superficial form of atresia of the vulva in women between the ages of 40 and 50 in which treatment with oestrin or stilboestrol in high doses stopped the gradual shrinking successfully, and dilatation with local infiltration of 1% 'Novocain' at intervals removed the dyspareunia which in these cases was the most distressing complaint. All these cases were still menstruating but they all complained of flushes. It is worth noting that all patients were treated as vulvitis and leucorrhoea and had local treatment for many months without the slightest effect.

Kingston-on-Thames.

WALTER SPITZER.

## SENSITIVITY TO SULPHONAMIDES

SIR,—In your leading article of March 13 you refer to my suggestion (*Lancet*, 1942, ii, 568) that cases developing sensitivity during sulphonamide treatment should be immediately desensitised. It is important to recognise that several factors may be responsible for the appearance of a sulphonamide dermatitis, and that, although 8th-day allergic sensitivity appears to be the most common cause, each case must be considered individually. Too often the drug is withheld or the patient ceases to take the tablets if a rash appears during medication, and nothing further is done about it. Many such cases remain sensitive for long periods and may exhibit startling reactions even months later if it is necessary to give further sulphonamide treatment; thus the treatment of a grave emergency may be handicapped. The extensive use which is now made of the sulphonamide compounds indicates the importance of this factor of sensitisation, and in my opinion it is wrong to allow a patient to remain sensitive when immediate desensitisation can easily be carried out with little risk.

The restriction of sulphonamide therapy to a maximum of 7 days whenever possible will considerably reduce the incidence of sensitivity; most of my cases of gonorrhoea receive 3 grammes a day for 7, or occasionally 10, days. If a sulphonamide rash appears around the 8th-day, my procedure depends on the clinical condition of the case. If Werner's test is positive and it is desirable to continue medication, I do so in the full dosage for the required period; but if the clinical condition for which the sulphonamide is being administered is already under full control, I give half the dose (i.e., one 0.5 g. tablet 8-hourly) for a further 2 or 3 days. If, as occasionally happens, chemotherapy has already ceased when the eruption appears, I give additional treatment with 0.25 g. three times a day for 3 days. Elimination of the drug seems to be assisted if during this desensitisation an alkaline diuretic is also administered. A sensitisation rash will show definite evidence of fading during this extended period of treatment and further sulphonamide later has not reproduced rashes to my knowledge. If sulphonamides are withheld when a rash appears, it often takes a week for the rash to fade, and many of these cases immediately reproduce a rash or more serious allergic phenomena (see *Brit. J. ven. Dis.* 1939, 15, 260) on later administration of the drug. It is important to keep the patient under careful supervision during desensitisation so that the rare exacerbations of the condition can



be assessed with blood-counts, excretion tests, &c., or desensitisation deferred for a week or two, when small initial doses should be tried. Basing my treatment on a positive Werner's test, I have had no experience of such reactions.

I think the erythema nodosum type of rash more often encountered during treatment with sulphathiazole is probably due to a liberation of toxins and should be treated by a reduced dosage for a few days. If a patient gave a history of previous reaction to sulphonamide without subsequent desensitisation, I would give small initial doses for 24 hours and then increase to full doses if no untoward symptoms had developed.

Guy's Hospital.

DAVID ERSKINE.

### STERILISATION OF SULPHONAMIDES

SIR,—After publication of the method of moist-heat sterilisation of sulphonamide powders in closed screw-capped containers (*Lancet*, 1942, 2, 456) several workers wrote or spoke to us about their failure to confirm our finding that sulphanilamide powder was physically unaffected by this process; in fact, this particular sulphonamide showed varying degrees of "caking" when so sterilised. We have since experienced the same trouble with fresh samples of sulphanilamide powder supplied by different firms, although the particular batches from which the original tests were made still remain in fine powder form after moist-heat sterilisation in closed screw-capped containers. Different samples of sulphapyridine and sulphathiazole and also two batches of sulphadiazine have shown no tendency to caking when sterilised by this method, but as sulphanilamide is still the most popular sulphonamide for local application some other more constantly reliable method must be used (see *Lancet*, Feb. 20, 1943, p. 247). In an attempt to discover the cause of the caking, Mr. A. T. Fuller, PhD, kindly examined two different samples of sulphanilamide powder for us. With the exception that the "caking" sample was less fine (19% passed a sieve of 100 mesh, compared with 91% of the non-caking powder), and contained an impurity detected by fluorescence—possibly the cause of the yellowish discoloration which may develop on heating—a full analysis which included moisture content, static electric charge, melting-point, behaviour on wetting, and pH failed to discover any appreciable difference in the two powders. It was noted, however, that both samples became intensely charged after passing through the sieve and afterwards both showed caking when heated. It may be that recently prepared batches of sulphanilamide powder aggregate on heating because of being electrically charged, whereas older samples, having lost this property, do not do so. A sample, which caked when originally tested, failed to do so but did become gritty when tested 3 months later.

ROBERT CRUICKSHANK,  
J. E. MCCARTNEY.

London, N.W.

### DARWIN AND PSYCHOTHERAPY

SIR,—While in agreement with Dr. McGlashan's view that the danger of destroying a socially valuable talent by psychotherapy is less than Dr. Hubble feared, I cannot see that his arguments remove such fear convincingly. In Darwin's case, as Dr. Hubble shows, the basic conflict which gave rise to the psychoneurosis originated in the father-son relationship and the sense of guilt resulting from it. It is true, this conflict played no part in the later years of his life. But we know that the father's authority is established in the unconscious mind of the child by his identification with the "God" father, and in this deeper significance the conflict might have never been solved. It seems to me that Darwin's psychoneurosis represented a subconscious conflict between a pious and a scientific propensity; or, in terms of instinct, between a religious instinct (which probably exists despite Freud's denial) and McDougall's instinct of curiosity. It is the old story of the Tree of Knowledge.

If this was so, then Darwin did not waste his powers in profitless inner friction, as Dr. McGlashan believes; on the contrary, the conflict might have become fatal (as it was in the case, originally similar, of Nietzsche) had not the neurosis spared him the necessity of fighting it out consciously. The protective adaptations, in the

light of Dr. Hubble's interpretation of the neurosis as an adjustment to external rather than internal environment, do not appear in their proper perspective; and by ascribing a conative tendency to what appears to be a secondary gain Dr. Hubble creates a discrepancy between Darwin's "unusually fine character qualities" and his alleged selfish methods of taking advantage of a disease. It is more likely that the protective adaptations served the purpose of relieving a subconscious sense of guilt by means of self-inflicted suffering. In the light of this assumption Dr. Hubble's conclusions appear more convincing. Analytical psychotherapy would have aimed at freeing the patient from his sense of guilt—which, however, was hardly feasible without attacking the well from which it was nourished, the propensity for scientific research.

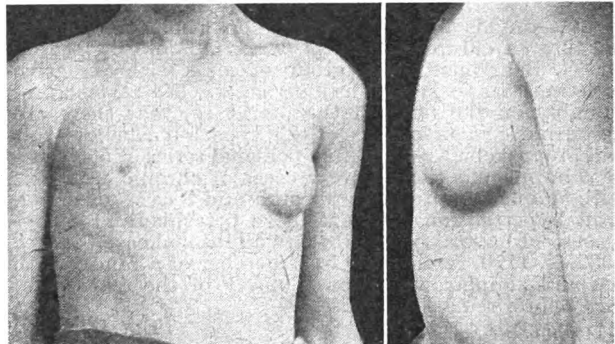
It may be argued that a genius would certainly be able to achieve a solution, other than neurosis, of mental conflict. Goethe found a way out by identifying God and Cosmos. But apart from the fact that the external environment was widely different in Goethe's case, it seems that Darwin's scientific mind was strongly opposed to any compromise which might have prejudiced his research work. Therefore, probably the least harmful, perhaps even the most courageous and dignified, of possible ways out of the conflict was to leave it unsolved in the unconscious, and through invalidism to pay the price for the Promethean task.

Birmingham.

BRUNO SAALER.

### GYNÆCOMASTIA

SIR,—Here are photographs of a boy referred to me by Dr. Reginald Lightwood. He has one large breast and one small one. Dr. Richardson's contention (*Lancet*, March 6, p. 304) that gynæcomastia may be due



to excessive production of œstrin seems difficult to uphold in this instance; for why should one breast be affected and not the other? I removed the enlarged breast which consisted of normal breast tissue.

Wimpole Street, W.1.

D. LEVI.

### SOCIAL MEDICINE

SIR,—Many of us in the Forces have much eagerness, and perhaps even some time, to give to the study of social medicine, a branch which had little place in the medical curriculum which we traversed. It seems to me that military medicine may afford a simplified approach to social medicine, in that we are dealing with a society circumscribed, accessible to observation, and amenable to control. Also the honesty of our human nature has this additional bulwark, that sickness rates do not affect our remuneration. As Plato has it in the first book of the Republic, "If we are to consider accurately, the medicinal art produces health and the mercenary art a reward." It should be possible, in such favourable circumstances, to verify or even amplify Ryle's description of the signs of health in his published lecture on the science of health; to arrive at a personal judgment of the effects on well-being of exercise, exposure, irregular working hours, responsibility and a dozen other variables of environment; and to estimate the relative importance of the common causes of deviation from rude health. Of course many of these things are already well known to those who have made a special study of individual health, but if we discover them anew and for

ourselves, they will be brought home to our business and bosoms, and we may be better prepared to play some part in removing the stigmata of preventable ambulant disease from our streets, and in the creation and preservation of a healthier England.

DOUGLAS A. K. BLACK.

#### PSITTACOSIS VIRUS IN ENGLISH PIGEONS

SIR,—In their paper on this subject in your issue of March 6 (p. 292) Andrewes and Mills say that "atypical pneumonias in pigeon-fanciers have not been described in Britain, but on the other hand it is unlikely that anyone has looked for them." This is incorrect, for case 12 of my series of human psittacosis (*Lancet*, 1930, i, 396) was a pigeon-fancier who had no contact with parrots and, as I pointed out then, he raised "the unpleasant possibility that this disease may be contracted from apparently healthy birds." Further, although it seems unlikely to Andrewes and Mills that physicians would concern themselves with such matters, I have continued to study the environment and habits of patients with atypical pneumonia and I have seen two other cases of psittacosis in pigeon-fanciers since. The possibility that the psittacosis virus or something like it might be carried by domestic poultry has not escaped me. In the Midlands I have seen recently a number of cases of atypical pneumonia—the so-called virus pneumonitis—and I have notes of three in which the disease was associated with sickness in newly established fowl pens. Is it possible that the apparent increase in virus pneumonitis is related to the multiplication of small domestic poultry runs?

Birmingham.

A. P. THOMSON.

#### SPONTANEOUS HÆMORRHAGES IN CHRONIC NEPHRITIS

SIR,—In his interesting paper drawing attention to purpura in chronic nephritis (*Lancet*, Feb. 20, p. 239) Dr. G. Behr mentions a group of cases with extensive ecchymoses and severe hæmorrhages. He states (presumably on the basis of the literature) that there are no purpuric spots in cases of this type, but I believe this will prove to be wrong. In a personal series of 500 cases of skin-purpura there were 7 cases of chronic nephritis with simple symptomatic purpura and 3 cases of malignant hypertension with extensive petechiæ and ecchymoses. I have also described an additional case (*Lancet*, 1930, ii, 1110, family XI) in a member of a family with purpura simplex who showed many of the features of Dr. Behr's remarkable case.

London, E.3.

ELI DAVIS.

#### REPLANTATION OF TEETH

SIR,—On reading your criticism (Jan. 23, p. 115) of an article of mine on tooth replantation in the *British Dental Journal*, I was astounded at your misrepresentation. The annotation was entitled "Transplanted Teeth," a disgusting operation which was condemned by everyone many years ago. Yet you cite Victor Hugo's prostitute character in *Les Misérables* who sold her teeth for transplantation and then without pause or differentiation you proceed to describe my treatment on replantation—an operation which has no analogy whatsoever with transplantation.

You say that success in this operation depends on the periodontal membrane remaining healthy and undamaged, and that I in my treatment destroy this. But I was speaking of the treatment of the tooth after extraction when any traces of periodontal membrane attached to it are completely removed. This should be obvious, since such tissue must be grossly septic and dead and therefore should be eliminated before the tooth is replanted. Any traces of healthy periodontal membrane remaining in the tooth socket after thorough curetting of the abscess sac, &c. may eventually regenerate, but I do not accept the hypothesis that a healthy periodontal membrane must be essential for success. You say that "with the membrane and pulp removed the tooth is just dead bone . . . the end of that tooth must be gross sepsis." The root of a tooth, of course, is not bone; but whether bone or dentine makes no difference, provided the tissue is sterile, and should not of necessity lead to

gross sepsis as you suggest or act as a focus of infection. You say that the tooth will probably discolour (a minor detail from a health point of view); but it is almost impossible for a tooth to change colour when treated in this manner—any change of colour that may take place is always to the good. You say that the procedure "though dentally feasible, seems medically unwise"; how can this be? And your statement that my X rays taken 6-18 months after implantation "do not show healthy surrounding bone" is of course a matter of opinion.

Welwyn Garden City.

STANLEY A. PLEASANT.

#### DIABETES INSIPIDUS

SIR,—With regard to the clinical application of the treatment of diabetes insipidus with a slowly acting pituitary preparation as suggested by Dodds, Noble, Rinderknecht and Williams (*Lancet*, 1937, ii, 309), I think it would be of interest to your readers to mention a recent paper by Foeldes and Strausz (*Schweiz. med. Wschr.* 1942, 72, 314.) These authors used, with apparent success, pituitary extract combined with 0.1% zinc as zinc chloride. As Swiss journals are not readily accessible under present circumstances it is understandable that this paper escaped the notice of Dr. Court and Mr. Taylor writing in your issue of Feb. 27 (p. 265).

Welwyn Garden City.

H. RINDERKNECHT.

#### Obituary

##### RUSSELL HENRY JOCELYN SWAN

OBE, MS LOND., FRCS

Mr. Jocelyn Swan, consulting surgeon to the Royal Cancer Hospital and to St. Paul's Hospital for genito-urinary diseases, died in London on March 2. As a craftsman few have surpassed him, but he was a man of many gifts and his sound judgment, courage, skill and capacity for taking pains enabled him in his early days to become an expert urologist without losing his personality as a general surgeon. These same qualities led him to take a sane view of the value of radium when sanity in this field was at an even greater premium than radium itself, and later he became a valued member of the grand council of the British Empire Cancer Campaign.

Born in 1876, the son of Dr. Richard Jocelyn Swan, he was educated at Wilson's School and Guy's Hospital where he graduated MB with first-class honours at the age of 22. After holding house-appointments at Guy's and St. Peter's Hospital for Stone he became surgical registrar at the Royal Cancer Hospital. He took his higher surgical qualifications in 1902 and in due course was appointed to the honorary staff of the hospital. S. C. writes:

"The late Sir Percy Sargent once said that Jocelyn Swan had the best pair of hands in London, and a visit to the Cancer Hospital showed this to be no exaggeration. No surgeon spoke less in the operating-theatre and no-one conveyed more clearly the spirit of surgical sanctity; he was no showman but a real artist. His contribution to the treatment of cancer was that of a practical surgeon—he knew what to attempt and when not to cut short, by ill advised surgical heroics, a life already doomed. His low operative mortality, the confidence of the doctor and the faith of the patient were his records. His practical knowledge of malignant disease, his open mind and his technical skill led him to use radium as soon as its possibilities became known, and he had the wisdom to divide his interests without losing perspective or skill."

In 1939 Swan was on the point of retiring, but when war broke out he settled down as divisional surgeon at Park Prewett EMS Hospital to work harder than ever. In the last war he had served in the RAMC as senior operating surgeon at the Royal Herbert Hospital, Woolwich, and as surgeon to the RAF hospitals and, the American Red Cross Hospital, and his colleagues at Park Prewett valued this background of experience. He was specially interested in peripheral nerve injuries and, of course, urinary surgery. As mess president Swan lived at the hospital and did much to make life easier for his fellow residents, for he liked things to be right and with

his likeable nature usually succeeded in making them so. He was a great raconteur and had travelled much, and a colleague recalls pleasant evenings at Park Prewett spent listening to Swan's account of his journeys which he illustrated with his own cinematograph films. He was a noted golfer and knew a lot about stamps, of which he had made a valuable collection.

Swan married in 1908 Miss Una Waterlow who died in 1924. In 1927 he married Miss Joyce Thornton who survives him with a son and three daughters of his first marriage.

### THEODORE ARMOUR

M B EDIN., F R C S E, J P

Mr. Armour, orthopaedic surgeon to the Royal Southern Hospital and visiting surgeon to the Ministry of Pensions Hospital, Liverpool, died on Feb. 21 at the age of 69. Soon after he graduated at Edinburgh in 1897 he went to Liverpool as assistant to the professor of anatomy, and as senior house-surgeon at the Royal Southern Hospital quickly caught fire from the enthusiasm of Robert Jones. He decided to specialise in orthopaedic surgery and was appointed to the honorary staff of the hospital in 1905. When the last war came it brought him increased opportunities and responsibilities. At the beginning of 1915 as an experiment several hundred beds were set apart at Alder Hey for the treatment of military patients likely to benefit by orthopaedic treatment and Robert Jones was put in charge of the surgical division. He chose as his assistants Armour and T. P. McMurray (now in the chair of orthopaedics at Liverpool). The experiment was a success, other centres were opened and soon Armour was appointed senior surgeon at Alder Hey with charge of eight hundred patients. With McMurray he performed between forty and fifty operations a week, and Robert Jones regarded him as one of his essential key men.

After the war, with his reputation established, Armour returned to orthopaedic practice in Liverpool. He succeeded Robert Jones as director of the orthopaedic department of the Royal Southern Hospital, and when the independent post of orthopaedic surgeon was created in 1924 he was appointed. Armour gave unstinting support to the hospital in every way and J. T. M. writes: "Those who knew the hospital in the days of the financial crisis of 1930-31 will never forget how Armour placed himself at the head of the band of workers determined to save the hospital from at least partial extinction. His constant faith in success stimulated them to unremitting effort and the financial position was stabilised in a way it had not been for years. When the movement for amalgamation of the four teaching hospitals in Liverpool was first set on foot, Armour with his intense loyalty to 'the Southern' long looked askance at the scheme. But when union was completed he staunchly supported the larger unity."

An original member of the British Orthopaedic Association, Armour was specially interested in the orthopaedic surgery of childhood, and his work at the children's hospital at Leasowe was a labour of love. His surgical skill, writes T. P. McM., was of a high standard, and he had the kindness which endeared him to patients, both young and old. He did not write much; his strength lay rather in his sound surgical judgment, and his contributions, when given, stood out for their clarity and straightforwardness.

Armour was elected a vice-president of his hospital in 1934 and a JP for Liverpool in 1938. He lost his wife in a motor accident some five years ago.

## Appointments

CROWTHER, W. E., MB LOND.: examining factory surgeon for Cavendish, Suffolk.

MOODIE, ALLAN, MB GLASG., DPH: temp. deputy MOH for Lincoln.

OLIPHANT, G. W., MRCS: examining factory surgeon for Bridport, Dorset.

Colonial Medical Service.—The following appointments are announced:

ADAM, R. S. F., MB EDIN.: MO, Kenya;

BAKER, C. H. J., MRCS: MO, Sierra Leone;

HARRISON, ELIZABETH N., MB ST. AND.: MO, Zanzibar;

NELSON, J. W., MRCS: MO, Northern Rhodesia;

PHILLIPS, C. M., MRCS: MO, Aden; and

AUSTIN, T. A., LRCP, DCH, DTM&H: DMS, Nyasaland.

## Notes and News

### BLAST IN 1812

Dr. W. E. Carnegie Dickson sends us the following account, evidently by a naval surgeon, of the death of a sailor in 1812. The document is endorsed "Mr. McTernan's Case of Death from the Wind of a Shot." Dr. Dickson rescued it from an ash-bucket in the nineties, at a time when the basement of the New University Buildings in Edinburgh was being cleared to accommodate Professor Chiene's surgical laboratory. It was addressed to Sir George Ballingall, who was, he believes, professor of military surgery in the university at the beginning of the nineteenth century and surgeon to King William IV. The account of the case, signed "James McTernan, RN," is as follows:

In the action of HMS *Northumberland*, off *L'Orient* in May 1812, where a French Squadron of Two frigates and a Brig were destroyed by that ship, Andrew Answan private Marine was knocked down on the poop where the Marines were stationed.

His comrades not observing any marks either on his person or clothes and his right and left man in the ranks remaining unscathed led to a belief among them that the man was only hurt by that missile of very popular belief among sailors—"The Wind of the Shot."

He was accordingly carried to the Cockpit where there was at that moment so much work of a distinctive character in hand as to prevent further examination of Answan beyond the certain fact *that he was dead*. When the work in hand had been disposed of, however, I returned to a search into the cause of his death.—Neither from his mouth, nose, ears or eyes was there the slightest exudation nor did any shadow of discoloration exist in either. I had him stripped completely and neither fracture or lividity of the slightest description could be detected. He was a remarkably clear and fair-skinned Man on whom even a shadow of Ecchymosis could be observed. His countenance was serene and tranquil.

I was much bewildered in my Pathology, however. The popular belief that the "Wind of a Shot" passing in proximity with the head or large cavities may be thus suddenly fatal, also the question of electricity as a cause, were not reconcilable to my views—and the Man's previous condition of health was not compatible with the presence of disease in the heart or its vessels, yielding at once to the influence of fear &c.

Tho' I came to the belief that a "spent Shot" was the cause of death in this case, that opinion is accompanied by two points of difficulty which I submit to your consideration. I am not quite clear upon the possibility of so instantaneous a destruction of all vital action as that no traceable mark of external injury is to be found—no Ecchymoses, not a livid spot, no puffiness. If quantity of clothing be taken into account he was in his light summer clothing. And again (as in the present case) an action *yard arm* and *yard arm* and "spent shot" are not compatible one with the other.

### University of Oxford

Convocation will be invited on May 6 to confer the honorary degree of DSc on Dr. Joseph Trueta.

### Royal College of Physicians of London

On Tuesday and Thursday, March 23 and 25, at 2.15 PM Prof. G. W. Pickering will deliver the Oliver-Sharpey lectures at the college, Pall Mall East, S.W.1. He will speak on the circulation in arterial hypertension.

### Royal College of Surgeons of England

A meeting of the council of the college was held on March 11, with Sir Alfred Webb-Johnson, the president, in the chair. A diploma of fellowship was granted to F. N. Glover, and diplomas of membership to D. G. Crawshaw, Raymond Greenwood, Kathleen M. Lawrence and Helen G. T. Maycock. The following diplomas were granted jointly with the Royal College of Physicians:

DOMS.—Hilda Baker, Harry Bentley, J. W. Bishop, C. A. Brown, R. A. D. Crawford, R. C. Jack, D. J. Pierse, Alfred Senn, Arthur Smith, W. T. Swanton and R. M. Thornton.

DME.—G. M. Ardran, J. S. Mitchell, D. C. Porter, Walter Shanks and Phyllis Wade.

### Biochemical Society

The annual general meeting of this society will be held at the Courtauld Institute of Biochemistry, Middlesex Hospital, London, W.1, on Saturday, March 27, at 2 PM.

**Medical Honours**

The following awards have lately been made to RAMC officers for gallant and distinguished services in Burma and the Middle East.

*OBE.*—Captain Edmund MacLaine, MB BELF.

*MC.*—Captain O. I. Green, BM OXF; Captain E. D. V. Nicoll, MRCS.

**Medical Casualties**

The following casualties have been announced:

*Missing, presumed killed.*—T/Surgeon Lieutenant J. B. Houghton, MRCS, RNVF, HMS *Welshman*.

*Prisoners of War.*—Lieutenant W. G. Anderson, IMS; A/Major A. M. Best, MRCS, IMS; Captain S. C. Colbeck, MB, NZ, IMS; A/Major A. C. Glendinning, MB BELF., IMS.

*Previously reported missing, now reported prisoner of war.*—Colonel J. M. Mitchell, MB ABERD., IMS; Lieut.-Colonel C. W. Maisey, MRCS, RAMC.

**Soviet Films**

The Socialist Medical Association has arranged for a special showing of Soviet medical and scientific films at the Imperial Institute cinema, South Kensington, on Thursday, March 25, at 6 PM. Tickets in advance from Dr. L. T. Hilliard, Fountain Hospital, S.W.17.

**Mental After-care Association**

The sixty-third annual meeting of the association will be held at Burlington House, Piccadilly, London, W.1, on Tuesday, March 23, at 2.45 PM, under the presidency of Princess Arthur of Connaught. The speakers will include the Bishop of London, Mr. R. Sargood, and Dr. Henry Yellowlees.

**Royal Society of Medicine**

At the section of odontology of this society, on Monday, March 22, at 4.30 PM, Mr. W. Warwick James and Mr. A. W. Wellings, MDS, will speak on the dental epithelium and its significance in tooth development. At 3 PM, on March 23, at the section of medicine, there will be a discussion on atypical pneumonia. The openers are to be Captain John W. Brown, USAMC, and Lieut.-Colonel Gordon E. Hein, USAMC. On March 24, at 2.30 PM, at the section of comparative medicine, Prof. John Eyre and Prof. T. J. Bosworth, FRCS, will open a discussion on immunity to bacteria. At 2.30 PM, on March 26, at the section of epidemiology and state medicine, the Ministry of Health film on scabies will be shown for the first time, and afterwards there will be a discussion on the control of scabies. On the same day, at 4.30 PM, the section of disease in children is holding a joint meeting with the maternity and child welfare group of the Society of Medical Officers of Health, when Dr. Ethel Cassie and Dr. Harold Waller will open a discussion on the decline of breast-feeding.

**Training Schools for Nurses**

Two grants of £1000 each have been made by King Edward's Hospital Fund for London towards the establishment of two group preliminary training schools for nurses. One of the schools has been set up in Hampstead to serve a north London group of hospitals, and the other at Blackheath to serve a group south of the river. Additional help has been assured the schools during the next three years if need be. There is accommodation for 30 students at the Hampstead school. Two sister tutors will have charge of the training and will give five courses of eight weeks each per year. At the Blackheath school there is accommodation for 23 students, and the sister tutor in charge will have the help of other tutors from the hospitals in the group. Here there will be four courses per year, of eleven weeks each. Students at both schools will be resident. The King's Fund is ready to help similar schemes by other groups of hospitals in its area and is prepared to make grants up to £5000 for this year, with assurance of continued help for three years in case of need. For some years the larger hospitals have maintained their own preliminary training schools where student nurses spend from two to three months before beginning ward duties. In small hospitals the cost of these courses has presented a difficulty, since the students are not part of the normal strength of the nursing staff, but by grouping six or eight hospitals together, as has been done for the schools at Hampstead and Blackheath, an economic unit is secured. Recruits to the nursing profession who wish to enter a group preliminary training school can obtain further particulars from the Nursing Recruitment Centre, 21, Cavendish Square, London, W.1.

**Medico-Legal Society**

A meeting of this society will be held at 26, Portland Place, London, W.1, on Thursday, March 25, at 5 PM, when Dr. C. Keith Simpson will read a paper on *Rex v. Dobkin* (the baptist church cellar case).

**Royal Sanitary Institute**

A meeting of the institute will be held at 90, Buckingham Palace Road, London, S.W.1, on Tuesday, March 23, at 2.30 PM, when Mr. P. G. Shute will read a paper on mosquito problems in static water tanks.

**Infectious Disease in England and Wales****WEEK ENDED MARCH 6**

*Notifications.*—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1928; whooping-cough, 1876; diphtheria, 827; paratyphoid, 7; typhoid, 2; measles (excluding rubella), 19,200; pneumonia (primary or influenzal), 1450; puerperal pyrexia, 179; cerebrospinal fever, 91; poliomyelitis, 4; polio-encephalitis, 2; encephalitis lethargica, 1; dysentery, 68; ophthalmia neonatorum, 103. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on March 3 was 2371, including scarlet fever, 561; diphtheria, 255; measles, 764; whooping-cough, 260; enteritis, 99; chickenpox, 78; erysipelas, 14; mumps, 26; poliomyelitis, 1; dysentery, 20; cerebrospinal fever, 22; puerperal sepsis, 18; enteric fevers, 6; german measles, 12; osteomyelitis, 1; encephalitis lethargica, 1.

*Deaths.*—In 126 great towns there were 2 (1) deaths from enteric fevers 1 (0) from scarlet fever, 22 (3) from measles, 9 (2) from whooping-cough, 15 (0) from diphtheria, 48 (8) from diarrhoea and enteritis under two years, and 79 (8) from influenza. The figures in parentheses are those for London itself.

Birmingham reported 10 deaths from diarrhoea and Manchester 5. The number of stillbirths notified during the week was 215 (corresponding to a rate of 32 per thousand total births), including 14 in London.

**Births, Marriages and Deaths****BIRTHS**

ADLER.—On March 7, at Epping, Essex, the wife of Captain Paul Adler, RAMC—a daughter.  
 CURRAN.—On March 9, at Beckenham, the wife of Temp. Surgeon Captain Desmond Curran, RNVF—a son.  
 EVANS.—On March 7, at Basingstoke, the wife of Major E. E. Evans, RAMC—a daughter.  
 HART.—On March 7, at Northwood, the wife of Major Edward Hart, RAMC—a daughter.  
 HEASMAN.—On March 9, at Bournemouth, the wife of Captain Leslie Heasman, RAMC—a daughter.  
 HOUSE.—On March 9, at Hednesford, Staffs, the wife of Captain R. J. House, RAMC—a daughter.  
 IRVINE.—On March 8, at Clifton, Bristol, the wife of Surgeon Captain L. C. Dundas Irvine, RNVF—a daughter.  
 KAUNTZE.—On March 12, at Dorking, the wife of Major Ralph Kauntze, RAMC—a son.  
 MALONE.—On March 10, in London, the wife of Dr. Francis Malone, RAMC—a daughter.  
 MILLER.—On Feb. 12, in S. Africa, the wife of Major Ashton Miller, FRCS, RAMC—a daughter.  
 TAYLOR.—On March 8, to Dr. Helena Taylor (*née* Lauder Thomson), wife of Captain A. W. Outram Taylor, RAMC—a son.  
 THOMPSON.—On March 5, in Oxford, the wife of Dr. R. H. S. Thompson—a son.  
 WEBSTER.—On March 11, in London, the wife of Surgeon Lieut.-Commander E. Maurice Webster, RNVF—a son.

**MARRIAGES**

BUNNEY—CUTTING.—On March 6, in London, Herrick Bunney, captain Royal Signals, to Mary Cutting, MB.  
 WALLACE—BROWN.—At Calcutta, on Jan. 11, Reginald James Wallace, captain Indian Army, to Doris Barbara Brown, FRCS.

**DEATHS**

CAMPBELL.—On March 10, Kenneth Campbell, OBE, MB EDIN., FRCS, of Wittersham, Kent.  
 MOLESWORTH.—On Feb. 24, Cecil Stanley Molesworth, MB SYDNEY of Campbelltown, The Riverina, and Sydney, Australia, formerly captain 1st Light Horse, 1st AIF.  
 PALMER.—On March 11, in London, Harry Mark Palmer, BA CAMB., MRCS, of Clock House, Byfleet, aged 53.  
 PARSONS.—On March 11, at Thame, Oxon, Frederick Gymer Parsons, DSC LOND., FRCS, FSA, formerly professor of anatomy in the University of London at St. Thomas's Hospital.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

## GENERAL AND LOCAL ADMINISTRATION OF PENICILLIN

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PENICILLIN in earlier work (Chain et al. 1940, Abraham et al. 1941) showed promise of being a powerful weapon against the common forms of sepsis. Certain of the basic biological and chemical facts which must be known about a chemotherapeutic substance before it can be used on man were established. To ensure the greatest effect these facts must always be kept in mind when the drug is used for the treatment of patients.

A reasonably stable impure sodium salt of penicillin can be made. This substance is extremely soluble in water but is destroyed by boiling, by acids and alkalis, by certain heavy metals, by oxidising agents and by enzymes produced by air and other bacteria. Penicillin is bacteriostatic and not bactericidal, at least in concentrations likely to be used therapeutically, and reliance must therefore be placed on the body defences, both humoral and cellular, to destroy the bacteria present in a lesion while penicillin prevents their multiplication. Pus, blood, serum and tissue autolysates do not interfere with the antibacterial action of penicillin and the number of organisms present has little or no effect on its capacities. Leucocytes will live and tissue cultures will grow in the presence of a concentration many times greater than that necessary to produce bacteriostasis. Mice will tolerate without toxic symptoms a dose much in excess of that which will produce bacteriostasis in their blood, and artificially induced infections in mice can be controlled by repeated injections of penicillin.

The few therapeutic trials already reported indicated that no serious toxic symptoms need be anticipated in man. They also showed that penicillin is rapidly excreted by the kidneys in a high concentration so that large doses must be given to maintain a bacteriostatic level in the blood. A larger therapeutic trial, based on these general principles, is reported here. The investigation has called for the coördination of many separate efforts.

The production of much of the penicillin used is due to the work of Mr. G. Glistler, with the assistance of Miss P. McKegney Miss R. Callow, Miss B. Cooke, Miss M. Lancaster and Miss P. Gardiner. Dr. A. G. Sanders and Mr. J. Kent have been responsible for constructing and working a laboratory large-scale extraction plant. We are also indebted to ICI (Dye-stuffs) Ltd. for part of the penicillin used. The many physicians and surgeons who have placed their cases at our disposal for penicillin treatment have been responsible for the diagnosis and general care of the patients and for such surgical interventions as were necessary; their names are given in the case-records. For the bacteriological investigations which have furnished some of the essential criteria for assessing the action of penicillin we are indebted to Dr. A. M. McFarlan, Dr. Joan Taylor, Dr. R. L. Vollum, Dr. Kingsley Smith and Dr. M. A. Jennings; and for the blood examinations to Dr. R. G. Macfarlane and Dr. J. R. P. O'Brien.

## Cases treated by General Administration

In this series attention has been directed to (1) methods of administration and dosage; (2) possible toxic effects, especially on the bone-marrow and kidney after long administration; (3) changes in the bacteriological content of the lesions during treatment; and (4) the course of the disease. It has been considered desirable to have at least a sufficient amount of penicillin always present in the blood to exert a complete inhibition of growth of the organism causing the disease. At first reliance was placed on the "ring" test, but this was not sufficiently sensitive and in the later cases a modification of the slide-cell technique (Wright and Colebrook 1921) was used. Dr. N. G. Heatley was responsible for the elaboration of this test.

## BY MOUTH

For a course of treatment likely to extend over many days in a patient seriously ill administration by mouth would usually be the most convenient. Penicillin is

absorbed from the intestinal canal, but the acid gastric juice will destroy at least part during its passage through the stomach. This might be avoided by enclosing the drug in a suitable capsule or possibly by using a duodenal tube. Some enteric capsules were prepared by coating gelatin capsules containing 10,000 or 20,000 units of penicillin with cellulose acetate phthalate (supplied by Eastman Kodak Co.), which is soluble in alkaline but not in acid media.

A normal person swallowed a capsule containing 10,000 units just before breakfast. Hourly samples of blood were taken for 3 hours and of urine for 7 hours. The plate and cylinder ring test was used for detecting bacteriostasis. The blood showed a trace of inhibition of the test staphylococcus at 1 hour and definite inhibition at 2 hours; there was none at 3 hours. In the urine, inhibition was present at the end of the first hour and penicillin was still being excreted at the end of 7 hours when observations were discontinued. When this experiment was repeated the capsule (containing 20,000 units) did not burst till 5 or 6 hours after ingestion. Urine samples up to the fifth hour were negative but at the sixth hour well-marked inhibition appeared.

In order to carry out a similar investigation over several days a patient (case 1) was chosen who was receiving no other treatment and who might benefit from penicillin.

**CASE 1.—Facial and orbital cellulitis.** (Radcliffe Infirmary. Mr. H. Whitelocke.) Male, age 42, weight about 160 lb. Pimple on nose 3 weeks before had led to cellulitis extending from alae nasi to top of forehead and into right orbit, producing loss of sight, proptosis and immobility of eye, with some delirium. During week's observation when no penicillin was available temperature and pulse-rate fell gradually to maximum of 99.6° F. and 96 per min.

**Bacteriology.**—*Staphylococcus aureus* (coagulase +ve) grown from lesion on nose and pus from right orbit.

**Method of penicillin treatment.**—By mouth: in capsule for first 5 days; by duodenal tube on days 6 and 7.

Day	Dose	Blood bacteriostasis (ring test)
1	5000 units 2-hrly.	Trace
2-5	10,000 ,, 4-hrly.	Trace
6 and 7	10,000 ,, 4-hrly.	Trace
Total: 480,000 units.		

**Progress.**—Inflammation of face subsided and proptosis and oedema of right eyelids lessened. An orbital cellulitis was still present, with secondary intraocular infection and hypopyon ulcer of the cornea. Tenderness and swelling of right knee developed on 3rd day but had almost completely subsided by 7th. Patient afebrile when penicillin discontinued but eye condition had not subsided; 16 days later pyrexia and signs of meningitis developed and *Staph. aureus* cultivated from cerebrospinal fluid. Treated with sulphathiazole and eventually recovered, eye being enucleated. No albuminuria throughout.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning of Tt.	3,500,000	65	15,000	24
At end of Tt. . .	3,200,000	60	18,000	29
Tt. = treatment.				

**Comment.**—Little was learnt from this case owing to the inadequacy of the bacteriostatic tests on blood in use at the time. That some absorption of penicillin took place was shown by the constant presence of penicillin in the urine. The patient's condition improved during treatment but little stress can be laid on this. Though he was afebrile at the end of treatment the staphylococci had not been eliminated as his subsequent history showed. No toxic effects were noted.

**CASE 2.—Actinomycosis of lungs and possibly of gastrointestinal tract.** (Radcliffe Infirmary. Dr. F. G. Hobson.) Male, age 36, weight 117 lb. Attacks of abdominal pain for 13 months. Swelling of left loin, pleural effusion, and cough with sputum which was ameliorated by potassium iodide and postural drainage. Afebrile when admitted for penicillin treatment but complained of cough and weakness. Swelling in loin and pleural effusion had subsided some time previously.

**Bacteriology.**—Actinomyces often found in sputum and present in faeces. Organism was sensitive to penicillin.

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**Method of penicillin treatment.**—In solution by duodenal tube passed through nose and kept in position continuously. The 4-hourly dose was 10,000 units on days 1-4 and 20,000 units on days 5 and 6; total 480,000 units. Blood bacteriostasis (ring test) was slight at 1 hr. only with both dosages.

**Progress.**—During treatment patient developed constant running of nose, loss of appetite, diarrhoea and colic. Sputum still contained actinomyces a week after end of treatment. Diarrhoea persisted. No albuminuria throughout.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning of Tt.	3,300,000	54	10,000	25
At end of Tt.	3,400,000	58	14,000	40

**Comment.**—Administration by duodenal tube was here a failure. Using the ring test no well-marked inhibition could be demonstrated in the blood, though penicillin was constantly present in the urine. There was evidence of gastro-intestinal irritation but as the nose was also running it is not clear that this was due to the penicillin. The drug had no effect on the course of the illness.

**INTRAVENOUS AND INTRAMUSCULAR**

After case 2 it was decided to abandon for the time being further attempts to give penicillin by mouth.

**CASE 3.—Osteomyelitis.** (Radcliffe Infirmary. Dr. Leonard Findlay.) Male, age 2 months, weight 7½ lb., weight at birth 6 lb. Osteomyelitis of 2nd and 3rd lumbar vertebrae with sinus formation developed after unsuccessful lumbar puncture. After 3 weeks secondary foci appeared successively in L. femur, L. index finger and nape of neck, latter accompanied by rigidity and head-retraction. X rays showed progressive bony lesions of lumbar vertebrae and periostitis of femur, with dislocation of femur from acetabulum. Finger showed some bony involvement but nothing abnormal seen radiologically in cervical vertebrae. Apathetic, very thin, gaining weight at 3½ oz. a week. Sulphapyridine proved ineffective; 6 days' administration of sulphathiazole lowered evening temperature to 100° F. from previous 103° F., but pyogenic lesions continued to progress.

**Bacteriology.**—*Staph. aureus* in pure culture obtained from lumbar and cervical lesions and finger.

**Method of penicillin treatment.**—Intramuscular injection. Two intravenous doses given into sagittal sinus. Local treatment of abscesses carried out by aspirating pus and injecting penicillin solution. Dosage: 1st-5th days, 250 units in 1 c.cm. 4-hourly; 6th-9th days, 500 units in 1 c.cm. 4-hourly; 10th-20th days, 1000 units in 1 c.cm. 4-hourly. In addition, 2000 and 3000 units were given intravenously on the 10th and 11th days and from the 3rd to the 8th day a solution of 250 units per c.cm. was injected into the abscesses in the neck and finger, after aspiration of the pus. Total: 100,800 units.

**Progress.**—Slight improvement in first 9 days; rapid improvement when dose raised to 1000 units 4-hourly. After 8 days (5 days of local treatment) no pus could be withdrawn from neck or finger. At end of 20 days' treatment neck swelling had disappeared, finger swelling was much reduced and soft-tissue swelling in lumbar region had subsided. Limited voluntary movement had returned in L. hip. X ray showed no evidence of further spread of bony lesions. Gaining 10 oz. a week and lively.

Three months after end of treatment baby's condition excellent. At 6 months of age weighed 14 lb.; lumbar deformity considerably less; no swelling or stiffness in neck and moved L. thigh as well as R. X ray showed bony consolidation in spine and resolution of periostitis in femur. At 9 months no visible deformity except for flattening of normal lumbar curve; X rays revealed still further progress in bone formation; looked healthy and active.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning of Tt.	2,960,000	56	17,000	..
4 days after end of Tt.	3,400,000	66	13,000	32
14 days after end of Tt.	3,860,000	72	14,000	..
4 months after end of Tt.	..	..	..	32

**Urine.**—High concentration of penicillin constantly present during treatment. No albuminuria.

**Comment.**—This case showed the practicability of the intramuscular route. A widespread staphylococcal

infection, involving bone, was controlled and no toxic symptoms were noted from the drug.

**CASE 4.—Pelvic abscess.** (Radcliffe Infirmary. Prof. Chassar Moir.) Female, age 23, weight about 100 lb. Admitted 3 weeks earlier with pelvic pain, vaginal haemorrhage and pyrexia after self-induced abortion. Condition had steadily deteriorated and abscess in pouch of Douglas opened 4 days before penicillin treatment started. When treatment began had great abdominal distension and was extremely exhausted, able to speak only few words in a whisper. Temperature erratic, mainly between 99° and 102° F. Pulse weak, fast and variable. Had received repeated blood-transfusion—6 pints in all—and 2 courses of sulphapyridine.

**Bacteriology.**—Pus aspirated from pelvic abscess grew actinomyces and anaerobic streptococci.

**Method of penicillin treatment.**—Intravenously for 4 days, at first into blood-transfusion tube and later directly into a vein. Intramuscularly for 2 days.

Day	Dose	Blood bacteriostasis (ring test)
1-4	35,000-40,000 units in 10 c.cm. intraven. 12-hrly.	Present at 2 hr.; absent at 7 hr.
5 and 6	17,500 in 10 c.cm. intramus. t.d.s.	
Total: 412,000 units.		

Continuous duodenal drainage established to relieve distension.

**Progress.**—No effect on pulse, temperature or respiration. Nine days after discontinuing penicillin another abscess discharged into vagina; culture still showed actinomyces and anaerobic streptococci as well as *Strept. faecalis* and *Bact. coli*. Made slow recovery and discharged convalescent in 10 weeks.

**Comment.**—This case showed that doses as large as 40,000 units could safely be given intravenously but that such doses given twice daily did not maintain constant bacteriostasis in the blood. It is therefore not surprising that no effect was produced on the bacterial cause of the illness. The evacuation of pus from the pelvis was enough to account for the patient's recovery. No toxic symptoms were noted.

**INTRAMUSCULAR ONLY**

The next case was treated by more frequent injections.

**CASE 5.—Chronic osteomyelitis of ischium and femoral neck; infection of urinary tract.** (Radcliffe Infirmary. Mr. Abernethy.) Male, age 6½ years, weight 36 lb. Eleven months earlier developed osteomyelitis of R. ischium with subsequent sequestrum formation associated with abscess in R. buttock. Sinus formed and still discharging after 7 months. A week before penicillin treatment begun second sinus appeared and urine contained blood and pus cells. No radiological evidence that destruction of bone had progressed during past 7 months but head of R. femur was subluxated and could only be kept in joint cavity by abduction frame. Considerable soft swelling of thigh. Temperature usually normal for several months but pulse fluctuated daily between 84, 120 and 130 per min. Thin and pale.

Had received three 3-day courses of sulphanimide—8, 6 and 8.5 g. during 3 weeks, without obvious immediate effect. Abscess of buttock incised and sequestrum removed.

**Bacteriology.**—*Staph. aureus* and *Strept. pyogenes* grown from sinuses and *Staph. aureus* from urine.

**Method of penicillin treatment.**—For 21 days given 9000 units in 1 c.cm. 6-hourly intramuscularly. Total: 755,000 units.

**Progress.**—Hyperaemia round sinus mouths diminished by 3rd day of treatment; fresh sinus closed within a week and old sinus in 2 weeks. After beginning of treatment temperature never rose above 98.4° F. and pulse-rate though variable remained between 80 and 90 for several days at a time. Urine still contained pus cells though they were fewer. Urine cultures sterile 2 days after penicillin was discontinued; thereafter weekly cultures of non-catheter specimens produced only *Bact. coli* or *Staph. albus*. Splints left off 6 weeks after penicillin first given and 9 weeks later dislocation had not recurred; considerable movement in joint though flexion limited. Not supposed to walk without crutches but often seen kneeling up in bed or walking with support of furniture. Soft swelling of thigh remained and not satisfactorily explained. Boy gained 16 oz. during 4 weeks after first administration of penicillin and thereafter at rate of 5½ oz. a week for remaining 2½ months in hospital. Urine sterile on discharge. General appearance greatly improved.

Walking 4 months after treatment began, mobility of hip-joint showing continuous improvement.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
Before Tt.	3,500,000	66	7000	26
7th day of Tt.	4,200,000	70	9000	24
At end of Tt.	4,400,000	74	7000	30

**Comment.**—It was not thought justifiable to trouble this child by blood sampling, but the clinical recovery showed that the 6-hourly injections maintained sufficient bacteriostasis in the blood. The practicability of long continued intramuscular injection was shown, since no local disturbance was experienced at the site of injection. No toxic effects were noted from the drug. Since the only other treatment given besides the penicillin was splinting, which had been in use before, it is reasonable to attribute the satisfactory clinical result to the drug.

**CASE 6.**—*Acute osteomyelitis of tibia.* (Wingfield-Morris Hospital. Mr. Scott, Mr. Trueta.) Female, age 6 years, weight 36 lb. Had had pain and swelling of L. leg and pyrexia for 3 days. No radiological evidence of bony lesion yet, but diffuse tender swelling of lower third of L. leg extending to below malleoli, with some redness over external malleolus. No fluctuation. Child flushed with hot dry skin; restless and plaintive. Temperature steady around 102° F. Had received 6 g. sulphanylamide followed by 4 g. sulphathiazole, discontinued 8 hours before penicillin begun.

**Bacteriology.**—On 3rd day of penicillin treatment *Staph. aureus* (coagulase +ve) grown from few c.cm. turbid fluid aspirated from L. ankle-joint. Blood-culture negative.

**Method of penicillin treatment.**—All doses given intramuscularly.

Day	Dose	Blood bacteriostasis (ring test)
1-4	20,000 units in 1 c.cm. 6-hrly.	None at 6th hr.
5-8	10,000 " 0.5 c.cm. 3-hrly.	"
9-14	15,000 " 0.75 c.cm. 4-hrly.	"
Total: 1,100,000 units.		

**Progress.**—During first 4 days fever changed from continued to irregular swinging course. Swelling of L. leg extended during first 24 hours almost up to tibial tuberosity and later down over dorsum of foot. On 5th day, after X ray had shown definite rarefaction on metaphyseal side of internal malleolus, child was examined under anaesthetic. No definite fluctuation or area of redness over tibia but well-defined red patch over external malleolus. This was incised down to periosteum and bone drilled. No pus found and cultures from bone were sterile. Dried penicillin placed in wound, 'Vaseline' gauze dressing applied, and limb put up in plaster. Temperature rose to only 100° F. instead of 102° F. that evening and settled to below 99° F. in 4 days—i.e., 10 days after beginning of penicillin treatment. Child made steady recovery from 5th day and able to take part in "school on 9th day. Three days after plaster cast had been applied it was demonstrably loose and oedema of foot had disappeared. On removal of plaster 7 days later no oedema of limb and cultures from wound sterile; some bony thickening remained above ankle.

X rays showed extension of rarefaction of lower end of tibia till 16th day after beginning of penicillin treatment but at 4, 6 and 8 weeks progressive calcification and well-marked periosteal reaction were seen. At 8 weeks child was running about, ankle showed only very slight bony thickening and wound which had at no time been infected was completely epithelialised. No albuminuria throughout.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.
At beginning of Tt.	4,000,000	76	10,000
2 days after end of Tt.	4,000,000	78	9000

**Comment.**—Here blood sampling was done and it appeared both from this and from the clinical state that 6-hourly injections were not adequate, so after the 5th day the same total dose was given at 3-hourly and later 4-hourly intervals. This undoubted case of acute staphylococcal osteomyelitis was treated early. The lack of any initial dramatic fall of temperature and a rise in the white count led to surgical intervention, but, fortunately for the assessment of the case, no pus was found and the incision remained sterile throughout. The application of a plaster instead of a backsplint may have had some influence on the fall of temperature but it is reasonable to attribute the abolition of infection and rapid recovery of complete function to the penicillin. No toxic symptoms from the drug were noted.

INTRAVENOUS AND INTRAMUSCULAR

**CASE 7.**—*Pyæmia.* (An RAF Hospital. Wing-Commander L. M. Crooks.) Male, age 51, weight 147 lb. Severe accident 20 years earlier fractured both legs and L. thigh; femur plated at that time. Since then sequestra removed at intervals. During present illness had been in hospital for 5 weeks with pain in sacral region and L. thigh, and pyrexia. No radiological evidence of active bony disease, but abscesses had formed in both regions and been opened down to bone. General condition had steadily deteriorated and penicillin asked for after 5th week because, all other treatment having failed, outlook considered hopeless. Irregular pyrexia, much purulent sputum but no radiological evidence of lung abscess; blood and pus cells in urine. Emaciated, mentally confused and looked extremely ill.

**Previous treatment.**—Repeated blood-transfusion, including 2 pints just before penicillin was begun. Sulphathiazole, 25 g. in 6 days, and later 100,000 units antistaphylococcal serum during 13 days. Just before penicillin treatment was started three screws were removed from plate on femur exposed in bottom of thigh wound.

**Bacteriology.**—*Staph. aureus* (coagulase +ve) grown from both abscesses and from urine, sputum and blood.

**Method of penicillin treatment.**—All doses given 3-hourly; 1st day intravenously, thereafter intramuscularly. Single dose: 1st day, 20,000 units in 5 c.cm.; 2nd and 3rd days 25,000 units in 4 c.cm.; 4th to 9th day 20,000 units in 4 c.cm.; 10th to 13th day 10,000 units in 2 c.cm. Total: 1,580,000 units.

**Progress.**—Temperature subsided to 99° F. within 24 hours and did not rise higher than that again; after 3 weeks remained normal. General physical and mental state steadily improved. After 7 days wounds were sterile but staphylococci returned 5 days after end of treatment. Wounds then dressed with penicillin powder every second day; and sacrum completely healed in 4 and thigh in 7 weeks. Urine remained free from pathogens after beginning of penicillin treatment; cells disappeared after fortnight. Staphylococci could almost always be grown from sputum, but he had difficulty in coughing anything up after 3 weeks. Walking with sticks 5 weeks after beginning of treatment and alone in 6 weeks. Left hospital after 7 weeks still needing to put on weight but looking and feeling well though weak.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning * of Tt.	4,130,000	80	38,400	24.8
11th day of Tt.	4,640,000	96	18,600	"
4 days after end of Tt.	5,149,000	100	9000	29.6

\* After transfusion of 2 pints of blood.

**Comment.**—Since all other treatment had been accompanied by a steady deterioration it is reasonable to attribute the patient's recovery, which dated from the beginning of penicillin administration, to the drug. It is remarkable that even the wound over the exposed plate in the femur healed. There were no toxic symptoms.

INTRAPLEURAL AND INTRAMUSCULAR

**CASE 8.**—*Empyema.* (Radcliffe Infirmary. Mr. White-locke; Mr. Holmes Sellors.) Male, age 64, weight 153 lb. Had had cough and pain in L. side of chest for a month. On admission looked ill and was in respiratory discomfort. Temperature swinging between 98° and 100° or 101° F. Aspiration produced 560 c.cm. creamy foul-smelling pus from L. pleural cavity.

**Previous treatment.**—Course of sulphapyridine (22 g.) given outside hospital without improvement. After admission 9 g. given in 32 hours.

**Bacteriology.**—Pus grew a streptothrix and streptococci (anaerobic). Sputum grew pneumococci, *Strep. viridans*, a streptothrix and *B. proteus*.

**Method of penicillin treatment.**—During first 3 weeks, by aspiration of pus from pleural cavity and replacement by penicillin. During next 2 weeks, by intramuscular injection.

Day	Dose (daily)	Route	Blood bacteriostasis (ring test)
1-20	10,000	Intrapl.	"
21-22	10,000	Intrapl.	"
	5000	Intramus.	"
23	10,000	Intrapl.	"
24	10,000	Intrapl.	Complete for 2 hr.; absent in 3rd hr.
	20,000	Intramus.	"
25-34	20,000 3-hrly.	Intramus.	"

Total: local, 213,000; general, 1,440,000 = 1,653,000 units.

**Progress.**—During local administration patient's appearance improved considerably; respiration-rate fell from 35 to 25 per min. in 4 days and appetite was greater than hospital menu could satisfy. Perpetually asking to get up. Evening pyrexia of 99°–100° F. continued and pus of variable, though less, amount aspirated daily. Bronchoscopy and bronchograms revealed no definite lung lesion, but because sputum contained a streptothrix with *Strep. viridans*, pneumococci and *B. proteus*, intramuscular injection begun. Chest then aspirated weekly. Fever continued till end of general treatment when ceased abruptly. General administration stopped after 9 days, mainly on account of short supplies. Pus from chest free of streptothrix after first 10 days of local treatment and of streptococci from 24th day till 12 days after treatment was stopped. Sputum contained no streptothrix after 4th day of general treatment.

In 7 weeks after general administration patient gained stone in weight and looked fit and cheerful. Doing small jobs about home and garden. Pleural pus decreased to nothing and radiography showed gradual clearing in lung. After 8 weeks a little pus found again in pleural cavity and surgery under local anaesthesia advised. Pleura removed at operation showed streptococci but no streptothrix. Convalescence complicated by carbuncles but patient has remained afebrile. No streptothrix found in sputum or carbuncles up to 4½ months after treatment.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning of Tt.	3,100,000	62	20,000	33
At beginning of G. Tt.	3,200,000	62	13,000	34
At end of G. Tt.	3,400,000	62	16,000	32
6 days later	3,700,000	74	11,000	..
3 weeks later	3,900,000	80	8000	..

G. Tt. = general treatment.

**Comment.**—The recurrence of the infection suggests that the penicillin was not continued long enough. Nevertheless the treatment was associated with considerable clinical improvement.

**INTRAVENOUS AND INTRAMUSCULAR**

**CASE 9.—Cavernous sinus thrombosis.** (A military hospital and the Head Injuries Hospital. Lieut.-Colonel J. Mason Brown and Brigadier Hugh Cairns.) Male, age 28, usual weight 152 lb. Six days before beginning of penicillin treatment noticed boil inside L. nostril. Two days later was feverish and had an "inflamed" nose and swelling of L. eyelids; fainted. At start of penicillin treatment temperature 101°–106° F., and pulse-rate 100–120. Patient lay on his back in bed, breathing stertorously through clenched teeth. Could be roused enough to grunt in reply to questions but resented interference. Whole neck and face swollen and suffused. L. frontal veins indurated. Both eyelids swollen, L. more than R.; on lifting closed lids eyes seen to be protruded and conjunctivæ œdematous. No purulent discharge. L. eye almost blind; pupil reacted sluggishly to light; movements of eyeball impaired (outward movement completely and upward movement partly lost). R. eye, acuity, pupillary reactions and movements of eyeball normal. Discs could not be seen clearly. Retention of urine.

**Previous treatment.**—7 g. sulphapyridine in 24 hours, then 12.5 g. sulphathiazole in next 24 hours. Patient vomited the sulphathiazole.

**Bacteriology.**—*Staph. aureus* (coagulase +ve) grown from blood just before start of penicillin.

Day	Dosage of penicillin
1	20,000 units 3-hrly. intraven.
2	6666 " hrly. "
3	20,000 " 3-hrly. intramus.
4	6666 " hrly. intraven.
5	10,000 " " "
6	6666 " " "
7	13,300 " 2-hrly. intramus.
8, 9 and 10	10,000 " 2-hrly. "
Total: 1,693,000 units.	

Intravenous glucose saline given with the intravenous penicillin, because patient was unable to drink.

**Progress.**—No improvement till 3rd day of treatment when less dull and could talk and drink a little. Local appearance unchanged. On 4th day seemed moribund, and could not swallow; again given intravenous saline and afterwards improved considerably. On 5th day signs of bronchopneumonia and pleurisy, but continuously improved from this time and penicillin stopped at end of 10th day. Temperature then did not rise above 99° F.; pulse-rate 84–96 per min. Had regained control of bladder. Appetite good. Some of

oculomotor palsies increased after general condition improved: right external rectus paralysis appeared on 10th day of treatment, was complete 3 days later and fully recovered in another 6 weeks. While right 6th nerve paralysis increasing right 3rd nerve paralysis diminishing. Infected clot seems to have involved left 6th nerve and to lesser extent, left 3rd nerve; the later and fleeting involvement of right 3rd and 6th nerves was probably due to non-infective clot covering main focus.

Temperature rose irregularly to 99°–100° F. for 5 weeks after treatment due to patch of pleuropneumonia in L. lung, followed radiologically until discharge from hospital. After 4 weeks was walking steadily and ocular palsies gradually diminishing. Eight weeks after initial injection became afebrile and remained so till discharged a month later. Since regained normal weight and able to go for long walks. Four months from beginning of treatment vision, pupillary reactions and external ocular movements all normal, except for impairment of outward movement of left eye. Two months later X ray of chest showed some basal thickening of pleura only. Outward movement of left eye possible to 18°. Returned to duty.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning of Tt.	..	..	8200	..
4th day of Tt.	..	..	17,000	42
5th day of Tt.	3,090,000	74	12,100	..
At end of Tt. (10th day)	..	..	7800	..
4 weeks later	4,260,000	72	8600	28

**Comment.**—This undoubted cavernous sinus thrombosis had a particularly acute onset, the patient being semi-comatose on the 4th day of the illness. It was justly described as a "fulminating" case. The only treatment apart from 48 hours of sulphonamides was penicillin and glucose saline. Penicillin was begun early and as far as the infecting organism is concerned recovery appears to be complete. Since the eye movements continue to improve it is reasonable to hope that the patient will recover completely.

**CASE 10.—Osteomyelitis.** (A military hospital and Wingfield-Morris Hospital. Lieut.-Colonel J. Mason Brown and Professor Seddon.) Male, age 34, weight 150 lb. Illness began 7 weeks before penicillin treatment with boil on back which developed into small carbuncle. As this healed abscess formed in R. thigh. Five weeks before penicillin treatment abscess was opened but thereafter temperature swung daily from 98° to 103° F. with occasional rigors. Fluid which on aspiration was not purulent formed in R. knee. Later inflammatory area developed in L. calf. Few days before penicillin treatment, X ray showed considerable rarefaction of upper half of shaft and neck, both condyles and intercondylar notch of femur; patient extremely ill and wasted, too weak to talk except in short low-voiced phrases; infrequent cough.

**Previous treatment.**—Limb had been fixed on Braun's splint and 30 g. sulphathiazole given in 4 days with staphylococcal antitoxin 20,000 units daily; no obvious effect on temperature, pulse-rate or general condition. Leg put in closed plaster with small window over thigh wound. Blood-transfusion of 1 pint given. Three days later temperature, which had dropped, again registered 102° F. and staphylococci cultivated from blood. Penicillin therefore begun.

**Bacteriology.**—*Staph. aureus* grew in pure culture from abscess in thigh, fluid in knee-joint and from blood. Immediately before start of penicillin same organism (coagulase +ve) obtained from urine, sputum, blood and thigh wound.

**Method of penicillin treatment.**—During first 3 days intravenously into continuous saline drip and thereafter intramuscularly.

Day	Dose	Blood bacteriostasis
1–3	10,000 units 2-hrly.	Complete for 2 hr. after 10,000 unit dose, intraven. or intramus. (confirmed 3 times).
4–12 (day)	10,000 " "	..
8–14 (night)	20,000 " "	..
13–14 (day)	15,000 " 3-hrly.	..
Total: 1,680,000 units.		

**Progress.**—No obvious effect on pulse, respiration, or temperature for 4 days but thereafter general and local conditions began to improve. Tender lump in L. calf regressed. Granulations round sinus in thigh epithelialised while cocci in discharge from sinus decreased and many became intracellular. Two days after end of treatment no staphylococci could be grown from sinus, urine sterile and no sputum obtained.



Evening temperature had not been above 99° F. for a week. Next day when plaster removed knee swollen and painful on movement; much pus expressed from depth of sinus, gave good growth of staphylococci. X rays showed rarefaction of whole length of femur; limb therefore enclosed again in plaster, and patient transferred to orthopaedic hospital. No albuminuria throughout treatment.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea : mg. per 100 c.cm.
At beginning of Tt. (after transfusion) ..	3,422,000	65	14,700	33
At end of Tt. ..	3,800,000	72	10,800	50
2 days later ..				27
3 weeks later ..	4,200,000	80	13,000	..

**Comment.**—This patient was severely ill with a generalised staphylococcal infection. His general condition improved steadily during penicillin treatment. The closed plaster, considered essential for orthopaedic reasons, hampered the assessment of progress of the local condition and prevented a representative sample of pus from being obtained from the sinus. The patient was left with a localised infection of the femur which has been dealt with by orthodox methods. Had it been possible to watch the local lesion in the thigh a second course of penicillin might have been tried in the hope of eliminating the staphylococci altogether. The blood-urea was higher than is usual at the end of treatment but fell promptly. There was no albuminuria. The urinary frequency may have been due to the penicillin as it stopped soon after the drug was discontinued. There was thus no indication of any serious toxic effect.

INTRAMUSCULAR ONLY

**CASE 11.—Pyæmia.** (A RAF hospital. Wing-Commander D. M. Anderson.) Male, age 34, weight 147 lb. (about). Illness began 3½ weeks earlier with boil behind R. ear, followed by carbuncle on back of neck, spreading over scapulae. Signs of pneumonia developed, and pain and swelling appeared on inner side of L. knee; no radiological evidence of bony lesion. Fever present from beginning and for last week had swung between 98° and 103° F. or over; pulse and respirations erratic: 80–120 and 20–40 per min.

At beginning of penicillin injections patient, who had just been transferred 40 miles by ambulance, was fairly well-nourished, pale and sweating profusely; exhausting coughing attack every few minutes. Speech difficult on account of cough and rapid breathing, but quite rational. Carbuncle extended from base of neck into both scapular fossae over area 5½ by 9 in. On L. side of neck were 17 areas of ulceration with undermined edges containing sloughs and exuding pus. R. side had reached stage of discoloration, swelling and induration only. Chest expanded poorly; signs of diffuse bronchopneumonia. L. knee tender over inner aspect of tibial head and small effusion into joint. Tender swelling in R. calf. L. forearm and hand swollen, without localised tenderness.

**Previous treatment.**—Sulphapyridine, 6½ g. in 3 days followed by sulphathiazole, 48 g. in 7 days. Temperature fell for short time but rose again while course was still in progress.

**Bacteriology.**—*Staph. aureus* (coagulase +ve) grown from blood. Carbuncle and sputum gave heavy growth of same organism. Urine sterile.

**Method of penicillin treatment.**—All doses given intramuscularly.

**Progress.**—During first 6 days temperature peak fell a little lower each day till down to 99.4° F.; after 36 hours pulse ceased wide excursions and kept between 110 and 120. Dramatic steadying of respiration-rate at about 30 in spite of persistent cough. Sputum 15–20 oz. daily at first; after 5th day steadily diminished. Swelling of carbuncle going down by 3rd day; sloughs smaller and granulations bright red. By end of 9 days all induration gone from R. side; on L. a few ulcers had coalesced, others dry, edges no longer undermined and epithelium growing in. Pus grew diminishing

Day	Dose	Blood bacteriostasis (slide test)
1–4 ..	20,000 units 2-hrly.	Complete for 3 hr. up to dilution of serum of 1; partial up to 1.
5–9 ..	10,000 ,, 2-hrly. by day	Complete for 2 hr. (undiluted).
	20,000 ,, 3-hrly. by night	..
10–13 ..	10,000 ,, 2-hrly. by day	..
	20,000 ,, 4-hrly. by night	..
14–16 ..	15,000 ,, 2-hrly. by day	Complete for 3 hr. (undiluted).
	20,000 ,, 4-hrly. by night	..
Total : 2,590,000 units.		

numbers of *Staph. aureus* till healing complete. Three days after large initial dose had been reduced, when blood-culture was sterile, temperature, pulse- and respiration-rate began to rise again; maxima 101° F., 120 and 35. Because 2-hourly injections were exhausting and batch of penicillin in use might have pyrogenic properties, treatment stopped on 16th day. All but 7 ulcers had then epithelialised completely and rest were beginning to do so. L. knee had no detectable fluid in it and all soft-tissue swellings gone. Paroxysms of coughing much fewer and sputum at most 10 oz. daily. Considerably greater air entry in chest than during first week of treatment.

At end of treatment there was no immediate alteration in TPR, but in another 10 days, during which transfusion given, temperature subsided to normal and remained there, pulse steadied round 100 and then began to drop lower and respirations suddenly fell to 20–25. Sputum lessened and 6 weeks later was very slight. Patient walking about 7 weeks after start of penicillin. No X ray taken at beginning of treatment for fear of disturbing patient. At end of treatment first radiogram (fig. 1, a) showed multiple cavitation at both apices and consolidation of both lower lobes and part of R. middle lobe. Subsequent weekly X rays showed steady clearing, passing through patchy stage indistinguishable from multiple abscess formation. Nine weeks after treatment began there was still some opacity at the base of the R. middle and lower lobes (fig. 1, b). By 3 months after treatment last remaining cavity had almost disappeared, and bronchogram showed normal filling of the R. middle and lower lobes.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea : mg. per 100 c.cm.
At beginning of Tt. ..	3,430,000	70	12,300	31
6th day of Tt. ..	3,810,000	70	20,000	20.8
14th day of Tt. ..	..	..	..	71
At end of Tt. ..	3,500,000	74	18,000	22.8
After transfusion	5,300,000	80	14,400	..
2 months from start of penicillin	4,700,000	92	8000	..

**Comment.**—The carbuncle started to clear up from the time of penicillin administration though at no time were the staphylococci absent from his lungs. As he had no other treatment till well on the way to convalescence his recovery from the very severe infection with lung abscesses may reasonably be attributed to penicillin.

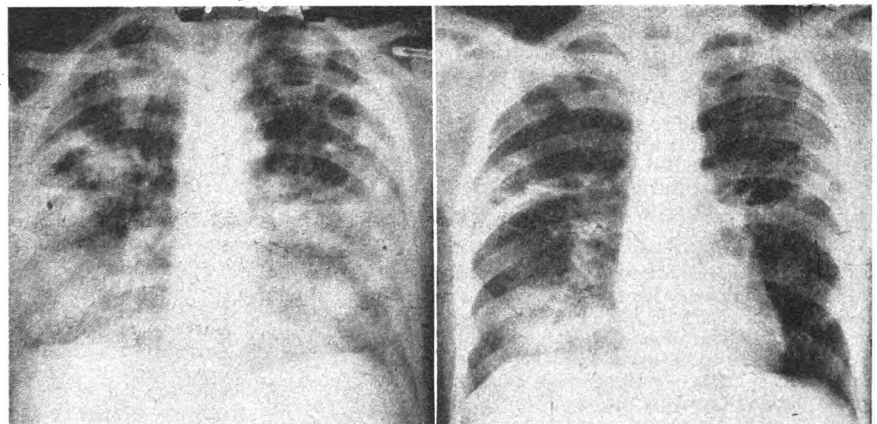


Fig. 1.—Case 11. (a) During 5th week of illness and after 2 weeks of penicillin. (b) Nine weeks after beginning of penicillin.

INTRAMUSCULAR AND INTRATHECAL

CASE 12.—*Streptococcal meningitis*. (St. Mary's Hospital, Paddington. Prof. Alexander Fleming.\*) Male, age 52. Seven weeks earlier patient became febrile, without localising signs. After 3 weeks, vomiting, drowsiness and frontal headache began and in next week further clinical signs of meningitis developed. CSF pressure 300 mm.; 500 cells (mostly polymorphs) per c.mm.; globulin and total protein increased. Except while sulphapyridine was being administered, temperature 97°-102° F. and pulse-rate 96-128. Condition deteriorated and when seen with view to penicillin treatment was drowsy and at times comatose, with intervals of extreme restlessness. Had had uncontrollable hiccough for last 10 days; incontinence of urine and faeces for a week. Night before treatment started oxygen administered; man believed to be dying.

Previous treatment.—Sulphapyridine, 1 g. 4-hourly for 8 days, lowered temperature but it rose again promptly at end of course, illness not otherwise influenced. Later, sulphathiazole given for 13 days without effect.

Bacteriology.—No organisms could be cultivated from CSF by ordinary methods, but 6 days before treatment began a non-haemolytic streptococcus was isolated by shaking 3 c.cm. of CSF in 10 c.cm. of sloppy (0.2%) glucose agar. Culture by this method was repeated. Organism was sulphathiazole-resistant but penicillin-sensitive; about half as sensitive as test staphylococcus. Agglutination of organism by patient's serum complete at 1 in 80 and partial up to 1 in 320; none of 12 normal sera gave any agglutination at dilutions of 1 in 10 or more.

Method of penicillin treatment.—Intramuscularly, with 5 doses intrathecally. For first 8 days injections given 2-hourly for whole 24 hours; thereafter 2-hourly from 8 AM to 8 PM, with 20,000 units at 10 PM.

Day	Units intramuscular		Units intrathecal
	Single dose	Total	
1 (part)	10,000	30,000	..
2 and 3	10,000	120,000	..
4	10,000	190,000	..
	or 20,000		
5	20,000	240,000	..
6	15,000	180,000	..
7	10,000	160,000	5000
	or 15,000		
8	10,000	105,000	5000
	or 7,500		
9	7,500	90,000	2500
10	10,000	100,000	5000
	or 20,000		
11-13	10,000	90,000	..
	or 20,000		
14	..	..	5000
Grand total:	intramuscular, 1,305,000; intrathecal, 22,500 = 1,327,500 units.		

Progress.—Uninterrupted. Temperature did not rise above 98.6° F. after 7th day of treatment. Discharged from hospital 5 weeks from beginning of treatment with no abnormal signs or symptoms.

Blood examinations	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning of Tt.	85	15,000	30
At end of Tt.	84	8300	30

White-cell count dropped steadily during treatment.

Bacteriostasis complete in 9 of 11 samples of blood, partial in 1 (slide-cell and other techniques). After intramuscular injection CSF was less bacteriostatic than blood, but after intrathecal injection it was many times more so, even 24 hours later. From this it is clear that penicillin does not pass freely between CSF and blood.

Comment.—Other medication had failed and the patient's condition appeared to be hopeless. Recovery began with penicillin treatment and was uninterrupted. This was the first patient to have penicillin intrathecally, and there appeared to be no ill effects.

INTRAMUSCULAR ONLY

CASE 13.—*Staphylococcus aureus septicæmia*. (Radcliffe Infirmary. Mr. Stallworthy.) Female, age 37, weight in health about 120 lb. After a delivery with considerable hæmorrhage given blood-transfusion into R. saphenous vein; 4 days later temperature rose to 105° F. and felt pain behind R. knee. On 7th day signs of lung involvement. Temperature remained between 102° and 105° F. and pulse about 140 till it became too weak and irregular to count. Penicillin

\* This case was treated with penicillin supplied from Oxford. We are indebted to Professor Fleming for permission to include an abstract of his notes in this series.

treatment started on 9th day. Then extremely pale with heavy shadows under eyes and round nose; breathing, interrupted by a short cough, very shallow and accompanied by loose rattle in throat which she seemed incapable of clearing. Could answer questions in few whispered words and seemed rational during day but wandered at night. R. leg considerably swollen from foot to thigh with induration of subcutaneous tissues along inner side of leg. Well-marked œdema of dependent parts of body.

Previous treatment.—Sulphonamides given but frequently vomited and as white-cell count fell from 12,000 to 5000 in 3 days they were stopped. Just before penicillin treatment packed cells from a pint of blood were transfused.

Bacteriology.—*Staph. aureus* (coagulase +ve) grown from blood (8 colonies per c.cm. and 4 days later 70 colonies per c.cm.), and from sputum before penicillin started, and later from abscess which developed in leg. Urine sterile.

Method of penicillin treatment.—For 20 days received 15,000 units 3-hourly intramuscularly; total 2,400,000 units. Bacteriostasis complete for 3 hours and partial in 4th hour after injection of 15,000 units on 9th day of treatment.

Progress.—In first 24 hours only change was slight drop in temperature. Next day pulse began to improve, but attacks of dyspnoea accompanied by pain in chest started, with clinical signs of multiple emboli; cough looser. On 4th day patient began to look better and blood-culture was sterile. After 6th day attacks of dyspnoea stopped. Temperature fell irregularly; by 14th day was normal, respirations below 30, pulse regular though still fast (100-110), little cough and no sputum. Packed cells from 4 pints of blood transfused on 15th day; no immediate reaction but 36 hours later sudden and very severe attack of dyspnoea with fear, cyanosis and almost imperceptible pulse; patient gradually recovered.

On 9th day radiogram of chest showed consolidation of both bases and partial collapse of both lower lobes. On 16th day, after the severe attack, areas of consolidation were smaller but fluid found in L. pleural cavity; on aspiration found to be amber-coloured, slightly turbid, free of cells and sterile. At no time was there evidence of abscesses in lungs, in spite of clear clinical history of pulmonary emboli. Weekly radiograms showed steady clearing of lung shadows. R. chest clear 4½ weeks after first administration of penicillin; L., where fluid had collected, by 8th week. Swelling of leg steadily decreased after 3rd day. Staphylococcal abscess found on inner side of leg on 6th day treated by aspiration; pus decreased daily till dry on 14th day.

Penicillin stopped on 20th day. Apart from mild cystitis due to *B. proteus*, which followed repeated catheterisation, patient made uninterrupted recovery. Cough completely gone 3 days after penicillin stopped.

Patient was losing profuse bright red lochia throughout treatment.

Blood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.
At beginning * of Tt.	..	38	5000	46
2nd day of Tt.	2,700,000	40	9000	..
4th	..	..	18,000	..
10th	2,200,000	40	10,000	..
14th	2,700,000	49	6000	32
At end of Tt. (20th day)	..	..	..	53
5 days after end of Tt.	..	..	..	35

\* Before transfusion of cells from 1 pint of blood.

	Red cells per c.mm.	Hb. %	White cells per c.mm.
After transfusion on 17th day	4,800,000	74	16,000
14 days after end of Tt.	4,200,000	80	8000
28 days after end of Tt.	5,000,000	76	8000

Comment.—In spite of the patient's very low hæmoglobin no transfusion was given after the initial pint of packed cells for the first 16 days. With the mastery of the infection the hæmoglobin rose although a profuse lochia continued. Only after the disappearance of embolic phenomena in the lungs for 10 days was the patient again transfused. Evidence of the lodgment of emboli in the lungs followed, but no lung abscesses developed and the fluid aspirated from the chest was sterile. It is reasonable to attribute the very satisfactory clinical result to the penicillin.

CASE 14.—*Osteomyelitis with pyæmia*. (Wingfield-Morris Hospital. Mr. Trueta.) Male, age 8 years, weight 53 lb. "Chronic bronchitis" for previous 3 years; treated in sana-

torium and later in open-air school. Present illness began as undiagnosed fever 3 weeks before beginning of penicillin treatment. After few days, vague pains started in joints; eventually abscesses pointed and were incised below R. knee and L. ankle. After 2 weeks, signs of consolidation in both lungs and rusty sputum. For 10 days before treatment started temperature, irregular at first, had swung between 99° and 103° or 104° F.; pulse-rate had steadily mounted to 120-140 and respirations to 30-40.

Extremely thin, very pale, especially round the mouth and nose, rational but listless, querulous when roused. Breathing shallow and rapid; little cough; tongue dry and dirty. Considerable areas of consolidation and pleural rubs on both sides of chest; osteomyelitis with abscess formation in upper end of shaft of R. tibia, lower ends of R. fibula and L. tibia, with some involvement of L. ankle-joint. Drains present in both tibiae; thick blood-stained pus aspirated from R. fibula. Fullness and tenderness of L. loin; psoas spasm and tenderness under L. ischium; reddened tender area over one metacarpal head; some stiffness of R. elbow; and tenderness over one sternoclavicular joint.

**Previous treatment.**—At onset of illness 2.5 g. sulphapyridine given in 24 hours, followed for some days by salicylates which favourably affected TPR. Appearance of pus led to further 2 days' sulphapyridine (12 g.) before admission to Wingfield-Morris Orthopaedic Hospital.

Day	Dose	Blood bacteriostasis (slide test)
1-6	7500 units 3-hrly.	Present for 2 hr. after injection.
7-12	10,000	Present for 1st hr. only.
13-22	15,000	Present for all 3 hr.
Total: 1,987,500 units.		

**Bacteriology.**—Heavy growth of *Staph. aureus* (coagulase +ve) obtained from sinuses and abscesses aspirated in legs. *Staph. aureus* of the same serological type isolated from blood and urine. Sputum could not be obtained for culture.

**Treatment.**—Child allowed to lie in bed in position found most comfortable. Limbs dressed every 2 or 3 days with dry dressings. No splinting except for week in middle of treatment when abduction frame used to overcome continued psoas spasm. Abscess over R. fibula treated by repeated aspiration. Sedatives were only drugs used beside penicillin; no transfusions. All penicillin given intramuscularly.

**Progress.**—After drop of 2°-3° in first 24 hours temperature swung regularly every day from 98° to 102° F. for over a week, increased dose having no effect on it. Then fell irregularly to region of 99° F. when penicillin was discontinued after 3 weeks. Pulse-rate remained at 100-120 throughout. Respirations showed earliest definite improvement; regular between 20 and 25 by 9th day. Temperature finally remained normal 26 days after treatment began. Anæmia showed progressive and rapid diminution throughout treatment. Listlessness disappeared early and child became very restless. Improvement in appearance even while temperature still swinging. Appetite prodigious by 14th day, and taking part in school on 18th day. Clinical and X ray examination demonstrated progressive clearing of consolidation in lungs, though resolution not complete by end of treatment. Elbow swollen and painful on movement on 6th day, but subsided. Sinuses dry by 9th day, L. ankle swelled more during second week; aspiration produced no fluid. R. fibula abscess aspirated several times and showed progressive diminution in *Staph. aureus*; both this abscess and some fluid which had

collected in old R. tibial abscess cavity sterile at end of 3 weeks.

Radiograms, as in other cases, showed progressive rarefaction of affected bones at first (fig. 2a and b). By end of treatment whole of R. fibula, half R. tibia, lower third of L. tibia, and astragalus involved; some indication of osteomyelitis in descending ramus of L. pubis. Evidence of subperiosteal bone formation in some places. No further rarefaction had taken place when radiograms were taken 1 and 2 months after end of treatment.

No explanation of tenderness in L. loin forthcoming until 5 days after penicillin stopped, during which time he was very cheerful, sitting up and playing in bed, and free from fever. Then developed high temperature and renal colic. Pyelogram showed stones in pelvis of L. kidney and in L. ureter. Urine contained some pus cells and grew *B. coli*. At no time were staphylococci grown from urine. After 9 days, during which passed a stone and much gravel, temperature fell to normal and boy became lively and active, with no residual disability except stiff L. ankle. During next 6 weeks remained afebrile. Movement in all joints except L. ankle became full and free. Looked very well and had returned to same weight as before illness.

Flood examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea : mg. per 100 c.cm.
At beginning of				
Tt. . . . .	2,000,000	38	22,000	45
8th day of Tt. . . . .	2,400,000	42	14,000	25
14th . . . . .	2,980,000	60	12,800	20
3 days after end of Tt. . . . .	3,400,000	60	10,000	25
6 weeks later . . . . .	3,900,000	74	10,000	40

**Comment.**—This case, a boy very seriously ill, demonstrated that with adequate doses of penicillin widespread osteomyelitis could be controlled without surgical intervention. No toxic effects were seen from the penicillin and the anæmia steadily decreased during treatment.

INTRAMUSCULAR AND INTRAVENOUS

**CASE 15.—Subacute bacterial endocarditis.** (Badcliffe Infirmary. Dr. Cooke.) Male, age 24, weight about 98 lb. (112 lb. in health). Pyrexia with daily range of 100°-103° for 2 months; onset accompanied by headache only. Known to have a congenital heart lesion, probably a septal defect, since a child. Now had aortic murmurs, probably due to endocarditis. When penicillin treatment began he looked ill, flushed, worried and very thin; rather rapid shallow respirations interfered somewhat with conversation. Skin very moist. No demonstrable lesions other than cardiac murmurs, moderate enlargement of heart to left, and Osler's nodes on great toe and right index finger.

**Previous treatment.**—First 'Dimol' and sodium salicylate, then 33 g. sulphanimide in a week and later 'Soluseptasine,' 4 ampoules daily for 3 days. None of these drugs affected TPR or symptoms.

**Bacteriology.**—Month after illness began *Strep. viridans* cultivated from blood. Positive blood-culture also obtained before beginning of penicillin administration. Streptococcus isolated from the blood 3 weeks after end of treatment found to be only a quarter as sensitive to penicillin as the one originally isolated.

Day	Dose and route of penicillin	Blood bacteriostasis (slide test)
1-18	15,000 units 3-hrly. intramus.	Complete for 2 hr. in 1st week; only for 1 hr. in 2nd week.
19-21	20,000 " " "	Complete for 1 hr. only.
22-25	30,000 " " "	Complete for 2 hr.
26-29	10,000 " hrly. intraven.	
30	15,000 " 3-hrly. intramus.	
Total: 4,670,000 units.		

**Progress.**—During first week appetite improved rapidly and remained of surprising proportions throughout treatment; temperature dropped steadily till between 98° and 99° F., pulse-rate fell a little and respiration-rate from 30 to 25. Temperature then became more erratic and condition obviously not improving. Blood-culture negative after a week but *Strep. viridans* isolated again at end of second week. Dose of penicillin increased but temperature only transiently improved and rose again after 2 days. On further raising dose temperature again dropped; blood-culture at this stage negative.

Bacteriostatic tests at all dosages up to date had shown absent or incomplete inhibition in third hour, so it was decided to give hourly injections of 10,000 units—i.e., same total

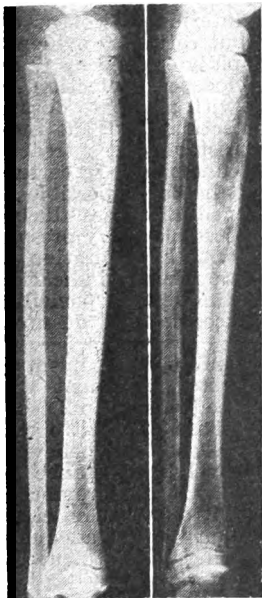


Fig. 2.—Case 14. (a) Right tibia and fibula before penicillin was begun. (b) Three weeks later, at the end of penicillin treatment; note extensive rarefaction in both fibula and tibia. (a) is a somewhat softer plate than (b).

daily dose but given more often by means of blood, and later saline, drip transfusion. This was kept up for 5 days. In spite of rigorous treatment patient obviously put on flesh and appetite remained prodigious. At end of treatment looked much better; very bright and anxious to get up. Temperature started mounting 4 days after penicillin discontinued; within a week curve resumed original height, and patient lost his appetite and looked ill and anxious as before. Little change in heart signs; some indefinite abdominal pain and tight sensation across chest; no other added symptoms and no embolic phenomena. Three weeks after administration ceased heart had appreciably enlarged; there was greater thoracic discomfort and blood-cultures were again positive; he was sent home, and died 3 weeks later.

Blood and urine examinations	Red cells per c.mm.	Hb. %	White cells per c.mm.	Blood-urea: mg. per 100 c.cm.	Urea clearance %
At beginning of Tt. . .	3,400,000	54	10,000	31	85 normal
End of 1st week . .	3,700,000	52	18,000	32	..
End of 2nd week . .	3,300,000	52	12,000	32	..
End of 3rd week . .	3,400,000	54	8800	35	..
End of 4th week * . .	4,200,000	80	19,000	29	..
3 weeks after end of Tt. . .	4,000,000	52	9000	25	115 normal

\* Five days after transfusion of 1½ pints of blood.

No albuminuria throughout administration.

**Comment.**—This patient had by present standards a very large dose of penicillin continued for a month. He showed no toxic signs and his appetite remained extraordinarily good throughout. Even these doses produced only temporary effects. The causative organism developed a considerable resistance to penicillin. It would probably have been better to give very large doses initially but it must be admitted that this case does not give grounds for the belief that penicillin will cure subacute bacterial endocarditis.

COMMENT ON GENERAL TREATMENT

From these observations the most practicable method for the administration of penicillin seems to be by intramuscular injection. Owing to the great ease with which penicillin is excreted by the kidney injections must be repeated frequently. In general a 3-hourly interval, especially in the most acute stages of the illness, is desirable. A dose of at least 15,000 units should be given and careful examination made of the serum to see that at the end of the 3-hour period after injection it is still fully bacteriostatic; if it is not the dose must be increased until it is. As penicillin at present is so difficult to make in quantity one has been tempted to find the minimum effective instead of the optimal dose. It is quite possible that some good results will be obtained with less dosage than is recommended above, but if penicillin ever becomes available in quantity the above dosage will probably be considered small. In estimating clinical progress the temperature chart seems to be a poor guide, and for those used to the sharp falls often associated with sulphonamide administration this is somewhat disconcerting. Other criteria, such as bacteriological examinations, diminution of pain, and improvement of appetite and general condition, rank high. In the cases treated the temperature has come down by lysis over as long as 14-20 days. Penicillin should be continued till this result has been obtained and for a few days longer.

In many hundreds of intramuscular injections there has been no suggestion of serious damage at the site of injection, even in a baby. The impure preparations employed have contained no more than 10% of penicillin and it can be counted extremely fortunate that the impurities are non-toxic. Even with the greatest dosage (case 15) no toxic effects of the drug were noted. There was a rise in blood-urea in some of the patients; this fell promptly on discontinuing the drug and such a rise probably does not indicate kidney damage. In some of the most severe cases we were fortunate in being able to avoid blood-transfusions so that a clear-cut picture was obtained of the effect of penicillin on the blood. In nearly all cases there was an improvement in the red

SENSITIVITY OF ORGANISM TO PENICILLIN BEFORE TREATMENT COMPARED WITH THAT DURING OR AFTER TREATMENT

Case	Organism	Source of organism	Days since start of treatment when 2nd culture taken	Comparative amounts of penicillin required for complete inhibition at 2nd and 1st culture	Notes
10	<i>Staph. aureus</i> (coag. + ve)	Wound	10	No change	Both compared with original culture from carbuncle. Organism from the original blood-culture had the same titre. Abscess aspirated during treatment compared with original blood-culture. Second culture taken 21 days after end of treatment.
11	"	Carbuncle	15	4 times as much	
11	"	Sputum	15	No change	
14	"	Abscess L. ankle	7	No change	
13	"	Blood-culture; abscess	12	No change	
15	<i>Strep. viridans</i>	Blood-culture	51	4 times as much	

count and haemoglobin level during treatment. Any fall in white cells was associated with a diminution of infection and in no case was there any suspicion that a leucopenia was produced. The fact that in certain cases blood-transfusion was withheld does not mean that it is undesirable. Improvement in the haemoglobin level by transfusion would possibly have accelerated clinical improvement.

With two exceptions the staphylococcal cases were only referred to us because they were considered hopeless, after other forms of treatment, including sulphonamides, had been tried without effect. They have all recovered, and, where dosage was adequate, without surgical interference. The cases with bony lesions were particularly interesting, for rarefaction of the bone increased simultaneously with the general improvement, so that at the end of treatment the bones looked a good deal worse radiologically than at the beginning. Nevertheless, when left alone they gradually recalcified. The extensive rarefaction should be interpreted not as an extension of the disease process but rather as evidence that the diseased bone is being rapidly cleaned up (? by macrophages) when the staphylococcal infection is overcome. The evidence is that with adequate dosage it is possible to eliminate all infection; and one may look forward to the time when osteomyelitis treated early will no longer be a surgical condition. In certain cases of staphylococcal infection it has been possible to follow the sterilisation of unopened abscesses during general administration only. Abscesses already present before treatment should be dealt with by aspiration, if possible, rather than incision; there is every indication that they will then heal. When the dose of penicillin is adequate we have not seen abscesses form de novo during treatment.

In 5 cases the sensitivity of the infecting organism to penicillin before and during or after treatment was compared by Dr. M. A. Jennings (see table). In 2 cases some resistance had developed and in 3 the titre was unchanged. There are therefore reasons for believing that organisms will sometimes develop resistance to penicillin during its administration. It has previously been shown that this can occur in vitro (Abraham et al. 1941). Even on this ground alone fully adequate dosage must be given at the beginning of treatment.

Cases treated by Local Application

While the large amounts of penicillin needed for parenteral injection are not likely to be widely available for some time, the relatively small amounts needed for local application could possibly be made available much sooner. When the properties of penicillin are considered—for instance, its unimpaired activity in the presence of pus and autolytic products, and its low

toxicity to leucocytes—its suitability for local application is beyond doubt, and it is indeed a reasonable view that if a good result is not obtained in an infection with a penicillin-sensitive organism the penicillin is, for one reason or another, not being adequately applied.

For some cases in the present series the hygroscopic sodium salt of penicillin was used. The calcium salt, which is not hygroscopic, is much more conveniently handled and has proved satisfactory for local application in either powder or solution; it is to be preferred to the sodium salt. The calcium salt should in no circumstances, however, be injected in strong solutions intramuscularly or intravenously.

In essence, the problem of using penicillin locally is that of devising some means to apply a very soluble and diffusible substance so that a bacteriostatic concentration is constantly maintained at every point where there are infecting organisms. It is useless to apply penicillin unless the whole infected area can be reached, and local application must therefore be accompanied by suitable surgery. For this purpose "suitable surgery" may not be orthodox surgery; free drainage is undesirable because the penicillin drains away with the exudate. In our view it is best to establish a closed cavity when possible into which penicillin can be instilled and from which exudate can be sucked away periodically if necessary. We are particularly indebted to Mr. R. G. Macbeth and Mr. G. H. Livingstone who have modified their usual mastoidectomy operation to fulfil this condition. This type of infected cavity may be considered as a model for other situations.

#### MASTOID INFECTIONS

Of the 22 cases of mastoid infection treated with penicillin, 16 had a history of from 4 days to 4 weeks and the other 6 were chronic cases with acute exacerbations. Pus was found in 18, mucoid or mucopurulent material in the remaining 4.

The patient's ages ranged from 10 months to 76 years, this last being a diabetic.

**Bacteriology.**—Hæmolytic streptococci were found in 8 cases, pneumococci in 6 and *Staph. aureus* in 2; 4 cases were sterile and in 2 no bacteriological examination was made.

**Method of treatment.**—After an orthodox Schwartze mastoidectomy the wound was sewn up completely from below and a fine rubber tube, with no side holes, was inserted through the upper end of the wound down to the base of the cavity and sutured into position. Penicillin dissolved in distilled water, sufficient to fill the cavity, was injected and the tube closed with a spigot. Penicillin in vaseline was smeared along the suture line. Exudate was aspirated and fresh penicillin injected 6-hourly for 5 days, when the sutures were removed, and twice daily for 2 more days, after which the tube was removed. The strength of the penicillin solution varied from 250 to 500 units per c.c.m. The amount used for one case varied from 5000 to 35,000 units; average 17,300 units.

**Results.**—Primary healing of the wound took place in 14 of the acute and 5 of the chronic cases. The ear was dry either at the first dressing (at 5 days) or within 10 days of operation in 19 cases. Two of the failures (acute cases) occurred early in the series and could reasonably be attributed to inexperience in the technique. In no case was any serious complication met with.

**Comment.**—It is likely that treatment every 6 hours was excessive, as the material aspirated just before an injection was several times found to be strongly bacteriostatic—i.e., penicillin was still present. Probably 12-hourly treatment would have been adequate. It is also uncertain whether 7 days' treatment was necessary, but to get complete information about variations in the treatment would have needed a far larger series. The present small series shows at least that the principle of instillation and aspiration after surgical cleaning and closure should be given a further trial.

#### EYE INFECTIONS

We are indebted to Miss Ida Mann for the diagnosis and advice on the cases and to Mr. H. E. Hobbs for his help. Of the 89 eye infections treated with penicillin, 46 were cases of blepharitis, 18 of acute conjunctivitis (with corneal ulcers 6, with infected eye-socket 1, with infected meibomian cyst 1, with hypopyon 1), 19 of chronic conjunctivitis, and 6 of dacryocystitis.

**Blepharitis.**—The 46 cases treated had scaling, redness of the lids, swelling, ulceration and soreness. The duration of symptoms ranged from 2 months to 32 years; 35 cases had had symptoms for over a year. Swabs were taken from ulcers on the lids before treatment with penicillin and plated on blood agar. *Staph. aureus* (coagulase +ve) was found in 35 cases; *Staph. aureus* and *Staph. albus* (coagulase +ve) in 1 case; *Staph. aureus* and pneumococci in 1 case; *Staph. albus* alone in 4 cases; and *Sarcina lutea* in 1 case; in 4 cases no cultures were made.

Penicillin ointment was made by dissolving the powder in distilled water and incorporating it in vaseline in a strength of 600–800 units per g. The patients were told to bathe the lids to soften and remove the scales, and then to rub the ointment into the lid margins two or three times a day with a glass rod or wooden probe. The length of treatment varied from 2 to 12 weeks, the time appearing to depend less on the severity or chronicity of the condition than on the intelligence and persistence with which the treatment was carried out. Evacuee children were almost invariably long in recovering; the children of obviously diligent mothers recovered within a few weeks.

A complete report on the bacteriology of the eyes after treatment is unfortunately impossible, as many patients would not report in person once they considered themselves cured. Clinical cure was obtained in 37 cases; of these, sterile or pathogen-free cultures were obtained at the completion of treatment in 24 cases. Improvement without complete recovery before the patients ceased attending was recorded in 7 cases, and no improvement after 2 weeks' treatment in 2 cases. Recurrences appeared in 10 cases, all but 3 within a month of the end of treatment. Except for 4, these recurrences were associated with staphylococcal infections of the skin, conjunctivitis from foreign bodies, colds or allergic manifestations. The recurrences were not severe and were all easily cleared in the 7 patients who persevered with treatment. In two cases *Staph. aureus* returned without producing symptoms. Of the 2 cases reporting no improvement, one may have had a chemical blepharitis, as a corneal ulcer had previously been treated with various preparations. No pathogenic organisms were isolated from this case. The other only carried out her treatment for 2 weeks.

**Acute conjunctivitis.**—The 18 cases include 4 of simple conjunctivitis infected with *Staph. aureus*, 1 growing a hæmolytic streptococcus as well; 6 cases with corneal ulcers, 4 being infected with *Staph. aureus* and 1 each with *Staph. albus* and *Bacterium coli*; 1 case with hypopyon which gave a growth of non-pathogens only; 1 case with meibomian cyst, infected with *Staph. aureus* and a hæmolytic streptococcus; 1 case of infected eye-socket, in which an achromobacterium only was found; and 5 cases of ophthalmia neonatorum, 2 infected with *Staph. aureus* and 1 each with *Bact. coli*, *Gonococcus* and an unknown organism.

The penicillin was applied in vaseline or distilled water, 600–800 units per g. or c.c.m. The ointment was preferred as ensuring less waste, but when patients, as they occasionally did, complained of a burning sensation from the ointment, the drops were substituted. Treatment was given hourly by day and 2-hourly by night at first in the most severe cases, the frequency lessening as progress was noted. It was continued in all cases till cultures taken after 24 hours without treatment were sterile or grew only non-pathogens. No other treatment was given except in cases with a corneal ulcer, which received atropine or hyoscine when necessary.

Some of the cases, particularly those with ulcers, had had various antiseptics applied before penicillin, so that a pathogenic organism was not always found. All cases were free of pathogens after treatment. Improvement was felt or seen (except in 2 cases, the hypopyon and the *Bact. coli* ring ulcer) in 1–3 days. The ulcers healed in 5–7 days, including the staphylococcal ring ulcer which extended round two-thirds of the cornea. The conjunctivitis recovered in 1–5 weeks according to the severity of the case. The hypopyon, in a woman of 80, had cleared completely in a month. Treatment after a week was discontinued in the second ring ulcer when *Bact. coli* was the only organism found and no improvement could be seen; the patient had rheumatoid arthritis.

The gonococcal case of ophthalmia neonatorum had shown no response to 3½ weeks' sulphapyridine and irrigation. The discharge was profuse even under ½-hourly irrigations. Penicillin (1200 units/c.c.m.) was dropped into the eye hourly. In 12 hours the pus had much diminished and in 2 days it had gone; the eyes were open and the conjunctivæ white. No gonococci were seen in films made 8 days later, after penicillin

had, been discontinued for 48 hours. No recurrence was reported. The other ophthalmias were treated with drops (600 units/c.cm.) and all cleared within a week. A mild recurrence which occurred in one was easily dealt with.

The infected eye-socket had received various local applications for 2½ weeks without improvement. The discharge, which was extremely copious, lessened considerably by the 4th day of penicillin treatment and within 2 weeks the socket looked healthy and cultures were sterile.

**Chronic conjunctivitis.**—These include all cases of conjunctivitis which had not responded to other treatment for one month to several years. Of the 19 cases, 17 were simple, infected with *Staph. aureus* (7), *Staph. albus* (4), *Staph. albus* and *Achromobacterium* (1), *Staph. albus* and *Pneumococcus* (1), *Strep. viridans* (1), *Staph. aureus* and *Neisseria catarrhalis* (2), and an unknown organism (1); 1 case was associated with a corneal ulcer, infected with an unknown organism; and 1 with recurrent corneal ulceration, infected with *Staph. aureus*.

Penicillin drops or ointment, 400–800 units per g. or c.cm., were applied t.d.s. or 4-hourly according to the convenience of the patient and in all but 3 cases were continued for a week after cultures grew no pathogens, whether symptoms were present or not. All but one case recovered in 1–5 weeks, the average being 2½ weeks. Lacrimation persisted in some cases but usually responded to ephedrine. In the one case which did not respond the *Staph. aureus* disappeared but *N. catarrhalis* persisted, the clinical picture being typical of "spring catarrh." Recurrences were reported in 3, all of which responded to further penicillin treatment. *Staph. aureus* was cultured also from 3 cases which were symptom free a month or more after the end of treatment.

**Dacryocystitis.**—All except one of these 6 cases were of several years' duration. The organisms grown were: *Staph. aureus* 2 cases, *Staph. aureus* and *albus* (coagulase +ve) 1 case, and *Pneumococcus* 3 cases.

The sac was injected with a solution of penicillin in distilled water (800 units/c.cm.) five times in a week. Cultures were taken on the 8th day. Where probing of the duct was necessary, penicillin in vaseline was applied to the conjunctival sac.

Cultures invariably became sterile but clinical recovery occurred only in 3 cases. Two of the pneumococcal cases improved during treatment but did not persist with it. The third who failed to recover had lupus of his face. There was no appreciable lessening of the discharge. The 3 who recovered completely had treatment for 1–3 weeks; one of these was a boy of 8 years who had suffered from this complaint since birth.

#### CHRONIC WOUND SINUSES

The 11 chronic wound sinuses treated were under the care of Professor Seddon, Mr. Scott, Mr. Elliot Smith, Dr. Cooke, Mr. Whitelocke, Mr. Livingstone or Dr. Findlay at either the Wingfield-Morris Orthopaedic Hospital or the Radcliffe Infirmary, Oxford. The source of the sinus was old osteomyelitis about the hip, 3 cases (duration 4 months to 12 years); old nephrectomy, 2 cases (duration 1 year and 5 years); ear and mastoid, 2 cases (duration 3 months and 2 years); old empyemas, 4 cases (duration 3 months to 1 year).

	Organisms	Cases
Old osteomyelitis	<i>Staph. aureus</i>	1
	<i>Staph. aureus</i> and <i>Strep. haemolyticus</i>	2
Nephrectomy	<i>Strep. haemolyticus</i>	2
Ear and mastoid	<i>Staph. aureus</i>	1
	<i>Staph. aureus</i> and <i>Strep. haemolyticus</i>	1
Empyemas	<i>Staph. aureus</i>	2
	<i>Staph. aureus</i> and <i>Strep. haemolyticus</i>	2

**Method of treatment.**—(a) For long and tortuous sinuses, injection of penicillin solution (200–500 units/c.cm.) under pressure through a catheter inserted to the furthest possible point, the sinus being closed by a rubber bung immediately after withdrawal of the catheter. Treatment repeated twice daily for from 10 days to 3 weeks.

(b) For short sinuses, insertion of penicillin powder.

(c) For empyemas, injection of solution, 5–20 c.cm., twice daily with closure of the opening for all but an hour before the next injection.

**Results.**—Apart from 2 empyemas, all but 2 sinuses healed in from 10 days to 4 weeks. Treatment was continued till they became sterile on culture or grew only non-pathogens, *Pseudomonas pyocyanea* and *Bact. coli*. The shortest period in which sterilisation took place was 5 days. One

sinus reopened after 3 months and discharged some pus—sterile on culture—and closed again quickly, another exuded a little watery fluid occasionally, while a third situated in the centre of much scar tissue, has not yet completely epithelialised. The others have shown no sign of recurrence in periods which range from 5 weeks to 18 months. In the 2 empyemas where healing was delayed a rib sequestrum and thickened pleura in the first and an epithelialised bronchopleural fistula in the second had to be dealt with surgically. The general health, as judged by weight, colour, blood-count and the patients' own feelings, improved noticeably in all patients who showed signs of debility.

#### MISCELLANEOUS INFECTIONS

A number of other infected cases (50 in all) have been treated locally. They include infected fingers, empyemas, wounds, carbuncles and dermatitis. They demonstrated repeatedly the ability of penicillin to remove staphylococci, streptococci and pneumococci when applied locally. In the majority of cases, chronic and acute, complete healing occurred without other treatment. In a few, surgical procedures were necessary to effect better access or to remove already sterilised abscesses. One case of meningitis following an infected lumbar puncture (*Staph. aureus*) appeared to be cured by repeated cisternal injection of penicillin (see also case 8 in "General" series). Further work is in progress on comparable cases of these types.

One case of staphylococcal infection in the terminal phalanx of first the right and then the left thumb provided an unplanned controlled experiment. Fig. 3a shows the condition of the right thumb 6 weeks after the onset of infection and

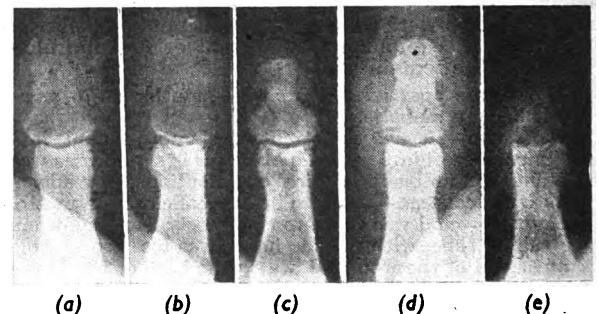


Fig. 3—Local treatment of infected thumbs (*Staphylococcus*), with and without penicillin treatment. (a) Right thumb, before penicillin, 6th week of infection; (b) at end of penicillin applications, 8th week of infection; (c) 4 weeks later. (d) Left thumb, 5th week of infection; (e) 17th week of infection. In the thumb treated with penicillin rarefaction accompanies cure of the infection, but 4 weeks later new bone has been laid down. In the thumb not treated with penicillin there is progressive necrosis of the terminal phalanx.

before penicillin treatment was started. Fig. 3b is 18 days later, at the end of a course of local applications of penicillin; note the increase in bone absorption. Fig. 3c is 6 weeks later and shows satisfactory calcification of the phalanx. While the left thumb was improving a similar condition appeared in the right. Fig. 3d shows the right thumb 5 weeks after the onset of infection; penicillin was not used in this case, and fig. 3e shows the end-result twelve weeks later.

#### COMMENT ON LOCAL APPLICATION

In this series of cases an attempt has been made to find means of applying penicillin locally so that susceptible infecting organisms are overcome. There is clear evidence that in a large number of the cases, both acute and chronic, the organisms were quickly eliminated, whereupon healing took place. A few general points can be emphasised. It is necessary to repeat the penicillin application at short intervals in an endeavour to keep up continuously a bacteriostatic concentration of the drug. It is necessary to continue till no organisms can be cultivated, and when treating eye lesions for some time after an apparent clinical cure. Relapses will occur if treatment is stopped too soon or is not pursued with sufficient assiduity and care. It cannot be emphasised too much that penicillin is not an antiseptic which kills organisms and it is therefore unlikely that one application will prove effective. It is no use expecting to sterilise a cavity, for example, by one

injection. It will be seen from a perusal of the cases reported that many applications are usually necessary but that when these are carried out properly there is every reason to expect a satisfactory result.

## SUMMARY

Methods of using penicillin for the cure of infections by both general and local administration have been explored.

Of 15 cases of serious illness treated with penicillin by mouth or by intravenous or intramuscular injection, in 10 there was a staphylococcal infection, in 1 a sulphoamide-resistant streptococcal meningitis, in 3 infection with actinomyces or streptothrix plus an anaerobic streptococcus, and in 1 a subacute bacterial endocarditis due to *Strep. viridans*. The staphylococcal cases comprised 1 of orbital infection, 4 of acute or subacute osteomyelitis, 3 of pyæmia or septicæmia, 1 of fulminating cavernous sinus thrombosis and 1 of chronic osteomyelitis; all recovered, as also did the case of streptococcal meningitis. The 2 cases with actinomyces infection were not informative because the dosage was probably inadequate; in 1 case a streptothrix appeared to be eliminated. The subacute bacterial endocarditis improved during treatment but relapsed immediately it was stopped.

It is clear from this series that a generalised staphylococcal infection can be cured by penicillin and that local lesions heal during parenteral administration. The healing of bony lesions is particularly striking. In 4 staphylococcal cases the sensitivity of the organism to penicillin was tested before and after treatment; in 1 there was evidence of increased resistance.

The most practicable method of administration of the drug is by the intramuscular route at 3-hourly intervals. An endeavour has been made so to regulate the dose that the blood at all times contains at least enough penicillin to inhibit the growth of the infecting organism. This dose is about 15,000 Oxford units, but it varies from case to case.

In assessing progress attention should not be too sharply focused on the temperature chart, since other features, such as lessening of pain and improvement in appetite and sense of well-being are often more important. In staphylococcal osteomyelitis, X-ray examination shows increasing rarefaction of the affected bones during treatment, although the infection is being overcome. The radiological appearances should be interpreted in the light of this knowledge.

No toxic symptoms due to the drug have been met with.

Local penicillin treatment has been used in 172 infections of the eye and mastoid process, chronic wound sinuses and miscellaneous local septic conditions. In most cases after adequate treatment staphylococci and streptococci were eliminated with subsequent healing. While the supplies of penicillin will not permit the treatment of more than a few cases by general administration the uses of local application are being further explored.

Penicillin is as yet available in only the smallest quantities; no applications for it should be made either to the authors of this paper or to ICI (Dyestuffs) Ltd. for supplies.

We are indebted to the Medical Research Council and the Rockefeller Foundation for grants towards the manufacture of penicillin in the Sir William Dunn School of Pathology, Oxford.

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## SORE AND BLEEDING GUMS

## IN NAVAL PERSONNEL

## VITAMIN C AND NICOTINIC ACID INTAKES

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THIS investigation forms part of an inquiry into the cause of sore and bleeding gums in Naval personnel, noted in 1940, and suspected on clinical grounds alone to be possibly due to vitamin-C deficiency. Between October and March 51 patients exhibiting the lesion were admitted to hospital, 38 from trawler-minesweepers and other small ships, 2 from larger ships and 11 from shore establishments. Our investigations included a search for clinical and other evidence of nutritional deficiency; clinical and bacteriological examination of the mouth and throat; estimation of vitamin-C intake; vitamin-C saturation tests; and finally controlled therapeutic tests in which both doctor and dentist took part.

## INTAKE AND EXCRETION OF VITAMIN C

Dietary studies aimed to determine whether vitamin-C intake had been deficient during the 6 months before the onset or exacerbation of symptoms. The history of an average week's diet was taken with the help of food models and checked with weighed helpings\* and investigation of victualling and cooking in small ships. "Typical" values for ascorbic acid content of raw, cooked and canned foods were adopted from food tables (Fixsen and Roscoe 1938 and 1940, Fixsen 1938, Olliver 1940); many were later replaced by lower values based on estimations by Dr. C. P. Stewart of Edinburgh, in another part of the investigation, of foods cooked and consumed on small ships. According to such data, which allowed merely an approximate estimate, the average daily intake in 49 cases ranged from 16 to 80 mg., as follows: 10-19 mg. (4 cases), 20-29 mg. (14 cases), 30-39 mg. (12 cases), 40-49 mg. (10 cases), 50-59 mg. (4 cases), 60-69 mg. (2 cases), 70 mg. or over (3 cases).

Men in small ships were seldom at sea longer than 3 weeks and usually in port every day or few days. They received the standard ration and a messing or victualling allowance, but did not appear to stint themselves of food containing vitamin C for the sake of mess savings; the average intake of vitamin C in 36 ratings from small ships was not significantly less than that of 10 ratings from shore establishments. Levels were highest in men who took large helpings of vegetables or who bought fruit ashore. Low levels were sometimes related to food fads.

The main source of vitamin C was potatoes. Usually the daily allowance of 1 lb. per head was peeled and kept in cold water until boiled. In some ships, freshly cooked potatoes were available twice daily. Usual helpings were 5-13 oz.; average 8 oz. Greens were cooked unconservatively and often kept hot. Dislike of cabbage was common. Vegetables in soups were cooked many hours—not added just before serving. Although plentiful, turnip was seldom eaten more than 3-4 times a week; canned beetroot even less often. Carrots and canned peas (even the non-processed variety) were not rich in vitamin C; the juice was usually discarded. Canned tomatoes, a useful source, were avoided by some. Compared with canned grapefruit, the usual canned fruits—peaches, pears, apricots, pineapple—were not good sources of vitamin C. In amounts consumed, liver, fresh milk and jams, apart from richer kinds (e.g., blackcurrant, strawberry) contributed little.

Patients were described as saturated, nearly saturated, or unsaturated to varying degrees according to whether an excretion of 100 mg. or more was obtained after the first, second, third, fourth, fifth or sixth test dose of 700 mg. of ascorbic acid.† In the few instances in which

\* Food models represented weighed helpings of foodstuffs—e.g., 4 oz. cooked cabbage, as used by Miss Pybus, dietetic sister, Royal Infirmary, Edinburgh. In the case of potatoes and other important sources of vitamin C, patients helped themselves with quantities they normally consumed aboard ship and these amounts were weighed.

† Urine, collected for 24-hour periods in dark bottles kept cool and containing concentrated glacial acetic acid, was tested by rapid titration against 2:6 dichlorophenolindophenol. Results checked well with those of C. P. Stewart, and of McNee and Reid.

**RUBBER GLOVES.**—The Ministry of Supply have for sale rubber gloves of a good household quality suitable for many tasks for which surgical gloves are normally used. The Ministry are prepared to supply these in reasonable numbers to hospitals, clinics and mortuaries. Application should be made to the Secretary, Ministry of Supply (Rubber Control), Empire House, St. Martin's-le-Grand, London, E.C.1, who will give the names of firms from which the gloves may be obtained.

tests stopped short of this, a moderate response—40 mg. or more in 24 hours—was taken as an indication that a large response would probably occur after the next test dose. On this basis, the 36 cases tested may be grouped according to whether they were saturated by the first test dose, 1 case (treated with ascorbic acid before admission); second dose, 5 cases (2 treated); third dose, 7 cases (1 treated); fourth dose, 13 cases (1 treated) fifth dose, 8 cases; or sixth dose, 3 cases.

The patients received a diet low in ascorbic acid during and before the tests, but were not, as a group, any more unsaturated than healthy trawler ratings in the same port, or healthy civilians and Naval ratings tested simultaneously by McNee and Reid (1942).

#### SEARCH FOR CLINICAL EVIDENCE OF NUTRITIONAL DEFICIENCY

Although some cases had been labelled scurvy, none had hæmorrhages into the skin or from mucous membranes other than gums, and follicular hyperkeratosis was not found. Fatigue and malaise were infrequent, even with active mouth infections, and ascorbic acid had no apparent effect on the feeling of well-being. Appetite was seldom impaired although sore gums often interfered with mastication. One patient had absent ankle-jerks for no apparent reason, but none had tender calves, tachycardia, cardiac enlargement or œdema. One had spoon-shaped nails, which, however, were not brittle, and there was no anæmia. Two patients with Vincent's infection had excoriation at the angles of the mouth, but no other signs to suggest riboflavin deficiency; a high vitamin regime was without effect on the condition. Denuded tongue papillæ or other mucosal or skin changes suggestive of incipient pellagra were not encountered.

Capillary resistance tests by a positive-pressure method gave normal results in the 49 cases tested. None of the 51 patients, to most of whom direct inquiries were made, complained of defective night vision. Four other cases without gingivitis but with subjective night blindness were also investigated, using a Rowett Adaptometer. Intensive treatment with vitamin A and C was ineffective in the 3 patients able to cooperate, so that factors other than nutritional deficiency may have been responsible for their symptoms.

About half the cases had occasional slight fever, from 99° to 99.9° F., but general symptoms were slight even with severe ulceromembranous stomatitis. In 26 cases hæmoglobin (Sahli-Leitz; 100% = 13.8 g. per 100 c.cm.) ranged from 82% to 120%; red blood-cells from 4.32 to 5.98 million per c.mm.; white blood-cells from 7500 to 13,600 per c.mm.; differential counts not remarkable.

#### CONDITION OF MOUTH AND PHARYNX

Vincent's organisms were found in gum smears of all but one patient, although probably not more than 43 of these cases could justly be described as Vincent's infection of the gums. In some the picture had been obscured by treatment given before admission. In 32 cases, however, the clinical and bacteriological evidence of ulceromembranous stomatitis (Vincent's infection) was clear cut: ulceration of the gum margins, often with a straight edge, usually covered with a greenish-grey "membrane" of debris and Vincent's organisms; redness, often patchy, usually more marked at the gum margins; sometimes swelling, general or marginal; perhaps a fine white membranous exudate on the body of the gums; a characteristic metallic odour; and numerous Vincent's organisms in gum smears.† The mouth was usually abnormal in other respects—e.g., subgingival calculus, excess of food debris, gross caries.

In 15 cases of Vincent's infection one or both retromolar areas was severely affected, perhaps because there had been stagnation in pockets in the third molar region. Pain and swelling of the jaw, cervical adenitis and pain in the throat were common; ulceration often extended to the cheek. In 14 cases the chief site was the incisor canine region; here periodontitis with recession of the gums was sometimes observed. Five had fusospirochætal ulceration of one tonsil

† In text and charts, "Vincent's organisms numerous" indicates that both fusiform bacilli and spirochetes were numerous. Cocci were usually abundant, but leucocytes few; there is little tissue reaction in this ulceromembranous "necrotic" gingivitis (Smith 1932).

starting either before or after the gum condition. In several the tonsils, although not ulcerated, were sore and red and yielded numerous Vincent's organisms.

In 8 cases the picture was not typical ulceromembranous stomatitis and there was little ulceration. In one case smears were negative for Vincent's infection, and in 7 others Vincent's organisms were often scanty or found only after repeated tests. In some, the part played by debris, calculus, &c., was obvious. In others, the diagnosis became clear only after observation and therapeutic tests. Two patients were receiving novarsenobenzol for syphilis.

In only 3 cases (see below) did appearances recall the classical picture of scorbutic gums, which, however, is often "atypical" even in frank scurvy. The possibility was considered that vitamin-C deficiency short of scurvy might predispose to gingivitis, even ulcerative types.

#### THERAPEUTIC TESTS

Therapeutic tests were carefully controlled; diets were weighed, and unless specified no mouth washes or other local measures were permitted. Under standard illumination, after 2-3 hours in which no hot food or drink and no local measures were given, the redness of the body and margin of the gums in six areas was matched against a standard set of colours, painted on celluloid strips, and graded from 0 (normal colour) to 10 (intensely red). This permitted an estimate of "total redness," which, with other findings such as ulceration, was used to follow progress (see figure). Ascorbic acid, 300 to 700 mg. per day, was given without local measures to 13 patients of whom 9 had ulceromembranous stomatitis. Improvement was slight in 1 case and moderate in 2 others. The remaining 10 patients, some of whom received other vitamins beside ascorbic acid, failed to improve although subsequent local measures were effective. Of the 3 patients whose gums recalled the classical picture of scurvy 2 did not improve with ascorbic acid † and were certainly not scorbutic; the third improved slightly. All 3 subsequently responded to local measures.

Ascorbic acid and other vitamin supplements did not appear to enhance or accelerate the response to local measures. In 6 patients given a diet low in vitamin C local treatment was no less rapidly effective than in 14 patients who first received vitamin supplements. Relapses, frequent in ulceromembranous stomatitis, were not prevented by vitamin supplements.

In addition to the observations made on 51 hospital patients, 11 unselected healthy ratings from a trawler were examined. All failed to excrete significantly increased amounts of vitamin C after test doses of 700 mg. of ascorbic acid. None had clinical evidence of scurvy, and capillary-resistance tests gave normal results. Dieters suggested that 2 had daily intakes as low as 8 mg. and 20 mg.—in each case the result of food fads. Minor gingival abnormalities were present in nearly all, but in these 2 cases gums bled on pressure and when the teeth were brushed. Ascorbic acid, 700 mg. daily, continued long after saturation had occurred, did not influence the bleeding. Mouth-breathing, subgingival calculus and dirt were probably responsible for the gingivitis, which was marginal and in one case hypertrophic.

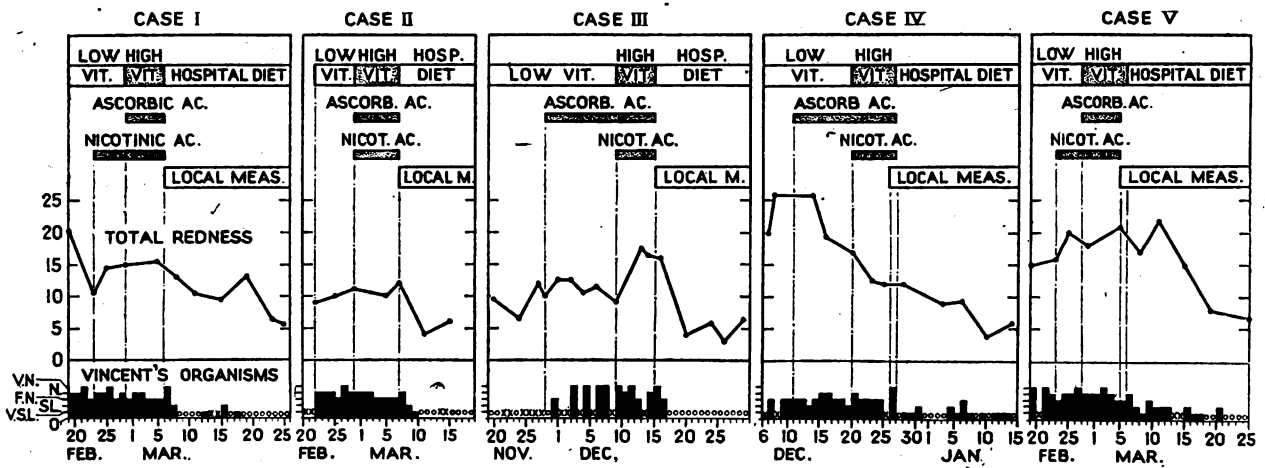
#### DISCUSSION

Two questions may be considered. The first is whether the men were suffering from vitamin-C deficiency. Four levels of vitamin-C nutrition are recognised: tissue saturation; unsaturation without symptoms or signs of vitamin-C deficiency; a state bordering on scurvy, with lassitude, pains in the limbs and perhaps follicular hyperkeratosis; and frank scurvy. There were only 4 men whose average daily intake of ascorbic acid was assessed as low as 16-19 mg. per day, compared with the reported minimum of 15 mg. needed to protect the average adult from scurvy and to keep him in good health † (Fox et al. 1940). Most of the diets were estimated

† In adult scurvy, by contrast, gingival and other lesions improve remarkably within a week after ascorbic acid, even in doses as small as 50 mg. daily. Saturation is not necessary for clinical cure (unpublished observations 1939; see also Ralli and Sherry 1941).

‡ Some workers believe that larger amounts are needed for health. Needs are related to body-weight, but even more to metabolic activity, being increased by hard work and in some infections. If for no other reason than to provide a margin of safety, an intake of at least 30 mg. a day is desirable.





Progress charts in patients with sore and bleeding gums. Arbitrary figures for "total redness" (see text) were based on the degree of redness of body and margin of gums in comparison with normal gum colour. VN = both fusiform bacilli and spirochetes very numerous in stained smears from gums; N = numerous; FN = fairly numerous; SI = slight; VSI = very slight; O = one or both types of organism absent from smears; X = no smears examined.

"Low vitamin diet," chiefly low in vitamin C, contained (in oz. before cooking): milk 6, butter 2.5, cheese 1.5, macaroni 2.5, cod 6, polished rice 4, and unlimited white bread, biscuits, sugar and golden syrup.

High vitamin diet\* provided liberal amounts of potatoes, cabbage and other vegetables, and available fresh and tinned fruit, wholemeal bread, beef, bacon, cod, cheese, milk, butter, eggs; also supplements of ascorbic acid 300-700 mg., nicotinic acid 500 mg., halibut liver oil = 70,000 IU vitamin A, wheat germ ("Bemax") 60 g., estimated to supply vitamin B<sub>1</sub> 2-3 mg., riboflavin 1.8 mg., vitamin B<sub>6</sub>, vitamin E and iron.

Where indicated ascorbic acid was given in doses of 700 mg. daily, and nicotinic acid in divided doses of 500 mg. daily.

to contain more than double this amount. The men were certainly not saturated.\*\* On the other hand, they showed no evidence of scurvy or of a state bordering on scurvy, and ascorbic acid had no apparent effect on their feeling of well-being. In levels of intake and degree of unsaturation they resembled healthy Naval ratings and civilians tested simultaneously. Presumably both patients and controls were at the intermediate level of vitamin-C nutrition—unsaturation without vitamin-C deficiency—which is compatible with perfect health.

The second question is whether subsistence at this intermediate level of vitamin-C nutrition predisposed to gingival disease. It has yet to be proved that gingivitis can arise from degrees of vitamin-C deficiency short of frank scurvy. Even frank scurvy is not necessarily associated with gum changes (see Crandon, Lund and Dill 1940). Roff and Glazebrook (1940) found, in young Naval trainees, a "gingivo-stomatitis" which cleared up with ascorbic acid, but nothing corresponding to their description was seen in this study. Campbell and Cook (1941) reported successful results with ascorbic acid in 14 civilian outpatients, whose gingivitis could in no case be attributed to trauma, drugs or calculus. Later (1942) they distinguished between simple and ulcerative (fusospirochætal) gingivitis, claiming that both types benefited from ascorbic acid, along with local measures. The present study, carefully controlled in hospital and approaching the problem from several angles, provides no evidence of a relation between gingivitis and intermediate levels of vitamin-C nutrition. Local causes—infection, calculus, &c.—were sufficient to account for soreness and bleeding. Ascorbic acid alone was therapeutically ineffective and did not appear to enhance the effect of local measures. Herlitz (1939), in a carefully controlled study in Swedish children, likewise found no connexion between gingivitis and vitamin-C subnutrition.

The alleged relationship between Vincent's stomatitis and nicotinic-acid deficiency (King 1940) was also considered. The cases occurred in a community where

Case 1.—Ulceromembranous stomatitis. Treatment with ascorbic acid, nicotinic acid and other vitamins was without effect. With local measures smears rapidly became bacteriologically negative and the gums gradually approached normal colour.

Case 2.—Ulceromembranous stomatitis. Vitamin therapy had no influence on "total redness" or number of Vincent's organisms, whereas local treatment was rapidly effective.

Case 3.—Diffuse gingivitis which later showed characteristics of ulceromembranous stomatitis. Ascorbic acid, nicotinic acid and other vitamins were ineffective, and the condition became rather worse. Local measures were rapidly effective.

Case 4.—Ulceromembranous stomatitis. Considerable decrease in gum redness but no effect on number of Vincent's organisms following ascorbic acid, later combined with nicotinic acid and other vitamins. With local measures further improvement and decrease in number of Vincent's organisms in gum smears.

Case 5.—Severe ulceromembranous stomatitis. No improvement with ascorbic acid, nicotinic acid or other vitamins. Fairly prompt response to local measures.

pellagra is unknown; dietary surveys gave no indication of low nicotinic-acid intake; clinical findings afforded no justification for suspecting impaired absorption of nicotinic acid; no denudation of tongue papillæ or skin and mucosal changes suggestive of incipient pellagra were ever observed. Nicotinic acid, 500 mg. daily, without local treatment, caused no improvement in 8 cases of gingivitis, of which 6 had typical ulceromembranous stomatitis. In 6 controls receiving low vitamin diet, local measures were as rapidly effective as in 14 patients who first received a high vitamin diet and nicotinic acid. Intensive treatment with nicotinic acid and other vitamins failed to prevent early and severe relapse of ulceromembranous stomatitis in a patient whose mouth condition had been rendered apparently normal by local measures. In this series, at least, no relationship between Vincent's stomatitis and nicotinic acid deficiency could be demonstrated.

SUMMARY

In 51 Naval patients with sore and bleeding gums, often labelled scorbutic, the average daily intake of ascorbic acid estimated from dietaries ranged from 16 to 80 mg. (average 37 mg.) They were "unsaturated," but no more so than healthy controls. Clinical evidence of scurvy or "subscurvy" was absent. Local causes—infections, calculus, &c.—were sufficient to account for the gum condition, and ascorbic acid was therapeutically ineffective. In this series vitamin-C deficiency was not a prime cause of sore and bleeding gums.

About 85% of the cases had Vincent's stomatitis. No relation to nicotinic-acid deficiency could be demonstrated.

Acknowledgements are due to Surgeon Rear-Admiral H. E. R. Stephens for permission to carry out this work, to my Naval medical colleagues at the hospital, and to many others for help and advice.

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\*\* To maintain full saturation with plasma levels of 1 mg. per 100 c.c.m. or over requires in an adult a daily intake of at least 100 mg. (Bryan et al. 1941, Rall and Sherry 1941). Unfortunately the three levels short of saturation (see above) cannot be distinguished by ascorbic acid determinations in urine and plasma, before or after test doses; low values may reflect a previous low intake of ascorbic acid, but they cannot show that a person is any the worse for it (Fox et al. 1940).

## QUARANTINE IN GENERAL HOSPITALS\*

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QUARANTINE is the restriction on the movements of "healthy" contacts and should be distinguished from isolation of infectious cases. Too many variable factors must be considered in each case to allow hard and fast rules for quarantine to be formulated. The tendency today is away from such rigid quarantine measures as the closure of a ward to all admissions, the suspension of all discharges and the exclusion of visitors after the appearance of a single case of infectious disease. The trend of quarantine practice is evident outside hospitals. In the last edition of the MOSA Code<sup>1</sup> for the control of infectious diseases in public and preparatory schools quarantine is recommended for one disease only—smallpox. In all other diseases contacts are allowed to mix with their schoolfellows providing they are kept under medical observation. Approval has recently been given<sup>2</sup> to a similar but modified procedure for day schools. It is claimed that in this way new cases are detected earlier and contacts of school age are less likely to infect their younger siblings of preschool age in whom infectious diseases are apt to be more serious. Among the first to dispense with quarantine for adult contacts was the Post Office.<sup>3</sup> With an experience extending over many years its medical officers found that the number of home contacts allowed to continue working who subsequently developed the disease to which they had been exposed was so small as to be negligible; and they gave rise to no secondary cases among their work-mates. By allowing them to carry on many man-years of labour were saved. Since the war the practice has been adopted by the Civil Service, by school authorities for their teachers, and in many large works.

In hospital, quarantine cannot be divorced from other measures of control. In deciding what course to adopt the first consideration is the seriousness of the disease and its degree of infectivity. Smallpox is both highly infectious and dangerous; the most rigid measures are necessary and obviously quarantine must be strict. Chickenpox, although highly infectious, is a trivial ailment, but some measure of quarantine is usually desirable for administrative reasons. The necessity arises because the disease has a rash, for despite all modern knowledge of the harmlessness of most rashes their very presence alarms both administrators and laymen alike. Compare chickenpox with another disease which is just as infectious and more dangerous yet for which no-one imposes quarantine—the common cold. We allow colds to run rampant for two reasons. The first is the absence of a rash; imagine the consternation if every one who caught a cold developed a brilliant erythema. The second reason is the magnitude of the problem; the disease spreads so widely and rapidly that we could not isolate all cases, and quarantine would completely disorganise hospital work. A good example of our irrational practice of quarantine is provided by scarlet fever. In every outbreak a proportion of those infected suffer not from scarlet fever but from acute tonsillitis. There is no essential difference between the two, for the same organism is responsible for both;

\* Opening paper of a discussion at the London branch of the Medical Superintendents Society, Dec. 12, 1942. This paper represents the personal views of the author and no official significance must be attached to them.

1. Medical Officers of Schools Association: A Code of Rules for the Prevention of Communicable Diseases in Schools, London, 1940.
2. Ministry of Health and Board of Education: Memo on closure of and exclusion from school. Addendum on exclusion, London, 1942.
3. Scott, W. L. *Lancet* 1941, ii, 739. Leading article, *Ibid.*, p. 733.

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the rash is merely evidence of sensitivity of the skin to the erythrogenic toxin. As far as infectivity is concerned they are equally dangerous, for the nasopharynx not the skin is the source of infection. Yet how often do those who quarantine for scarlet fever do so for acute tonsillitis?

By contrast with such virus diseases as smallpox and chickenpox, bacterial diseases such as diphtheria and whooping-cough are not very infectious although both are dangerous. Scarlet fever is neither highly infectious nor, in these days, very dangerous. Mumps is even less troublesome. Rubella, which is mild, is not readily transmitted. Poliomyelitis is an example of a disease in which infectivity of the organism is high but the number of clinical cases which result from widespread infection is low; case to case spread is so rare as to be of little significance. Since ingestive diseases such as enteric fever and inoculation diseases such as erysipelas are readily controlled quarantine is rarely necessary for them.

After consideration of the disease itself, the next question requiring attention is whether the patient who developed the disease was incubating it at the time of admission or acquired it in hospital. If a patient with enteric fever was infected in hospital the source is probably still operative. Measures for controlling spread must include a thorough search for the source as well as the imposition of quarantine. If the disease was incubating on admission quarantine is rarely necessary. The third consideration is the time which elapsed between the onset of the disease and the removal of the case from the ward. The longer an infectious patient is allowed to remain in a ward the more opportunity is there for the transfer of infection to contacts and the greater the precautions necessary. The susceptibility of ward contacts is the fourth—and a most important—consideration. The appearance of a case of measles in a ward of young children demands extensive measures of control, whereas in a ward of adults, almost all of whom can be presumed immune, ward routine need be much less disturbed. The fifth factor to be taken into account is the magnitude of the ward outbreak. Obviously different procedures will be necessary on the occurrence of a single case of nasal diphtheria and the appearance of an outbreak involving a large number of patients. The sixth and last consideration is the prevalence of the disease in the general population. A single case of cerebrospinal fever, poliomyelitis or influenza appearing sporadically as a rule entails no quarantine, but if an epidemic is prevalent it may be wiser to impose restrictions on the movement of contacts and on admissions to the ward.

So far I have considered quarantine and other measures of control chiefly from the medical aspect—from the point of view of the patient who is, or may become, a contact. There are other aspects—administrative and legal—which influence practice enormously. Clinical knowledge and administrative procedure should go hand in hand, but in fact administration lags far behind new knowledge. As long as the administrator feels he may be blamed by his seniors or the law he will play for safety and not adopt new practices which may be regarded as lax. Clinicians with special knowledge of this subject must therefore not hesitate to make emphatic pronouncements, to demand administrative backing for new methods and to insist that the law must fall into line with medical knowledge. This does not mean that official blessing is expected for the practice of taking a chance that no further cases will occur. It does mean that if careful consideration is given to the factors mentioned a decision not to impose quarantine may be right and proper, despite the occasional occurrence of other cases. That is to say, support should be forthcoming for a considered judgment, but not for a gamble, although both may involve the same procedure. A sense of realism must pervade practice, and at no time is this more important than in war when unnecessary quarantine means waste of time, money and accommodation.

## GENERAL PRINCIPLES

Clearly no definite rules for quarantine can be given even for a single disease, but some general principles are worth mentioning. Known immunes should never

be quarantined; this practice will save administrators and patients much trouble. The state of immunity may be determined from the history (not always a reliable guide), from tests when they are available (e.g., Schick and Dick), and from objective evidence such as scars of chickenpox. If the state of immunity cannot be determined it is reasonable to assume that most adults are immune, but children must be regarded as susceptible. In general, quarantine should not be imposed in adult wards for a solitary case of a common infectious disease. For all wards, particularly adult, degrees of quarantine may be imposed. Such partial measures are the kernel of modern practice. They may involve partial or complete suspension of admissions without interference with discharges, or vice versa. They cannot be carried out safely unless there has been a complete survey of the ward and certain obligatory rules for control have been followed, such as the immediate removal of definite cases, isolation and investigation of doubtful ones, clinical examination of contacts to detect missed cases and carriers, an inquiry into the state of immunity of contacts and a twice daily examination of susceptibles to pick out new cases at the earliest possible moment. Full quarantine is then rarely necessary.

In discharging from wards in partial quarantine the procedure must vary according to circumstances. Sometimes the administrator must refuse to accept responsibility for contacts who want to leave, but often he can safely let them go or send them out himself. For example, I would not impose quarantine on child contacts of a solitary case of whooping-cough or vulvovaginitis detected early and removed from the ward. As regards admissions, children who are immune to the disease for which the ward is in quarantine can safely be admitted. Rarely may it be necessary to suspend all admissions. Sometimes the restrictions may be limited to certain age-groups—for instance, I would prefer not to admit children under 2 years of age into a ward in which a solitary case of gastroenteritis had appeared until I was sure no secondary cases would occur. Visiting of wards in quarantine by children under 16 should always be prohibited; while some restriction on adult visitors is also desirable to minimise the transfer of infection, it should be remembered that prohibition of visiting may inflict psychological trauma, not so much on the child as on the parent.

My chief point, then, is this: if, on the appearance of a case of infectious disease in a ward, careful investigations are made and consideration is given to the factors enumerated, it will often be right and proper to impose no quarantine or a limited form only, with consequent minimal disorganisation of the procedure for the admission and discharge of patients.

**QUARANTINE OF CONTACTS**

A WASTE OF TIME AT SCHOOLS

R. E. SMITH, M B CAMB, F R C P  
MEDICAL OFFICER TO RUGBY SCHOOL\*

In the past quarantine of contacts was generally enforced. My predecessor at Rugby, Dr. A. I. Simey, was shocked at the loss of school time caused by imposing quarantine whenever exposure to infection was suspected, and he framed our medical regulations so that boys exposed to certain infectious diseases in the holidays can return to school at the beginning of term (provided they are isolated from the source of infection as soon as this is recognised).

Today we require, no quarantine for contacts of measles, rubella, mumps, whooping-cough, chickenpox, scarlet fever or diphtheria. Between 1933 and 1939 128 boys returned to school after known contact with one of these infections, and only 2 developed the disease. The figures given in the accompanying table show that the policy has been amply repaid.

After return to school the contacts have their temperatures taken as a routine till the quarantine period is over. The two boys who developed the disease to which they

\* The figures given in this note were communicated to the section of disease in children of the Royal Society of Medicine on Jan. 22. A condensed report in these columns (Jan. 30, p. 153) gave a wrong impression of Dr. Smith's findings and conclusions, which we are glad to reproduce more fully and correctly.—ED.

had been exposed were (a) a boy who contracted whooping-cough from his sister (but this was in the summer holidays and he did not return to school), and (b) a boy with mumps who returned to school but was isolated on the first day of the disease and gave rise to no further cases. Of course, not all the time shown in the table as

Disease with which boy was in contact—	Mumps	Measles	Rubella	Whooping-cough	Chicken-pox	Scarlet fever	Total
Total contacts	33	30	18	12	15	20	123
No. with history of previous attack (or negative to intradermal test for scarlet fever)	9	24	7	9	9	10*	68
No. with history of no previous attack	24	6	11	3	6	10	60
Quarantine days usually advised	30	16	21	21	21	10	..
Days lost if all are excluded	990	480	378	252	315	200	2615
Days lost if only those are excluded who have not had clinical attack or are not negative reactors to intradermal tests	720	96	231	63	126	100	1336

\* 8 known to be Dick-negative: 2 others have been actively immunised.

"lost" is school time, but the boy himself probably resents quarantine during holidays more than he does in term time.

Infections are introduced into schools unwittingly. From 1931 to 1942 we had at Rugby 8 outbreaks of measles, 8 of mumps, 10 of rubella, 2 of whooping-cough, 14 of chickenpox, 12 of scarlet fever, and 1 of diphtheria; and, apart from the one case of mumps already mentioned, not one of the originators knew he had been in contact. This completely vindicates our regulations.

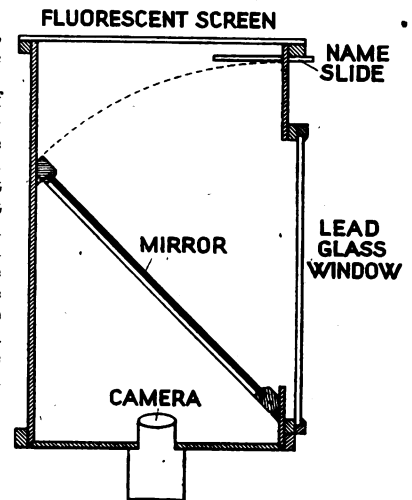
**THE PHOTOFLUOROSCOPE IN SCREEN PHOTOGRAPHY**

WLADIMIR GRIFFEL, M D VIENNA

TUBERCULOSIS OFFICER TO THE COUNTY BOROUGH OF ST. HELENS

THE excellent quality of screen photographs already obtained<sup>1</sup> justifies the hope that screen photographs will in time equal the best full-size radiograms taken with intensifying screens. The present sets for screen photography are constructed for dealing with large numbers of people at a great speed, and do not permit of routine fluoroscopy. Since I consider that screening is indispensable to a thorough radiological examination, I have tried to combine fluoroscopy with screen photography in one set.

In order to be able to observe the image on the fluorescent screen before taking a photograph I have fitted a mirror between the screen and the camera. This mirror, made of lead glass, has its reflecting surface on the side facing the screen. It is so placed that during fluoroscopy it prevents rays emitted by the screen from reaching the film in the camera. The image on the screen can be viewed through a lead glass window in the side of the box and the patient can be moved behind the screen until portions of lungs or other organs previously obscured by bones or other



1. Dormer, B. A. and Collender, K. G. *Lancet*, 1939, ii, 1026; Cranch, A. L. *Publ. Hlth, Lond.* 1940, 53, 176; Potter, H. E. *Amer. J. Roentgenol.* 1942, 47, 71.

structures are in the best position for photography. A photograph of the screen image can then be taken by moving the mirror through an angle of  $45^\circ$  so that it lies flat against the side of the box (see figure). This movement can also be utilised when transporting the film in the photographic camera and for switching over from fluoroscopy to photography. True "spot photographs" are obtained with no more delay than with any other device. The inside of the box has a non-reflecting coating which reduces to a minimum the reflection caused by the flash emitted by the screen in the moment of exposure. I suggest the name photofluoroscope for the apparatus, a name used by J. M. Bleyer,<sup>2</sup> of New York, some fifty years ago.

I have used the photofluoroscope in ordinary chest work, in controlling artificial pneumothorax refills, for bronchography, in examination of the heart and great vessels and the digestive tract after barium meals, and for stereographic work.

I wish to thank Dr. F. Hauxwell, medical officer of health, and the Health Committee of St. Helens for permission to publish this note; Mr. A. P. Statham and his staff of the Borough Engineers Department for the design of the apparatus and for the work they carried out; and Dr. H. Moore and his staff of the research laboratory of Messrs. Pilkington Brothers for providing the mirror and the non-reflecting coating.

## Reviews of Books

### Osler's Principles and Practice of Medicine

(14th ed.) H. A. CHRISTIAN, MD, FACP, emeritus professor of physic, Harvard University; physician in chief, Peter Bent Brigham Hospital. London: D. Appleton-Century Co. Pp. 1475. 45s.

THIS edition brings Osler's medicine to its fiftieth year—a half-century of rapid and continuous progress, in which the literary skill of the nineteenth-century medical writers has gradually been obscured and replaced by hard, concise scientific terminology and description. Much of Osler's original literary style remains however in this edition, and there is still a pleasant personal quality that makes it easy to read. It is wonderfully complete and its 14 hundred pages leave very little out, even though the rarities may only receive brief mention. Its form remains unchanged, but it is a striking commentary on modern medicine (for which the editor deserves full praise) that the first pages are given up to psychosomatic medicine, and the first chapter to functional diseases of the nervous system. The relationship of functional and somatic disabilities are rightly emphasised and the economic and personal factors in disease are constantly brought to the reader's notice. Much new subject matter has been introduced, and it seems that some of the old statistical data have been dropped out, with advantage. In the references American authors predominate perhaps. Descriptive clearness and general presentation are in the first class. "Osler" is a book that practitioners as well as students can use and enjoy, and the balance between pathology, diagnosis and treatment has been well kept. The almost complete absence of illustrations hardly seems to be a handicap; though occasionally they would be welcome. The indexing is good, and there can be very few occasions when "it can't be found in Osler."

### Self-Analysis

KAREN HORNEY, MD. (New York City). London: Kegan Paul. Pp. 309. 10s. 6d.

PSYCHO-ANALYSIS is here put forward as a means whereby people can, without outside help, remedy defects in their character which have interfered with happy and easy adjustment to the intricate conditions of their life. It is however made clear that treatment by a psychoanalyst is a desirable preliminary, especially if the analyst will take pains not to assume an authoritative attitude, but will make it clear that the enterprise is a coöperative one, which the patient will later be enabled to carry on by himself. In general Dr. Horney would not advise those with a severe neurosis to embark on self-analysis without a preparatory analysis of the usual kind; milder disturbances, however, can be benefited by occasional self-analysis, even though the person

concerned has little or no experience of analytical treatment. A number of illustrative cases are cited, especially that of an unhappy woman called Clare (concerning whom the reader may be forgiven for wondering whether the self-analysis really did her much good). Although the writer is much indebted to Freud, the procedure she advocates here is essentially different from his: and in its approach to "resistance" and "transference" it accords with her earlier formulation of the nature and treatment of neuroses. As in her other books, the language used is clear and mostly free from technical terms.

### Health for All

D. STARK MURRAY, MB Glasg. London: Gollancz. Pp.143. 6s.

BEFORE the war few doctors could contemplate any major change in the country's health services. Today, the pro and con of drastic changes are debated on the air while the Beveridge report assumes that a comprehensive health and rehabilitation service will be forthcoming: Doctors are therefore inquiring as to the nature of these proposals and how the profession would be affected by the suggested changes. The title "Health for All" might imply advocacy of some healing cult or panacea, but the book is in fact a clear and concise statement of how a comprehensive health service could be initiated and developed in this country. Dr. Stark Murray is well fitted for this task having, as editor of the quarterly, *Medicine Today and Tomorrow*, studied all aspects of the problem, and being in addition a member of the BMA Medical Planning Commission. He gives a reasoned statement of the present position, indicates logical lines of development, and shows how common objections can be overcome. Some ingenious diagrams contrast the complicated present system, or lack of it, with the planned services which could be achieved. The chapters on health centres and administration are particularly useful, answering the question: "How would it work in practice?" The book is unusually readable but it is a pity that there is no index.

### Preventive Inoculation

W. P. PHILLIPS, MRCS, DPH; C. W. ANDERSON, MB Glasg., DPH, deputy and assistant medical officers of health, Cardiff. London: Eyre and Spottiswoode. Pp. 74. 6s.

WITH prophylactic inoculation so much to the fore, those likely to be engaged in the immunisation of children and adults against diphtheria, pertussis, typhoid, tetanus and other preventable infections need to know the principles of active and passive immunity, the apparatus and technique required for the inoculations, and the facts to be given to the layman about the pros and cons of immunisation in any given disease. This booklet in the *Practitioner* series adequately fulfils these needs. In a second edition the authors might stress the rarity of serum reactions with modern refined sera; passive immunisation against infectious diseases could be practised more freely among family and institutional contacts. The significance of pseudo Schick-reactions, and the prime necessity of immunising the preschool child against diphtheria also need emphasis. Tetanus and typhus might have been given more space in wartime, and the arguments for and against immunisation against scarlet fever need discussion. These minor criticisms apart, practitioners and public health workers will find the little book useful.

### Diabetes Mellitus

ZOLTON T. WIRTSCHAFTER, MD, clinician i/c of the diabetes clinic, Mt. Sinai Hospital, Cleveland; MORTON KORENBERG, MD. London: Baillière, Tindall and Cox. Pp. 186. 14s.

MEDICAL books fall into one of three broad categories; practical manuals; reviews for specialists; original theses. This book cannot fairly be included in any of them; too little attention is given to treatment for it to be of any use to the practitioner; the original articles selected for discussion are not fully representative so that as a review of the subject it is neither comprehensive nor critical. The absence of any unifying conception of normal or abnormal carbohydrate metabolism prevents it, from being a contribution to our understanding of this subject.

2. Bleyer, J. M. *Electr. Engng*, N.Y. 1896. 22, 10.

## "In Cases of Climacterium Virile . . .



. . . the symptoms recorded  
consisting of

HEADACHES · SLEEPLESSNESS  
IRRITABILITY · IMPOTENCE  
DEPRESSIONS

could be completely removed by injection of 25 mgm.  
Neo-Hombreol . . . 3 to 5 times a week. . . Often  
following the second injection the patients report  
better and refreshing sleep.

The gait, previously tired and sluggish, was . . .  
much more elastic after about a week . . . the patient  
notices a decrease of fatiguability and especially,  
improved power in mounting stairs, an exercise  
usually complained of as particularly exhausting.

During the following weeks the regression of  
other symptoms is completed. Many symptoms, as  
for example, giddiness and sickness, disappear  
immediately after the start of treatment."

*J. Ment. Sc., Vol. 86, No. 364, p. 782.*

# NEO-HOMBREOL

AMPOULES — OINTMENT — MUCOSETS



## ORGANON

BRETENHAM HOUSE, LONDON, W.C.2.

TELEPHONE: TEMPLE BAR 6785 ★ TELEGRAMS: MENFORMON, RAND, LONDON

## VITAMIN THERAPY IN GASTRO-INTESTINAL DISORDERS

Considerable clinical evidence exists to show that vitamin deficiency, particularly that of the vitamin B complex, may be manifested by a variety of gastro-intestinal symptoms and abnormalities. Noteworthy among these are anorexia—one of the earliest and most constant manifestations of hypovitaminosis B—functional abnormalities such as achlorhydria and alterations in the motor activity and absorptive powers of the intestine, the “unstable colon” causing constipation or diarrhoea, and such lesions

as stomatitis, glossitis, proctitis and inflammation and atrophy of the gastric and intestinal mucosæ.

The syndrome of degeneration of the gastro-intestinal mucosa with hypochlorhydria and atony of the intestinal musculature tends to create a vicious circle leading to malabsorption, not only of the B complex, but of the other important vitamins. The concomitant anorexia still further limits the intake of the dietary factors.

### THE EFFECT OF VITAMIN B

That a high percentage of patients with functional digestive disorders are improved by the administration of a vitamin B complex concentrate, in sufficient dosage, has been shown.\* A deficiency in the vitamin B complex in such patients was suggested, not only by the satisfactory results from vitamin B therapy, but also by the demonstrations of a low excretion of aneurin. This work indicated that the effectiveness of the vitamin B concentrate

was due, not only to the aneurin or riboflavin content, but probably also in some measure to nicotinic acid.

All this is yet further confirmation of the already recognised advantages, in many cases, of prescribing vitamins, not individually, but in association with others. In this connection, two products are of particular interest to the physician, Bemax and Complevite.

\* Amer. J. Digest. Dis. 1940, 7.24.

### THE B COMPLEX IN ITS NATURAL FORM

Bemax, one of the richest natural sources at present available of the vitamin B complex, also contains vitamin A and an important amount of vitamin E. Moreover, while containing relatively little carbohydrate, it is as rich in protein as cooked beef, and its protein is of first-class biological value. For gastro-intestinal disturbances, in which vitamin B deficiency is likely to be an aetiological factor,

Bemax is suggested as the corrective agent of choice.

APPROXIMATE ANALYSIS OF BEMAX AT TIME OF MANUFACTURE

The Vitamins	The Food Constituents	The Minerals
A. 280 i.u. per ounce	Protein 34.0%*	Calcium 0.058%
B <sub>1</sub> . (aneurin) 320-420 i.u. per ounce	Digestible Carbohydrate 46.5%	Phosphorus 1.11%
B <sub>2</sub> . (riboflavin) 0.9 mg. per ounce	Fat 8.5%	Iron 0.0047%
P.P. factor (nicotinic acid) 1.1 mg. per ounce	Mineral Salts 4.5%	Copper 0.0015%
B <sub>6</sub> . (pyridoxin) 0.45 mg. per ounce	Water 5.0%	Magnesium 0.31%
E. (α-tocopherol) 7-10 mg. per ounce	Cellulose (fibre) 1.5%*	Sodium and Potassium 0.64%
		Chlorine 0.017%

\*Note the exceptionally high protein and low fibre content.

### A COMPLETE VITAMIN AND MINERAL SUPPLEMENT

Complevite is a polyvitamin product containing the vitamins A, B<sub>1</sub>, C and D in amount and proportion design to provide the optimal daily requirements of these factors. It is also rich in assimilable calcium, phosphorus, and iron so that its ingestion will definitely ensure that poor and indifferent dietaries are rendered adequate in these essential food factors. Complevite is more economical, too, than a number of different vitamin supplements, given individually.

100% = The full daily requirement

Average Dietary Deficiency

Complevite supplies, at time of manufacture, approximately

3700 i.u.	VITAMIN A 4,000 i.u.
150 i.u.	VITAMIN B <sub>1</sub> 200 i.u.
350 i.u.	VITAMIN C 400 i.u.
250 i.u.	VITAMIN D 300 i.u.
0.35 gm.	CALCIUM 0.35 gm.
0.002 gm.	IRON (available) * 0.012 gm.
0.18 gm.	PHOSPHORUS 0.55 gm.
	TRACE MINERALS

\*The iron in Complevite exceeds the calculated deficiency expressly to combat the nutritional anemia so common in children and in women of child-bearing age.

*Further particulars concerning Bemax or Complevite sent to medical men on application. Please state product in which you are interested. Vitamins Ltd. (Dept. L.X.V.), 23, Upper Mall, London, W.6.*

# THE LANCET

LONDON: SATURDAY, MARCH 27, 1943

## INDUSTRIAL HEALTH AND HOURS OF WORK

In a report on the health and welfare of women in war factories the Select Committee on National Expenditure recommended that a central advisory committee be set up to advise the Ministry of Labour and the Supply Departments on all questions of industrial health and on the coördination of medical services to meet the requirements of the war effort. The Government has lost little time in implementing this recommendation and last week we were able to give the names of a committee to be attached to the Ministry of Labour with the minister, Mr. ERNEST BEVIN, as chairman. This body represents widespread interests including employers, trade-unions, Government departments and the medical profession. The nine medical members come from general and consulting practice, the universities, the Medical Research Council and Government departments, including the Ministries of Supply and Health. The constitution of the committee augurs well for the future coördination of factory medical services with the other activities of the profession.

Mr. BEVIN has also announced that a three-day conference on industrial health is to be held in April and that representatives of the Dominions and of organisations in this country concerned with the health of the working population are to be invited. It is to be hoped that one of the first questions tackled by the new advisory committee will be that of hours of work and their influence on health and efficiency. The Chief Inspector of Factories said in his latest annual report that a good deal of time had been spent by his department trying to convince even the Supply Departments that over-long hours of work lead to decreased output from fatigue and ill health. There is no doubt that the hours worked in many factories are still too long and that holidays are too few. As a beginning we welcome the return to the salutary practice of including the preceding Saturday in the statutory Monday holidays. In her introduction to a new pamphlet by Dr. H. M. VERNON<sup>1</sup> Miss MEGAN LLOYD GEORGE refers to the persistent delusion that long hours result in increased production. We have had many opportunities of referring to the pioneer work and writings of Dr. VERNON on this subject and in his present pamphlet, published under the auspices of the British Association for Labour Legislation, he again makes a number of important points. In the first place, women, contrasted with men, have outside their factory work many demands on their energies. Shopping is much more laborious than in peace-time and the household duties especially of married women factory-workers put an extra strain on them. Yet the Government is imposing additional fire-guard duties on women between 20 and 45 years of age if they do not work for 55 hours a week. Dr. VERNON

holds that the fatigue arising from such combined hours of work and fire-guard duty, if continued over long periods, is likely to reduce efficiency, and increase liability to sickness and casual absenteeism. In the interests of production it would probably be best to keep to the ordinary provisions of the Factories Act and impose a 48-hour week with a temporary 54-hour week in times of special need. He thinks that young women of 16 and 17 years of age should seldom be called on to work more than 48 hours a week, but young men of the same ages can work efficiently on a 54-hour week. Boys and girls of 14 and 15 should be limited to 44 hours as a rule and only very exceptionally work for 48 hours. It might be interpolated that even these hours appear to be too long for growing adolescents who come straight from school, with its sensibly short hours, to the hurly-burly of factory life. With grown men a working week in excess of 60 hours does not usually lead to an increase of production and for heavy work shorter—much shorter—hours than these are advisable.

## UNEQUALLED BUT UNOBTAINABLE

THE latest clinical trial of penicillin reported from Oxford by Professor and Mrs. FLOREY on another page, though small and uncontrolled, leaves no doubt about the potential value of this bacteriostatic agent. It is effective against the common pathogens in dilutions many times greater than the sulphonamides; it is as active against staphylococci as against streptococci; it takes no account of sulphonamide-resistance (though bacteria can apparently become penicillin-resistant); and it acts in the presence of pus, serum, blood and tissue-autolysates. Above all, it is almost non-toxic, even in its present impure form, and in high concentration does not damage leucocytes or inhibit tissue growth. The FLOREYS' 15 cases treated by general administration included staphylococcal infections so advanced when penicillin was started that the outlook was hopeless by all previous standards; and yet the patients recovered. So far there has been little opportunity to show what it can do in cases with a reasonable prognosis.

Like the sulphonamides, penicillin should no doubt be given in such large doses at the outset that the bacteria have no chance to develop resistance, and its toxicity is low enough for the patient to come to no harm if a high concentration has to be maintained in his blood for a long period to overcome the infection. But so quickly is penicillin excreted by the kidney that keeping up a bacteriostatic level in the blood is like maintaining a statutory 5 inches of water in one's bath with the plug out. This, then, is a remedy which must be given generously if its full effects are to be obtained, and the penicillin available contains 90% of impurities, which for clinical use it is uneconomic to remove. Owing to its destruction by acids, administration by mouth has not proved satisfactory, even with coated capsules or a duodenal tube, but a bacteriostatic blood level can be kept up by giving large intramuscular doses 3-hourly—an unpleasant ordeal for the patient when treatment has to be continued perhaps for weeks, but injections have so far caused no local damage. The FLOREYS briefly summarise the results of local treatment in 172 infections of the eye, the mastoid, wounds and so on. The solubility and diffusibility of penicillin raised

1. Hours of Work and their influence on Health and Efficiency. British Association for Labour Legislation, London, 1943. 9d.

difficulties in the maintenance of an adequate concentration, but these were largely overcome, and the application of penicillin as powder, solution or ointment proved as strikingly successful as did general administration in systemic infections.

Here we have a substance whose therapeutic possibilities have only begun to be explored, though clinical trials started three years ago. Practitioners will wonder now, if they have not wondered before, why supplies are not yet generally available, and will be disappointed to read the FLOREYS' tailpiece holding out no prospects of the shortage being soon remedied. The best we can hope for is enough for local application not too long ahead, for a mastoid wound can be locally treated with 15,000 Oxford units, whereas a staphylococcal septicæmia may need that amount 3-hourly for weeks. The technical difficulties of large-scale manufacture have yet to be overcome and even in the laboratory much skilled work brings but a small return. The drug is highly labile—it is readily broken down by acids and alkalis, by heat, by certain heavy metals, and (most serious of all) by many bacterial enzymes which means that production must be carried out with strict asepsis. Funds for research are said to be ample, and Imperial Chemical Industries Ltd. as well as the new Therapeutic Research Corporation are tackling the outstanding problems. At the request of the Ministry of Supply, a production committee to integrate these efforts has been set up, representing the British firms interested and the Medical Research Council. American firms working on penicillin have kept the MRC informed of their findings. In the States all the penicillin made is pooled and its use is controlled by a committee; the MRC is setting up a similar controlling committee here.

While this shortage holds up progress we can still hope for a short-cut or a collateral circulation. We no longer have to depend on willow-trees for our supplies of salicylates, so why must we rely on the much more capricious *Penicillium notatum* for our penicillin? Unfortunately the synthesis of aspirin was simple compared with that of penicillin, the structure of which is only now beginning to be elucidated. Lately, Oxford workers<sup>1</sup> have obtained a substantial part of the penicillin molecule in crystalline form. This nitrogen-containing compound, penicillamine, produced by hydrolysis of penicillin, appears to be an amino-acid, but with properties very different from the known amino-acids, suggesting a relation to an amino-sugar and ascorbic acid. Another crystalline product—penillic acid—has since been produced<sup>2</sup> by acid inactivation of penicillin, and this will probably prove to be a larger part of the penicillin molecule. These are valuable steps towards the short-cut of synthesis, but early ones. The other chance is that another compound will be found which will be as upsetting to bacterial metabolism as penicillin but will be easily made. Yet this might mean the loss of what might be a triumph for British bacteriologists, chemists, drug manufacturers and clinicians. Meanwhile, however much we would like a few grammes of penicillin for an individual patient, it is right that the small amount made should go to the chemists for analysis or be pooled and used in carefully planned clinical trials under the eye of a MRC committee.

## PHYSICAL APPROACH TO THE BRAIN

IN the field of mental disorder failure to plan therapeutic experiments has led to much confusion. Insulin, leptazol, electrical convulsions, and leucotomy have come on the stage in turn, but there is still controversy about their efficacy and the indications for their use. Yet R. A. FISHER's book is fairly widely read among doctors and biologists, and experience at Rothamsted should serve as a reminder that biological experiments need to be planned. LIONEL PENROSE,<sup>1</sup> surveying with a suitable statistical technique the 1600 patients who had been given "shock treatment" in the mental hospitals of Ontario—which have an average of 16,000 patients in residence—concludes that "taking all the facts together, however, it is probably safe to assume that in consequence of the shock therapy work carried out during the years 1938–41 there were at least 100 patients fewer on the books of the Ontario hospitals during the year 1941–42 than there would have been if no such specific treatment had been given." He also found that valuable as the method is for affective psychoses in persons first admitted between the ages of 40 and 59 years, "very little support is provided for the view, formerly widely held, that shock treatment has value in schizophrenia." These moderate conclusions are in sharp contrast with the optimistic statements made about the efficacy of insulin and convulsion therapy. In any case it looks as if a planned therapeutic experiment would have made a better job of it. Perhaps the therapeutic trials committee of the Medical Research Council might be invoked.

At the Royal Medico-Psychological Association on March 10 the present status of prefrontal leucotomy was discussed. Among the psychiatrists there were differences of opinion about its value and modus operandi; among the surgeons about the technique and the risks. But there was substantial agreement that the method is still experimental, that it sometimes produces dramatic improvement, that in the hands of a skilled neurological surgeon it is not attended with great risk to life, and that it can have by no means negligible ill effects. Dr. ROLF STRÖM-OLSEN gave a candid account of clinical findings which were not reassuring as to the wide applicability of the method. Mr. F. W. WILLWAY and Mr. WYLIE MCKISSOCK described their respective surgical techniques, and Mr. MCKISSOCK pointed out that epilepsy, aphasia and incontinence of urine were complications that could not be dismissed as trifling in comparison with the mental illness. Dr. F. L. GOLLA drew comparisons between the tissue damage in electrical convulsion therapy and that in prefrontal leucotomy, and he deprecated the static conception of cerebral function that sees in this operation nothing but an irremediable trauma. Other surgeons and other psychiatrists contributed to a discussion which sometimes intentionally and sometimes by implication underlined the vagueness of the indications and the dubiety of the rationale and results. Psychological tests may be used to decide if there is deterioration after the operation.

In our last issue Dr. HUTTON reported on 50 patients treated by the method and was able to point to many

1. Abraham, E. P., Chain, E., Baker, W. and Robinson, R. *Nature*, Lond. Jan. 23, 1943, p. 107.

2. Duffin, W. M. and Smith, S. *Ibid*, Feb. 27, 1943, p. 251.

1. Further Report on the 1938–1941 Shock Treated Cases in the Ontario Hospitals. Prepared by the Division of Statistics, Ontario Department of Health, January, 1943.



encouraging features; the patients were selected as having poor prognosis, yet the outcome was satisfactory in a considerable proportion—they are back at work, or their distress of mind has been alleviated and their conduct bettered. Similarly Dr. FLEMING and Mr. McKISOCK report that of 12 melancholics with a good prognosis 7 have recovered completely since the operation, and another has shown considerable improvement. It would seem from these and other reports that affective disorders, in which the prognosis is in any case on the average good, may do well, but that typical schizophrenics, especially of the "nuclear" type, do not profit by it as a rule.

## Annotations

### SIR JOHN LEDINGHAM'S RETIREMENT

At the end of this month Sir John Ledingham, FRS, will hand over the directorship of the Lister Institute to Dr. A. N. Drury, FRS. He thus concludes an uninterrupted period of service which began in August, 1905, with his appointment under the late Dr. George Dean to the staff of the serum department of the institute at Elstree. In 1906 Dean was transferred as chief bacteriologist to the main institute on Chelsea Embankment with Ledingham as his assistant. Three years later Dean became professor of pathology in the University of Aberdeen, and Ledingham took his place and held it until his appointment as director in January, 1931, in succession to Sir Charles Martin, FRS.

During his tenure of one of the most responsible research posts in the domain of preventive medicine in this country, Sir John has proved himself not only a capable administrator and supervisor of research in his chosen fields but also an active experimentalist in microbiology. Before the war of 1914-18 he was chiefly occupied in serological studies—such, for example, as those on the mechanism of phagocytosis—and in investigations on the bacteriological and epidemiological aspects of the typhoid carrier, a subject to which he was one of the first British contributors. He has always been keenly interested in experimental hæmatology, and in 1914 he opened a new line of inquiry by finding that a serum prepared by immunising with blood-platelets was capable, on injection into the animal species providing them, of producing a condition closely resembling purpura hæmorrhagica in man. In the interval between the two wars fundamental studies on viruses and virus diseases engaged his attention. With the aid of the high-speed centrifuges then available he was able to obtain pure suspensions of the virus bodies of vaccinia and fowl-pox and to prove that these minute elements were in truth the ætiological agents. Later he studied the morphology and the conditions of growth of the curiously diverse forms of a group of organisms whose exact relationship is hard to define and which are represented by the causal agent of pleuropneumonia of cattle.

As chief bacteriologist and director, Sir John has taken part in establishing and in fostering the activities of the National Collection of Type Cultures; he took steps to create a department of biophysics in the institute through the provision by the Rockefeller Foundation of the Svedberg high-speed centrifuge and electrophoresis equipment; and he has witnessed the steady growth of the various research divisions, and the early stages of new and important additions to knowledge in bacterial chemistry, protein chemistry and the application of efficient bacterial antigens as prophylactic agents. He has taken his full share of the work of expert committees under the former Local Government Board, the Ministry of Health, the London County Council, and the Medical Research Council. The encyclopædic *System of Bacteriology* sponsored by the latter body owes much of its value

to his editorial care and skill and to his own contributions and those of the members of his staff.

Sir John Ledingham's friends and former colleagues whose work has benefited by his sound advice and helpful suggestions will wish him a pleasant retirement with opportunities for continuing the researches to which he has unsparingly devoted his active life.

### CANCER TREATMENT IN SOUTH WALES

BEFORE the war a scheme had received general approval to provide for the treatment of cancer in South Wales and Monmouth in fulfilment of the Cancer Act 1939. There was to be a radiotherapeutic institute at Cardiff Royal Infirmary, with 52 beds and all services; for this the architect's plans had been prepared, the necessary staff decided on and the cost estimated. The war naturally caused delay, and the "appointed day" under the act was put off from year to year. Now, however, an attempt is being made to bring the scheme into being, a temporary building has been provided at Whitechurch EMS Hospital, near Cardiff, and its therapy apparatus is due. Members of the National Radium Commission lately visited this building and conferred with the committee of the radium centre, and later with representatives of local authorities and others. There was unanimity about the urgency of proceeding with the scheme as far as the war allows, and the three voluntary hospitals and eleven local authorities involved—those of Newport, Cardiff, Swansea, Merthyr and seven county councils—are considering details. The local authorities have agreed to report quickly to the Welsh Board of Health, and the temporary building is to be enlarged. The first appointment made will be that of a full-time radiotherapist of high professional status.

### BLOOD OXYGEN LEVELS AFTER BIRTH

It is generally agreed that at birth the arterial blood of the baby, as measured in the umbilical vein blood, is saturated only to about 50% of its oxygen-carrying capacity, whereas in the adult the corresponding figure is about 95%. There has been little evidence of how quickly the newborn baby achieves the "adult" level and yet this change is one of the most essential adjustments of the neonatal period. C. A. Smith and E. Kaplan have endeavoured to supply this evidence<sup>1</sup> working with a method whereby blood taken under oil from the infant's heel was used, a method shown to give results practically identical with arterial puncture and requiring only 0.2 c.cm. of blood. A series of 36 normal infants in the Boston Lying-in-Hospital were investigated at intervals of 8 hours to 14 days; in another series of 31 infants the oxygen content of the blood in the umbilical arteries and vein at birth was measured, and at short intervals afterwards 2, 3 or 4 further specimens were obtained from the heel—the first usually at about 30 minutes but in some at 15 minutes or sooner after birth. In some instances, too, X-ray examinations were made to check the degree of expansion of the lungs. The first point that emerges from this work is that with the group of infants in the first 2 weeks of life the neonatal blood was fairly well oxygenated. The average for the whole 36 was 93%, and the range 82 to 100%. Of the whole series 23 (64%) had arterial (i.e. cutaneous) blood with an oxygen level as high as or higher than the lowest adult level. In the second series, with determinations made during the first hour, 12.8% of samples were within the normal adult range. In the second hour the percentage had risen to 35, and by the third hour 75% of the samples had reached adult levels. It is observed that sometimes the speed of change taking place was even visible in the increasingly red colour of the blood as it flowed during a single sampling. No consistent relationship was found between the level of the cord blood at birth and the rate of change in the

1. *Amer. J. Dis. Child.* 1942, 64, 843.

arterial blood after birth. Studies of the X-ray findings showed that satisfactory adjustment of blood oxygenation does not appear to require that the infant must entirely overcome the initial atelectasis of the lungs at birth. In a small series of premature infants oxygen saturations were generally lower than those in adults or in full term infants of comparable age with an average of 88% between birth and 20 days with a range of 75-99%. In general in the newborn period the necessary adjustment appeared to be accomplished satisfactorily and relatively rapidly, even in the presence of incomplete pulmonary expansion. The speed with which this is brought about suggests that circulatory changes after birth occur abruptly rather than gradually. The authors in fact suggest that their work offers support for the evidence adduced on X-ray examination by Barcroft and others for the sudden closing of the ductus arteriosus and foramen ovale with the first breath. They suggest in conclusion that more work is necessary along the lines indicated. If evidence is sought on the normality or abnormality of respiratory and circulatory efficiency in the newborn, particularly with reference to the effects of maternal anaesthetics or analgesics, then observations should be made on arterial (cutaneous) blood at a stated interval, say 45 minutes, after birth rather than on umbilical cord blood.

#### 2nd LIEUTENANTS, RAMC

THE profession as a whole is apt to think of the Royal Army Medical Corps as a body of doctors supplying the medical needs of the Army. Few civilians come into close contact with the work of its unqualified members, who form the large majority of the Corps and whose devotion to duty must be complementary to that of medical officers if the efficiency of the service is to be maintained. Even in commissioned ranks, however, there has long been a proportion of non-medical personnel. Senior warrant officers and non-commissioned officers of the Corps are selected from time to time to fill vacancies as lieutenants (quartermasters) and are responsible for looking after hospital equipment and medical supplies and generally for relieving medical officers of routine administrative duties in hospitals, casualty-clearing stations, field ambulances and head-quarter offices. During this war many new quartermaster officers have been appointed and this type of officer has now replaced medical officers as registrars in general hospitals and in other appointments carrying greater responsibilities and field rank. A very small number of non-medical specialist officers have also been appointed; entomologists for antimalarial work, analytical chemists in hygiene laboratories, and an occasional specialist from other allied sciences when required for some special purpose.

A new type of non-medical officer has lately been introduced to relieve medical officers of those duties in the forward areas for which a qualified doctor is not essential. These officers will be employed in CCSs and forward medical units. In field ambulances they will be in charge of stretcher-bearer sections and will assist in organising the unit for the reception and evacuation of battle casualties. In this way they will free the medical officers of routine duties and their employment will actually be in lieu of one medical officer in each unit, so that economy in doctors will be effected. The nature of their duties will call for administrative ability and powers of leadership as well as for a high standard of first-aid training. For these reasons only serving soldiers (not "only sons of soldiers" as elsewhere reported) who have proved powers of leadership and who are especially recommended by their Commanding Officer are considered for these appointments. Those selected are given special training in a field ambulance and then pass through an OCTU. Although appointed in the rank of 2nd lieutenant—

a rank new to the RAMC—these officers will normally be promoted to the rank of lieutenant after six months, and after a further period of service they will be able to gain further promotion on merit, since they will be eligible for appointments as company officers at RAMC depots and static hospitals in this country, or for administrative posts as staff-captains. Most appointments of this kind are at present filled by lieutenants (quartermasters), but the supply of these is not unlimited and by their wide experience in the Corps they are better able to relieve medical officers of the more responsible administrative duties.

The increased use of non-medical officers in the RAMC will be welcomed by the profession. It is a means of relieving qualified doctors of non-medical duties at a time when heavy demands on the profession make the full employment of professional talents more and more important.

#### "NAYLAND HALL"

ON May 1 the East Anglian Sanatorium at Nayland, near Colchester, will be taken over by the British Legion which has long been concerned with the care of tuberculous ex-Service men at Preston Hall, Aylesford, and at Douglas House, Bournemouth. The Preston Hall council are now to extend their care to women, especially those discharged from the Women's Services. It is proposed to develop at Nayland Hall courses of occupational therapy and training in industrial pursuits similar to those available for the men and to link up the activities of all three institutions under the direction of Dr. J. B. McDougall. The necessary alterations to the property will be put in hand as soon as labour and material are available. The name Nayland will keep alive the memory of that pioneer of open-air treatment Dr. Jane Walker, who founded the sanatorium in January, 1901, and was herself buried there on Nov. 19, 1938. Started for private patients, pavilions for hospital patients soon sprang up in the grounds, then a juvenile section through which 2700 children passed in 25 years, and in 1916 a section for the training of soldiers disabled by tuberculosis. It is good to remember the zeal with which "Dr. Jane" supervised the big farm and garden, and initiated occupations such as home-made jewellery which made Nayland a hive of hope and industry.

#### DEATH TO THE LOUSE

NURSES who have had a ward infested through the unwary admission of one child with pediculi capitis speak feelingly of the labour of delousing. Last year Busvine and Buxton<sup>1</sup> drew attention to the value of three drugs as speedy insecticides: 25% technical lauryl thiocyanate in a white oil; 50% lethane 384 special in similar oil; and derris cream. The expert committee on methods of eradicating the head-louse set up by the Ministry of Health have agreed that lethane is effective; and a uniform pack of medicated hair-oil with correct instructions will shortly be available at all pharmacies. Busvine and Buxton recommended a dose of 30-120 min. (2-8 c.cm.) per head, the lower dose sufficing for a child with short hair, the higher for a long-haired woman. The quantity suggested is about equal to the amount of brilliantine commonly applied, and does not make the hair look unsightly. The hair is parted with one hand, and the liquid put directly on to the scalp, with a pipette or teaspoon, at about eight different sites. It is distributed by rubbing it in with the fingers, and the hair should not be combed too much afterwards because that draws the insecticide away from the scalp. The patients in their series were told not to wash the head for ten days. Failures with any of the three drugs, used in the proportions suggested, were generally under 2% and always under 10% in patients going into a clean environment. Dr. R. J. Irving-Bell,

1. Busvine, J. R. and Buxton, P. A. *Brit. med. J.* 1942, 1, 465.

speaking to the Royal Sanitary Institute on March 13 at Bristol, set out further evidence of the effectiveness of lethane. This drug is not only lethal to lice and their eggs but gives immunity to further infestation for at least a week. It has not been found to irritate the skin of the scalp in 50% strength, though it is thought that in some people it might cause irritation of other parts of the body. Busvine and Buxton advised against its use on the scrotum. The cost is small; 35s. purchases a gallon, which is sufficient for treating 2400 heads, at less than a farthing per head. The public health department in Bristol has used it on infested heads for a year as a brilliantine in 40% strength. This is easy to apply and pleasant to use; the head is washed on the eighth day after application and the nits combed out with the help of dilute acetic acid. Treatment, to be effective, has to include the whole family, disinfestation of pillows and sheets, and inspection once a fortnight for some time afterwards. In a few cases where heads were getting reinfested a week or so after treatment the family has been given some lethane brilliantine with instructions to apply a few drops to the hair two or three times a week, in much the same way as an ordinary hair dressing is used.

The drug has also successfully destroyed vermin in Bristol air-raid shelters. It was sprayed from an atomiser, under pressure, on to all hessian coverings of bunks, their wooden frames and the walls of the shelters. Dr. Irving-Bell suggests that it would have great value in a typhus epidemic; the Bristol teams trained to deal with such an outbreak, after washing the patient with soap and water and shaving the hairy parts of his skin, will swab him down with 40% lethane. Their own protective clothing, moreover, will be sprayed with lethane inside and out before they handle a case.

#### A NEW BULLETIN

THE British Council was founded some years ago to correct a belief then current abroad that Great Britain no longer had anything substantial to offer the world, whether in art, literature, science or social experiment. It was founded, no doubt, with one eye on the incessant foreign propaganda of Nazi Germany, but its work is now much more than a means of national self-advertisement—it is a useful channel for spreading knowledge among the nations. Especially perhaps is this true of the medical bureau, originally sponsored by the British Medical Association, which has now become the Council's medical department. From this department, which is in charge of Dr. Howard Jones, abstracts of British medical papers have been circulated to medical journals throughout the more accessible parts of the world: they are sent in the language of the receiving country and they have been widely reproduced abroad. To supplement this service the Council has now begun to issue the *British Medical Bulletin* which seeks "to provide a guide to medical science and thought in Britain" and consists mainly of summaries of recently published papers grouped according to subject. The bulletin itself will not be distributed generally to the medical profession, but other journals are invited to reproduce these summaries. The address of the department is 3, Hanover Street, London, W.1.

#### EAST MIDLANDS PHYSICIANS SOCIETY

PHYSICIANS in consultant practice in the counties of Leicester, Nottingham, Derby and Lincoln are being asked by Dr. Hugh Barber to meet at the Leicester Royal Infirmary, at 11 AM on April 3, to form a society for the study and discussion of scientific hospital medical work. It is suggested that physicians and assistant physicians on the staff of hospitals in the area with not less than 150 beds shall be the foundation members, but that specialists of any kind and physicians of any address shall be eligible for election. The society is therefore

likely to include a leavening of pathologists, radiologists and such from the four counties and some physicians from the voluntary hospitals of neighbouring ones. At the inaugural meeting quarter-hour papers will be read on neurosyphilis, rheumatism, heart-block, spondylitis, Addison's disease and ocular palsies, and there will be a demonstration of clinical cases and a discussion on infective hepatitis. Dr. J. V. C. Braithwaite will preside over this pleasant adventure.

#### THE ROYAL SOCIETY

THE 20 new fellows of the Royal Society whose names we announce on p. 417, include 5 members of the medical profession and 3 close associates of medicine. Of the former, Dr. Buxton at the London School of Hygiene has repeatedly proved the value of expert entomology to the public-health officer at home and abroad. Dr. de Burgh Daly of Edinburgh is a physiologist whose special knowledge of the circulation is now being utilised in research for the War Department. Dr. Fleming of St. Mary's Hospital pursued the study of antibiotic substances at a time when their interest was generally dismissed as academic; from the discovery of lysozyme in tears he passed to the antibacterial activities of moulds and thus originated all subsequent work on penicillin and kindred substances. Dr. Wilder Penfield directs at Montreal a school of neurosurgery that has already done much to elucidate cerebral localisation and narrow the boundaries of "idiopathic" epilepsy. Dr. Zuckerman, formerly an investigator of the reproductive functions of primates, has lately become an authority on their destructive capabilities: he is anatomy professor elect at Birmingham. Of the non-medical fellows Dr. Ewins is head of the research team of Messrs. May and Baker Ltd. which produced sulphapyridine; Dr. Felix of the Lister Institute is co-author of the Weil-Felix test and author of valuable typhoid vaccines and sera; and Dr. Kon is the newly appointed research professor of chemistry at the Royal Cancer Hospital. These names well illustrate the direct (if sometimes delayed) impact of scientific investigation on medical practice.

#### HUTCHINSON'S TEETH

FORTY years ago Hutchinson's teeth were common in this country, but today there must be many doctors who have never seen them. Unfortunately, in 7-10 years' time, when this war's crop of syphilitic babies reach their second dentition, they may again be common, and it is important that the typical deformities should be recognised, since they sometimes provide the only obvious pointer to the disease. Sarnat and Shaw<sup>1</sup> of Chicago have amplified, with the help of radiograms, what Hutchinson told us in 1858. They refer especially to the confusion that may arise between Hutchinson's teeth, and teeth showing hypoplasia of the enamel caused by other diseases, such as measles and scarlet fever. In hypoplasia caused by an infection after infancy the incisal edge of the upper centrals will as a rule be fairly well formed, the hypoplasia taking place higher up the crown; though of course the incisal edge may be broken off at the band of hypoplasia. In Hutchinson's teeth, on the other hand, the infection is prenatal and it is the centre of the incisal edge that is missing. Hypoplasia caused by difficulty in feeding a newborn infant would affect the incisal edge, but would not give the peg-shaped crown characteristic of Hutchinson's teeth. Radiograms of children at birth or up to 2 or 3 years would be instructive in showing whether the change in tooth-formation coincides with the early manifestations of syphilis in other parts of the body.

1. Sarnat, B. G. and Shaw, W. G. *Amer. J. Dis. Child.* 1942, 64, 771.

MEDICAL SUPERINTENDENTS SOCIETY.—The annual meeting of this society will be held on Saturday, April 17, at 2 PM at BMA House, Tavistock Square, London, W.C.1.

## Special Articles

## MEDICAL REHABILITATION

## PLANNING FOR IMMEDIATE NEEDS

THE Government has avowed its intention of organising a unified and comprehensive health service to cover the whole range of medical needs. This intention includes "assumption B" of the Beveridge report in which it is taken for granted that rehabilitation of all the sick and injured shall be carried through till the maximum of earning capacity is restored; and the recommendations of the Tomlinson report covered disablements from all causes, not only physical injury but conditions resulting from disease. These tremendous aims were set out in an appendix<sup>1</sup> to the latter report which should be posted in every outpatient hall and every surgery in the country. They are attainable because, as we pointed out at the time, they do not imply a change of heart but only a widening of existing well-doing. They require no more than money to provide the equipment, time to train the personnel, and full recognition of remedial therapy as a branch of medicine. And whatever else can wait this rehabilitation cannot. Take the case of fractures as an example of a strictly localised lesion in an otherwise fit and healthy person. The Delevingne Committee laid bare in 1939 our lack of provision for early and complete recovery, and the position has since been only partly made good. The present shortage of man-power has underlined this easily preventable waste; further, it has shown the need for restoring every sick or injured man, woman and child to workaday efficiency as quickly as possible, for every adult is contributing in one way or another to the national effort, and time spent in attending to others is time diverted from the winning of the war.

The aim should be not only to treat the disease or injury and heal the damaged part, but at the same time to maintain the general fitness of the patient, and when convalescence is established to make good without delay the loss in strength and efficiency that has occurred. The term "medical rehabilitation" applies more especially to this making good, and the amount of restoration required must clearly depend on the skill and care with which treatment has been carried out in the earlier stages. Economically, therefore, it would be a mistake at this time of national emergency to concentrate attention solely on shortening the convalescence of serious cases requiring long periods of medical care to the neglect of the treatment, for example, of minor maladies and relatively trivial injuries.

## QUICK RETURNS

While many patients are fit for work as soon as the illness is over, others require nothing more than a breathing space at home, without special treatment, before resuming work. The need for rehabilitation is an equation between the severity of the illness or injury and the nature of the work. Rest in hospital or loafing at home will never restore some patients to fitness, especially if their work demands unusual endurance or exceptional skill. To make a soldier fit to resume military duties the War Office provide the final stages of medical rehabilitation at convalescent depots of their own. Civilians are provided for under the Emergency Hospital Scheme. Early in 1941 the Ministry of Health designated hospitals for long-term cases of injury, authorising them to provide accommodation, personnel and equipment for the rehabilitation of this type of case. During the last two years responsibility has been accepted for many other classes of patients; these provisions are now inadequate, and the Ministry is doing its utmost to expand the provision wherever possible

and to make more effective use of existing provision. Accommodation and trained staff cannot, however, be much increased now for the very reason that demands the extended use of rehabilitation—namely, the shortage of man-power—but everything that can be done within these limitations is to be done without delay. It is not a problem for the EMS alone. The civilian who has had an operation for inguinal hernia at a hospital near his home, and has been discharged as soon as he can walk about, should attend daily as an outpatient if he is to be made fit for work as soon as possible. Even where the provision of new accommodation is out of the question, much could be done even now by utilising space allocated to less important purposes. What is principally required is room for class exercises and games, indoors and out-of-doors, and for occupational therapy. If fully trained ancillary staff—masseuses, physical-training instructors and occupational therapists—are not available in ideal numbers, group treatment can save the time of the trained staff and one fully trained member can supervise a number of partially trained. A masseuse with the right personality can manage a class of men as well as the missing physical-training instructor (who by the way may sometimes be rediscovered in a rescue party or the fire service where he could render part-time duties in a nearby hospital).

## A SURVEY OF EXPEDIENTS

As a first step the Ministry of Health has decided<sup>2</sup> to conduct a detailed review of the rehabilitation measures at present carried out in the larger hospitals throughout the country, and for this purpose the hospital officers in each region and sector are to arrange visits by members of their staffs, taking with them other doctors experienced in this field of medicine and acquainted with the local hospitals. The aim is to explore by full and frank discussion with those concerned what expedients hospitals can be advised to adopt to secure the greatest possible development of rehabilitation measures under war-time conditions. The visitors will advise the authorities of hospitals (voluntary and municipal) and convalescent homes on what can be accomplished now and how to set about it. When sufficient accommodation and staff have been found for massage, class exercises, games and occupational therapy, there will remain the crucial problem of medical oversight. For the most part doctors have hitherto had little opportunity of studying this form of treatment and of learning how to prescribe it. The first essential is to find the proper chief in each hospital to direct the department and supervise treatment. It matters not whether he is physician, surgeon or expert in physical medicine, so long as he can improvise, overcome difficulties and gain the confidence of colleagues and staff. Arrangements can be made for him and his staff to visit other hospitals with departments already running smoothly and efficiently. The director will need to be in frequent consultation with his clinical colleagues on the best use to be made of the methods of treatment at his disposal; a special form has been found useful on which are printed the various methods available, from among which the physician or surgeon can choose his prescription. In the outpatient department the director will make contact through the almoner with the welfare authorities and the labour exchange.

## WORKING MODEL FOR THE FUTURE

These are emergency measures to meet a war-time need; but they are more than that, for out of them will be evolved the peace-time departments envisaged in a comprehensive health service. Hospital authorities and lay administrators will need guidance, now and after the war, on the accommodation, staffing and equipment

1. Reproduced on p. 119 of THE LANCET of Jan. 23, 1943.

2. Circular DGL 242 (March 8, 1943) to hospital and sector hospital officers.

required for these methods of treatment. Such guidance can be given only by doctors responsible for the care of patients; the more experience the medical profession can obtain, and the more interest it takes in the practical details, the better will be the guidance and the more efficient the treatment. That is the meaning of full recognition of remedial therapy as an essential part of medicine.

## BRITISH ORTHOPÆDIC ASSOCIATION

### MILITARY ORTHOPÆDICS

At a special meeting of the association in London on Feb. 27, under the presidency of Mr. G. R. GIRDLESTONE, the organisation of orthopædic sections of military hospitals in the British Isles was discussed by Major R. FURLONG, on behalf of Brigadier W. ROWLEY BRISTOW. In the Army, he said, the orthopædic department is not separate from the rest of the hospital activities like the eye and ear, nose and throat departments, but takes its place as one of the two main branches of surgery. In most military hospitals the orthopædic surgeon takes his turn on duty as surgeon-on-call, prepared to deal with the usual surgical emergencies. The fracture ward contains all the patients with fractures, irrespective of who was on duty when the patient was admitted, and it is the orthopædic surgeon's responsibility to direct or continue the treatment himself. When a patient is convalescent he is transferred to a BRCS auxiliary hospital; all of these have trained masseuses, and the bigger ones have sergeant instructors, APTC. There the orthopædic specialist visits the patients, usually weekly, with the local GP, and arranges continuity of treatment and eventual disposal. The patient returns to the parent hospital for change of plaster, X rays, &c. Normally, patients return to their units via a convalescent depot. The surgeon should then have finished treatment, and the soldier has no further need of specialist attention and only requires conversion from a patient to a soldier. The orthopædic specialist has attached to him one or more medical officers to assist with the work of the department and to learn the routine treatment and disposal of fractures and injuries. Such an officer may afterwards be posted to a field ambulance, or may be graded as a surgeon and sent to a general hospital. Occupational therapists now being appointed to military hospitals are qualified CSMMG and have done a six months' course in occupational therapy. Their work is largely diversional or recreational, for true occupational therapy has only a limited application in a military hospital. Patients requiring long-term occupational therapy for a specific purpose are transferred to command long-stay rehabilitation centres. The military orthopædic specialist confines himself to treatment which is likely to make a man fit to serve again. Patients requiring reconstructive surgery or treatment of degenerative conditions are mostly transferred to EMS orthopædic centres or dealt with by the Ministry of Pensions. It is not customary to treat soldiers with ambulatory fractures as outpatients.

The close working of orthopædic with general surgical teams was further elaborated by Lieut.-Colonel St. J. D. BUXTON, who described the organisation of the orthopædic service in the Middle East Force. The service consisted of five orthopædic centres closely co-operating with convalescent depots. Each centre worked as part of a general hospital to which it was attached, and was staffed by 2 orthopædic surgeons, a clerk, a nursing sister and orderly for the plaster room, 8 masseuses and 3 occupational-therapy workers; this was roughly the personnel required for a hospital of 1200 beds. ATS secretaries can relieve medical officers of much of the labour of note-taking. At a convalescent depot there were special facilities for physiotherapy, for physical training and for occupational therapy. At one such depot, in addition to handicraft work, bookbinding, carpentry and metal work with a forge were available. Swimming and games on the shore had proved their value. Sufficient surgical equipment was available at the hospitals, but a surgical appliance workshop had to be set up. The tradesmen employed under supervision were Italian prisoners. Ordinary accidents were responsible for much invalidism, and the orthopædic surgeon could advise

on their prevention. Serious fractures not due to gunshot wounds formed a fifth of the total injuries. Primary suture of wounds, especially those complicated by fracture, was to be avoided in the Western Desert. In Lieut.-Colonel Buxton's view foreign bodies should not necessarily be removed at forward operating centres. When amputation is carried out in the forward area the stump should be dressed with sulphanilamide powder and a loose 'Vaseline' gauze pack. A stitch or two may be useful, but closure of the wound is to be condemned. If a wound is packed in a forward area, care must be taken that this packing is loose and does not act as a plug. Limitation of change of dressings and the use of plaster-of-paris splinting were a valuable advance in the treatment of gunshot wounds of the limbs. Of 200 gunshot wounds causing fracture of the femur, the deaths at the base numbered 13 and the amputations also 13; of the deaths, 3 followed amputation. Of 273 wounds of the knee-joint, 178 were non-suppurative and 95 suppurative; 5 died from all causes and 12 amputations were carried out. Of 51 wounds of the elbow-joint, 12 were complicated by injury to one or more nerves; two arms were amputated and no death was directly due to the lesion of the joint.

Colonel E. C. CUTLER, United States Army Medical Corps, urged that there is no place in the forward areas for the limited specialist; orthopædic surgeons working there should have had adequate general surgical training also. In the modern ultra-mobile campaigns air transport still makes it possible to evacuate cases requiring special treatment early to the general hospitals, where full orthopædic facilities are available. Orthopædics, he said, has an important part to play in the application of its principles to the problems of trauma, but since something like a quarter of a young doctor's work is concerned with injuries trauma should not be made a speciality.

### SHORT PAPERS

A series of short papers were read on various clinical aspects of military orthopædics. Major FURLONG, discussing *four minor injuries*, dealt first with "Churchill finger," an injury common in tank crews, in which the tip of one or more digits is crushed by the sudden closure of the roof-flap. Conservative treatment is advisable for the lacerated finger—"sew it back however bad it looks." Satisfactory results are obtained by covering the ends of the finger by whole thickness skin-grafts with loose dressings to avoid rigid immobilisation and consequent stiffness. In fractures of the metacarpals the surgeon should regard the injury as a contusion of the hand rather than a fracture and so should pay more attention to the restoration of function in soft tissues than to the employment of splintage. Return to duty after Bennett's fracture of the base of the thumb is quicker and more satisfactory if no attempt at reduction is made. For fracture of the clavicle Major Furlong advocated auto-reduction by the soldier, employing the hips-firm-shoulders-braced-back attitude, during which a figure of eight bandage is applied over both shoulders without padding; the absence of padding ensures that the soldier keeps his shoulders back. After this the patient's whole effort should be to maintain the position actively. Early movement and return to light duty at the end of 3 weeks is the rule.

Lieut.-Colonel BUXTON reviewed the simple *method of charting for peripheral nerve injuries* employed in the advanced areas of the Middle East, complete diagnosis based on exact investigation being left until later.

Major G. PERKINS read a paper on the *surgical treatment of osteomyelitis, the result of penetrating wounds*. The osteomyelitis pursues one of five courses: (a) the inflammation may resolve and never again trouble the patient; (b) it may continue as persistent acute osteomyelitis; (c) the acute inflammation may subside leaving a sinus down to the interior of the bone; (d) it may heal but after months or years may recur; (e) there may be a persistent sinus associated with recurrent "flares" of acute inflammation in the bone. In persistent acute osteomyelitis surgery is rarely necessary for the cure of the inflammation—drainage is usually adequate because of the wound. Later amputation may be advisable either to save life or because an artificial limb will be more useful than a crippled leg, in cases with

an ununited fracture or serious unsutureable nerve lesions or soft-tissue loss. A sinus may remain because of the presence of a foreign body or sequestrum; this needs careful exposure of the cavity without excision of the track which has been opened up, removal of dead fragments, and light suture without drainage. Sequestra and foreign bodies are not always revealed radiographically, and it is often difficult to decide when inflammation has subsided enough to permit of interference. The sinus may persist from continued mild infection without sequestra. Here the object is to remove all infected bone, though this may not be entirely practicable. The obliteration of cavities is important; no more than half the circumference of the infected bone should be chiselled away, care being taken not to fracture the bone. The immediate sequel is acute inflammation of the bone that is left, and there must therefore be free drainage by light packing with paraffin soaked gauze, which should be removed as soon as a "safety valve" is no longer needed. For recurrent attacks of acute osteomyelitis Major Perkins advocated conservatism, the essential treatment being rest; surgery is not indicated unless an abscess forms, and then only if an exit for pus is necessary. A sinus with recurrent flares as a rule defies treatment. Usually there is a continuous grumbling inflammation in a bone riddled with organisms. The more serious cases in the lower extremity amply justify amputation, which should first be done through the lowest limit of healthy bone. When all sepsis has been eliminated the final amputation is done at the site of election.

Major T. T. STAMM, discussing *injuries to the knee-joint*, said that in civil practice the removal of a torn semilunar cartilage has always been regarded as one of the most satisfactory of surgical procedures, but its results in the soldier are mostly disappointing. The men themselves have come to regard the operation with increasing suspicion, and not without reason. Bad results following surgery are doubly unfortunate in the Army, for they leave the patients inefficient fighting units and may lead others to refuse operation when they could have been cured. These poor results can usually be traced to inaccurate diagnosis or mistaken judgment in immediate or postoperative treatment. In diagnosis the joint should be examined under intravenous anaesthesia. The injury most often missed is a lesion of the anterior cruciate ligament, probably the commonest of knee injuries. This may be the only lesion present; it is then nearly always possible to lock the joint and unlock it while performing the diagnostic test elaborated by Lambrinudi. All degrees of damage to the ligament are encountered, from a simple sprain to a complete rupture. It is in the cases with minor degrees of damage that mistakes may result, since the knee is held flexed by spasm of the hamstrings, which may be mistaken for locking of the joint. In late cases there are two groups of symptoms—those due to the lesion itself, a feeling of insecurity and that the knee "comes forward" suddenly when under load in the semi-flexed position, with no actual locking; and those due to slipping of one or other cartilage, usually the medial, producing momentary locking as the main feature. In spite of the symptoms no lesion of the cartilage will be found at operation in such cases. Operation may be justified where repeated attacks of locking cause severe disablement, but as a general rule it should be avoided, for the results are not good. With true cartilage tears it is important to differentiate between tears of the substance of the cartilage and peripheral detachments of the cartilage from the capsule. The former occur in the non-vascular material and therefore produce less reaction, but healing is impossible. In the latter the reaction (haemarthrosis, tenderness, &c.) will be severe, because of the vascularity and sensitivity. Thus, paradoxically, those injuries which appear more severe do best with conservative treatment and heal well, whereas the apparently less severe lesions more often require operation. In the postoperative treatment, the fact is often overlooked that removal of a cartilage completely upsets the lubricating mechanism of the joint; much longer convalescence is required than is usually allowed.—Major-General D. C. MONRO and Prof. HARRY PLATT emphasised the need for thorough investigation at the time of the first injury.—Major STAMM agreed that

patients with internal derangement of the knee should be treated like fracture cases and sent to hospital at once.

The need for early, accurate diagnosis was also stressed in a discussion of *fractures of the carpal scaphoid* by Major G. D. ROWLEY, who reviewed 450 cases. Difficulties arise from delay in diagnosis and imperfect suspension and immobilisation. Fractures in the proximal third and those with displacement of fragments appear to have a poor prognosis. It is questionable whether a graft is ever justifiable in a private soldier. Some cases with delayed unions will unite if immobilised long enough. For recent strains in old-standing lesions plaster immobilisation for 4-5 weeks will often relieve symptoms. If a soldier does not have a perfect result he will find difficulty in handling a rifle or ammunition as a member of a gun crew.—Mr. C. LAMBRINUDI brought forward important new evidence concerning the mechanics of the carpal joints in relation to displacement of the scaphoid fragments, which he showed to be associated with a minor degree of subluxation of the lunate bone. The cystic appearance seen in some fractures of the scaphoid is due to opening up of the fracture gap. Accurate reduction of all scaphoid fractures and of the intercarpal subluxation is needed before the application of plaster fixation.—Major SOTO-HALL of the US Army Medical Corps demonstrated a manoeuvre for achieving impaction. In fractures of the right scaphoid the surgeon provides counter pressure with his left hand against the lower end of the humerus with the elbow flexed, while he presses the first interosseous space of his right hand against the interosseous aspect of the patient's first metacarpal, forcing the patient's wrist into slight dorsiflexion and radial abduction. Plaster is applied in this position, including the interphalangeal joint of the thumb. Over 90% of perfect results should thus be obtained.

#### CIVIL ACCIDENT SERVICES

Mr. R. WATSON-JONES presented a report on behalf of the executive committee dealing with the future of accident services; this was approved by the association. The BMA Fracture Committee in 1935, and the Delevingne Committee in 1939, recommended the development of special fracture services based on the principles of segregation of cases and continuity of treatment and aftercare under a unified control. The comprehensive accident service of the future should embrace the treatment of soft-tissue injuries, infections of the hand, burns, tendon injuries, nerve injuries and indeed all injuries of the locomotor system. These injuries are no less incapacitating than fractures, their importance to industry is just as great, and they outnumber fractures by five or ten to one. The problem will be solved more readily by the reorganisation of accident departments of general hospitals than by the formation of special accident hospitals. The accident department must be reorganised, replanned and often rebuilt. There must be a separate organisation and even a separate entrance for accident cases. The director of the accident service should be trained in very branch of surgery, experienced in orthopaedic surgery, and specially trained in the problems of trauma. It would be inadvisable to develop "traumatology" as a new branch of surgery, or to train "traumatic surgeons" whose skill would be disseminated over the vast fields of locomotor, abdominal, thoracic, facio-maxillary, ophthalmic and cerebral surgery. Since the accident unit must provide a 24-hour service, the director must be aided by 2 first assistants, in addition to the usual resident surgical officers, house-surgeons and house-physicians. There must be full secretarial and clerical assistance, and almoners or social service personnel. Close liaison must be established with industrial medical officers in the area served by the unit. The rehabilitation of sedentary and light industrial workers can usually be completed within the hospital itself by physiotherapy, occupational therapy and recreational therapy; for the rehabilitation of more seriously injured patients who must return to heavy industry the accident service must have a special rehabilitation annexe with playing fields, swimming pools and gymnasiums. Such special centres are essentially medical units where treatment is continued by the same team, and they must remain under the same administration and surgical control as the parent hospital.

## In England Now

### A Running Commentary by Peripatetic Correspondents

CHICHESTER Cathedral stood massive and beckoning in the winter's sun and as I went into its warm echoing shade from the jostling street the centuries seemed to fold back. The choir-boys were practising in the south transept and the coloured lights from the windows, azure, ruby, old green, glowed like a hypnotist's ring. Soon I found a seat near that historic spot where in 1559 Matthew Parker was consecrated Archbishop, "through whom the episcopate of the Catholic Church descends to the Bishops of the Anglican Community." With those young lovely voices to lure one back to earlier days, to the barbaric centuries they represent in development, what a time and place to see history! Yet I don't believe the human mind works like that. During long millennia to protect us it has had to envisage opposites, to see winter in summer, danger in security, and (as many a rich mean man still shows) starvation in abundance. The most it can do is to make some rough attempt at parallelism. Actually my mind was hearing, though distantly, the strident debate in the House on 33B, which I had been reading in the *Times*. A small useful measure, to be used with rarity and only in cases of imbecile recalcitrance, like the Alexander trout fly—useful only to catch an eccentric and gaudy-minded fish—yet four hundred paid legislators squabble about it for hours of the country's time. Of course, we could get rid of VD if we cared to use the methods of the market-place. Take sulphathiazole, put it in attractive cartons, advertise and sell it everywhere under the ægis of the Minister of Health; and calomel cream with a spot of silver in it. These are almost certain remedies and preventive, if used soberly, but may fail in the presence of alcohol. That trade which—even now when food is fuel to our fight—keeps square miles under barley for its malting, half counties under hops for flavouring, and fosters still that strange barbaric code "it's manly to take drink and daring to imbibe," has much to answer for. But supposing we could thus get rid of VD, should we have ecclesiastical support? Encouraging promiscuity? Fear has always been an ally of religion, threatening sanctions. In prehistoric times the Haitian spirochæte separated from its brother yaws—a mere skin disease—settled down in the damp tropic mucous membranes, said in fact, "On man's promiscuity I shall stake my dynasty"; and centuries later it came on some Columbian's sore to ravage Europe, to lay under curse castle and cottage, to bring misery and tears beyond compute to men and the children of men, to continue through the centuries a plague. Is that an ally worthy of your creed, O Reverend Sirs? Modern man is somewhere between that beast-like form whom Nature had to tempt with urgent desire, climax, and release, and that logical being, some millennia hence, who purposefully, selectively, and under the best conditions, with the child god in his mind, will initiate life like a high priest before the altar of destiny.

That boy's voice is beautiful, but it is the beauty of asexuality, mercileis, larval. Such as we are, man has developed by sexuality, and the intenseness of it must many times—especially in his early days—have saved his phyle. Must we make a boggy of that which is our source. If there is merit in restraint—and of course there is—it is pure only if not sprung from fear. Besides, which of us would be here if it were not for promiscuity? Somewhere in all of us there is a small packet of genes that has come to us illegitimately. I know there is in me. As I go out I see a notice asking for prayer and I drop mine gratefully. O God, I thank Thee for them who made me including those but for whose sin—or perhaps carelessness—I should not be here. Amen, and so out into the glorious world and the sunlight.

One of the men in the unit to which I am attached has a stutter which is obviously of functional origin, and last week it suddenly became so bad that I set out to cure it by suggestion under 'Amytal.' With an air of great solemnity I explained to him what I intended to do and having obtained a suitable set of props to impress him with the importance of the occasion I proceeded to inject the solution into his arm. I made one bad

mistake at this point. I asked him to count backwards from two hundred in the hope that when he was fully hypnotised he would reverse and begin to count forwards. To my horror he reached zero long before the stuff I was injecting had had any effect and there was nothing for it but to ask him to begin again. He seemed to regard the request as unusual but was too polite to comment. For a short time it looked as though I might have to ask him to do it a third time but fortunately at twenty-five he began to mutter incoherently. It was now time for me to exert my hypnotic personality, if any. In a loud peremptory parade-ground voice I demanded of him his name and number, rank, home address, date of birth and his wife's maiden name. He answered without the least suggestion of a stutter. Presently I persuaded him to tell me all about his home and his personal affairs and still he spoke without the slightest trace of impediment. Sure that success was now within my grasp I persuaded him to repeat three times: "I don't stutter any more." He did it with some reluctance; and then, after a few seconds, the full realisation of what he was saying came home to him and he said "Pull the other leg. It has got bells on it." Somewhat discouraged I resumed conversation with him and once again there was no evidence of a stutter. Feeling that after all I had been successful and that my last setback had been only temporary I announced to him with all the conviction which I could muster that his stutter was now completely cured. He apparently did not hear me, with the result that I repeated the statement with what I thought was even greater emphasis. There was no doubt whether he heard me this time. He shook himself, sat up on his couch, looked me straight in the eyes and told me that I was an adjectival red-stained stranger to the truth. I packed up and went home.

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The removal of hospitals to outlying districts has not been a wholly successful experiment. Is the advantage to the patient sufficiently great to justify the increased amount of travelling imposed on their visitors? My daughter was a patient in one notable example of a hospital recently built outside the smoke-laden area. On my way I visited a friend in another part of the city and he drove me to the hospital in ten minutes; but without his car it would have taken me over an hour by the public services. There was no public vehicle available at the conclusion of the visiting hour, so I took a taxi at the cost of 3s. 6d. Visitors to patients in the general wards have to travel by two sets of vehicles which do not run in conjunction.

More recently I was a patient myself in another outlying hospital. Even with the assistance of a taxi from the station several friends were quite unable, with the best will in the world, to devote the time necessary to visit me. Visiting to these base hospitals imposes a severe burden upon relations and friends. The patients are bound to realise the fact, and that has its effect. Before any decisions are taken about building hospitals in outer areas the Ministry of Health would be well advised to refer the subject to the Ministry of Information, so that they could make a systematic inquiry through their organisation for social survey. The aim would be to obtain the opinions of patients and their friends, especially those who after spending a time in a hospital in an inner area have been transferred to an outer one. On the whole the folk who fill our hospitals take a balanced view of pros and cons, and a report on the subject might be really an informing document.

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In war-time, as at other times, difficulties arise only to be overcome; but there is one for the medical man which is not so readily remedied: the loss of the last, most useful of his domestics, his right hand in running his practice, his receptionist and maid-of-all-work. This is a much more serious deprivation than is appreciated by the powers that be, or the general public, none of whom has the slightest idea how much the doctor must depend on domestic assistance in the successful management of his practice, and the maintenance of the quality of his work. He cannot act as his own telephone boy except while indoors; nor can he be expected to answer the door-bell and keep his rooms clean and tidy, except at the expense of his service to his patients. What is the remedy? A substitute may be gaily offered—who

usually fails dismally. The correct, best remedy (if he and his wife and family are to live sanely, or to live at all) is to arrange that he lives away from his practice in the future. With the prospect of a reduced and lessening income he must consider how to reduce his establishment expenses so as to live within the narrower limits of his income. If not too firmly rooted he will do this with no bad grace but cheerfully; and it will bring him into closer contact with his colleagues. In the meantime, he must fight to keep his receptionist, a fight which he may win if he shouts loud enough and long enough. If he fails, he will have to make the best of a bad job, and so will his patients.

## Parliament

### ON THE FLOOR OF THE HOUSE

MEDICUS MP

COLONIAL debates in the House have often been rather dull and academic affairs, not well attended, discursive and inconclusive. Last week's debate was concentrated on the West Indies and had special reference to the amendment of the Jamaican constitution, to Sir Frank Stockdale's report on Welfare and Development and to the work of the Anglo-US Caribbean Commission—broadly speaking, the political, economic and international aspects of West Indian problems. The debate also reflected the House's increased interest in the scientific aspect of its work. At one time, about the lunch hour, when debates are usually sparsely attended, there were seven members of the Medical Parliamentary Committee present out of forty members, and three doctors took part in the debate out of the total of ten who were able to catch the Speaker's eye.

There was general approval of the new Jamaican constitution which represents agreement by all the main political groups in the island and carries democratic representation a long step forward. The Anglo-US Caribbean Commission is working on fishing research, medical questions and the provision of materials for the development of the plans in the Stockdale report. It is a happy example of international coöperation. Attention was centred on the Stockdale report, and Mr. de Rothschild stressed the "new point of view of the present time" that "political advance is dependent upon economic advance throughout the world."

Colonel Stanley's speech as the new colonial secretary made this clear. Indeed, difficulties in the West Indies date back to the days of the abolition of slavery, when Great Britain, content with having made a great libertarian gesture, did not make plans for the training of the ex-slaves or help the planters over the period of adjustment, but in the sacred name of Free Trade continued to import sugar from South American countries where slavery still prevailed. The Stockdale report is candid, said Colonel Stanley. It does not gloss over things which are wrong or attempt to hide faults or deficiencies. What emerges is that the Islands are densely populated; indeed, on the basis of their present capacity over populated. Yet migration, which has been tried and carefully examined, is impracticable. The Stockdale remedy is in the application of schemes involving a total expenditure on welfare of nearly £4 million. The Colonial Secretary wants more still, and Prof. A. V. Hill later spoke of needing several times this amount. The biggest share of the Stockdale schemes is for the benefit of Jamaica, where about half the population of the West Indies is concentrated and where the problems are most acute. Colonel Stanley said that "the greatest economic asset of these islands is always going to be the productivity of their own people." But in the past there has been too great a dependence upon a single-crop economy. In most places this has been sugar. What is needed is education of which there is "lamentably little," water supplies and a new medical system based on self-sufficient units for prevention and treatment and improved hospitals, and above all reliance for future development on the people of the Islands themselves.

Mr. Creech Jones thought that the picture of social and economic conditions was not too reassuring and asked "how can a reasonable income be assured to the primary

producers?" He also wondered whether the proposals in the Stockdale report were comprehensive enough to deal with "the squalor and the dreadful housing that exist in most of the West Indian Colonies. Prof. A. V. Hill has been acting as chairman of the colonial research committee at the Colonial Office, and his view may be regarded as perhaps semi-official. He defined the ultimate goal of present policy as "the development of all the Colonies, by and for their own people, as self-respecting and self-governing units within the British Commonwealth." Education in the West Indies should not necessarily follow our traditional lines, and plans for higher education should be laid now. Professor Hill quoted with approval the dictum of the report that it is no service to a boy or girl or to their country "to lead them into the ranks of the unemployed middle-class" and called attention to the work by Prof. T. H. Pear of Manchester on *The Intellectual Respectability of Muscular Skill*. But Professor Hill wanted to rouse up interest in the Colonies and proposed a perambulating mission, "perhaps with a harmonium rather than a big drum," to stir up the universities. He went on to say that disease in the West Indies "is largely the consequence of social, moral and economic conditions, due to malnutrition, poverty and lack of moral restraint," and stressed the importance of the application of research to the problems of Colonial resources, industry and agriculture. After the war more and more money would be needed for research, and at a meeting of the British Commonwealth Scientific Committee General McNaughton, president of the National Research Council for Canada, had said, "We shall hold up our heads, stick out our chests, look as bold as brass and ask for all we want and expect to get it."

Dr. Haden Guest who spoke next called the West Indies "the depressed area of the British Empire" and paid tribute to the excellence of the medical recommendations of the Stockdale report and to Sir Rupert Briercliffe's high qualifications for the post of Stockdale's medical adviser. But he thought that the Minister should draw up an order of priority in which the recommendations should be carried out. It was not so much subsidies as the creation of new wealth by the use of the labour of the West Indian population on the land of the West Indies which was needed. "The problem of the West Indies must be solved in the West Indies." Dr. Haden Guest quoted from the report by the Government Committee on Nutrition and the Colonial Empire, published in 1939, which says of Jamaica that the bad nutrition is complicated by "yaws, hookworm infection and malaria," and goes on to describe the adverse economic conditions, the poverty of the masses, their over-large families, and the high percentage of illegitimacy (71% of all births) which are the root causes of their malnutrition. The average income of 92% of the employed population in 1935 fell below 25s. a week and of 71% below 14s. But the responsibility of bringing up children mostly devolves on the mother with a wage, "intermittently earned," of 5s. a week, and these bad conditions are reflected in the infant mortality.

Dr. Haden Guest advocated as first priority the creation of a self-sufficient peasant agriculture on land leased by the Government to the West Indians, as the foundation of a general improvement in health and increase in productivity and prosperity. To erect a costly medical structure on the basis of the poverty of the West Indies would be indeed "to pass the buck" to the doctor, for the health problems of the West Indies were "insoluble without adequate nutrition."

Dr. H. B. Morgan, who was born in the West Indies, spoke with knowledge and deep feeling of these fundamental health problems. He pleaded for facilities in Great Britain for training of West Indian nurses. Leprosy, which was endemic in some of the islands, could, he declared, be abolished in a generation.

In his reply Colonel Stanley did not altogether agree with Dr. Haden Guest on the creation of new wealth. He looked to the development of exports, such as cotton, cocoa and lime-juice, as the possibility of the future. But he readily agreed that nutrition was one of the most important problems, and for children he thought it would be best dealt with by the provision of school meals. He was attracted by Dr. Morgan's suggestion for training Colonial nurses.



Although the debate ended, so much interest was shown that Colonel Stanley agreed to consider "through the usual channels" whether it could not be extended over at least part of another Parliamentary day. So perhaps Professor Hill's harmonium will not be needed after all.

### FROM THE PRESS GALLERY

#### THE MINISTER'S SPEECH

In opening the debate on the West Indies on March 16, Colonel OLIVER STANLEY, Secretary of State for the Colonies, said that the Stockdale report set out well and shortly with problems of health. The most interesting, and in some ways the most important, of the recommendations made was the suggestion of a health community system—an attempt to give the scattered rural communities the advantages of urban and populated areas. The Government had given authority for a large-scale experiment in this system in Jamaica in the parish of St. Catherine. The report on the health side also drew great attention to sanitation, hygiene and housing—one of the things unfortunately which were most affected by shortage of supplies—but something had been done with local material. The reference to sanitation, said Colonel Stanley, was interesting because it showed how interlocked were all the problems dealt with in the Stockdale report. They were dependent not upon anything which one could strictly say came under health, but upon what had been done for education and social welfare. Perhaps most important of all was water-supply, where the difficulty in importing materials had presented almost insuperable barriers to large-scale projects. Colonel Stanley was anxious that the provision of school meals should be pushed ahead as far and as fast as possible. Part of the trouble with diet in the West Indies was not so much its lack of sufficiency as its lack of balance. Certain products were available in great quantities and the danger was that feeding in the home might be unbalanced, whereas in the schools it could be made certain that a properly balanced meal was given. Summing up, Colonel Stanley emphasised that the Stockdale report and the schemes which would emerge from it depended not merely upon material products and money, but upon men and women. We could do something to help and train West Indians in this country and to provide the material background against which their work would be successful, but it was upon West Indians themselves more than anything else that the future of the islands would depend.

#### Nurses Bill

On March 17, the Minister of Health introduced the Nurses Bill, a measure to provide for the enrolment of assistant nurses for the sick, to restrict the use of the name or title of nurse, to regulate agencies for the supply of nurses for the sick and to amend the Nurses Registration Act, 1919. The measure was read a first time.

### QUESTION TIME

#### The Services and the Press

In answering a question on the censorship of letters from serving officers to the press the PRIME MINISTER quoted the Army regulation which forbids an officer or soldier to publish any military information or his views on any military subject without special authority; to prejudice questions under the consideration of superior military authority by the publication, anonymously or otherwise, of his opinion; or to take part in public in a discussion relating to orders, regulations or instructions issued by his superiors. But Mr. Churchill added that he was informed—though this was not in the regulation—that an officer or soldier can write to the press on other than military subjects without the permission of the higher authorities.—Mr. F. J. BELLENGER: That is quite contrary to the regulations.—Mr. CHURCHILL: The hon. gentleman knows better than the War Office. The position was made clear in an answer given by the Secretary of State for War on June 16, 1942. A member asked whether there was any ban in Army regulations which prevents a soldier exercising his citizen's right to write to the press on other than Army matters. To this the Secretary of State replied "No, Sir."—Mr. BELLENGER: Is the Prime Minister aware that numerous officers and other ranks, not only abroad but in this country, have been forbidden to write articles for the press? If he will consult the Secretary of State for War concerning one

editor of a newspaper who is now serving in the forces, he will find that that editor has to submit any articles which he writes before they are allowed by his superior officer.—Dr. HADEN GUEST: Is the Prime Minister not aware that the ban against serving soldiers in this country writing to the press has been interpreted so severely as to prevent medical communications being sent to the medical press on purely medical subjects?—Mr. A. BEVAN gave notice that he would raise the question again.

#### The Nurse's Pay

Mr. F. MESSER asked the Minister of Health (1) if he had considered the letter sent to him by the Middlesex Medical Society<sup>1</sup> in reference to the position of ward sisters as recommended by the Rushcliffe Committee; and if he proposed to take any action to effect some improvement, and (2) if he was aware that the recommendations of the Rushcliffe Committee relating to assistant nurses would not encourage suitable women to take up this work; and if, in view of the special position they occupied through absence of the possibility of promotion, their position could be reconsidered.—Mr. E. BROWN replied: The recommendations of the Rushcliffe Committee are the result of a full examination of the question by a committee consisting of two panels representing employers and employed. I have commended to hospital authorities these recommendations, the adoption of which will secure for the first time uniform national scales for all grades of hospital nurses. I do not propose to take any action likely to prejudice the agreement which has been reached.

Mr. MESSER: Is the Minister aware that as the most progressive public health authority is not represented on the employers' side the report in effect makes some of the workers worse off than they were before, and will he give an opportunity for the reconsideration of the matter?—Mr. E. BROWN: I could not agree with that. The individual representatives of the employers' panels and the Royal College, the trade union concerned, all agree that this is the greatest advance ever made in the history of the nursing profession.—Mr. P. W. JEWSON: What will be the estimated financial advantage to the nursing profession as a whole if the report is implemented?—Mr. E. BROWN: The total additional cost of the proposals in a full year is estimated at £2 million.

Dr. E. SUMMERSKILL: Is the Minister aware that before a ward sister attains that position she has had to work for many years and is also responsible for the training of the students, and can the Minister honestly say that £130 a year, plus £70 living-out allowance, is a fair and just remuneration?—Mr. E. BROWN: The hon. lady had better look at the report. She will see that there are figures for recommended increases in the salary of £130, rising by increments of £10 to £180, with one additional service increment of £20 after ten years' service, so that with emoluments the salary goes from £230 to £300.—Dr. SUMMERSKILL: Was there a ward sister on the Rushcliffe Committee?—Mr. E. BROWN: That is not my responsibility. The Royal College, the trade union concerned, formed the panel, and it is to them that the question should be addressed.—Mr. WILLIAM BROWN: Is it not the case that the Royal College of Nurses is in no sense whatever a trade union, and that the trade unions that represent the staffs are appalled at the character of this report?—Mr. E. BROWN: There were trade union representatives on the Rushcliffe Committee.—Mr. S. STOREY: Is it not a fact that not only were the nursing bodies represented on the committee, but the Trade Union Congress and all the local authorities were represented?—Mr. E. BROWN: That is so.—Mr. MESSER: Is it not a fact that the Middlesex county council has sent a letter to the Minister pointing out the anomalies?—Mr. E. BROWN: That may be so, but over a large scale of various grades of nurses it is perfectly simple, when long negotiations have taken place and there have been general decisions about a national standard, for any body to say that it does not agree with this, that or the other thing. I am defending what is a great advance on a national basis for the first time.

Mr. MESSER gave notice that owing to the unsatisfactory nature of the reply he would raise the matter again on the adjournment.—Mr. E. BROWN said: That will suit me.

#### Shortage of Nurses and Midwives

Sir RALPH GLYN asked the Minister of Labour whether he would consider the need of recalling from other work all nurses and midwives who were registered and certificated, in view of the great shortage of these qualified women and the consequent difficulties of local authorities who were responsible for these public services.—Mr. MALCOLM McCORQUODALE

1. See *Lancet*, March 13, p. 348.

replied: The Minister is proposing to register nurses and midwives by a special registration at an early date. The extent to which such women will be recalled from other work will depend on the advice which the Minister receives from the National Advisory Council for the Recruitment and Distribution of Nurses and Midwives.

#### Medical Grading of Soldiers

Mr. W. F. JACKSON asked the Secretary of State for War if he was satisfied with the present arrangement whereby soldiers who were medically graded downwards by a board of experts could in a short period be upgraded again by a single medical officer.—Sir JAMES GRIGG replied: A man's physical condition tends to improve as a result of Army training and in a normal case the medical officer who has watched the man at work in his unit can properly determine when a man is fit for a higher medical grading. This arrangement will, however, shortly be modified. In order to make full use of all the men available in the Army, including those of relatively low medical category, and to ensure that the duties a man carries out are, as far as possible, suited to his medical condition, Army selection centres are being instituted. Eventually all soldiers whose change of medical category entails a change of employment will pass through these centres. They will be there for a week, and will then be classified and allotted to the duties they can best perform. Men suffering from defects which can be cured will be given special remedial training. It is hoped in this way to make as many men as possible fit for combatant duties. When a change of medical grade does not entail a change of employment the present system will continue in force.

#### Spare Artificial Limbs

Sir SMEDLEY CROOKE asked the Secretary of State for Air whether he was aware that men discharged from the Royal Air Force with loss of a limb, due to an accident sustained when technically off duty, were only supplied with one artificial limb; and whether he would give instructions for a duplicate limb to be issued in such cases so that the disabled man should not be handicapped if the original limb broke down, especially having regard to the fact that the Admiralty had decided to issue duplicate limbs in similar cases.—Captain H. H. BALFOUR replied: It has recently been decided on an inter-Service basis that for the duration of the war a duplicate artificial limb may be provided for any airman discharged from the Royal Air Force who requires an artificial limb. In the case of personnel already discharged and where only one limb has been provided, a duplicate will be provided on application.

Mr. ARTHUR HENDERSON, financial secretary to the War Office, informed Sir SMEDLEY CROOKE that instructions had been issued that for the period of the war the issue of artificial limbs to soldiers suffering from non-attributable disabilities should be allowed on the same conditions as applied to soldiers suffering from attributable disabilities, but this concession did not, of course, constitute any admission of attributability in such cases.

#### Discussions on Medical Service

Mr. J. H. WOOTTON-DAVIES asked the Minister whether his conversations with the medical profession with regard to the implementation of the Beveridge report would include discussions with allied professions, such as dentists, opticians and pharmacists.—Mr. BROWN replied: Yes, and I shall make appropriate arrangements to this end.

#### Tomlinson Recommendations

Mr. ROSTRON DUCKWORTH asked the Minister of Labour if he would initiate a survey of all occupations suitable for persons with particular disabilities, including the adaptation of processes, tools and machinery, and invite the co-operation of employers' organisations.—Mr. ERNEST BEVIN replied: The necessary steps will be taken by my department to initiate a survey of this kind in accordance with the recommendation made by the Interdepartmental Committee on the Rehabilitation and Resettlement of disabled persons.

Mr. DUCKWORTH: Will the Minister now set up a register of persons handicapped in employment by effects of permanent partial service disablement and a specialised service within the employment exchange machinery to deal with the placing of disabled persons in suitable employment and with follow-up work.—Mr. BEVIN: The establishment of a register of persons handicapped by disability in obtaining or retaining suitable employment was recommended as part of the post-war scheme by the committee and preparations are being

made to give effect to this recommendation. It is not proposed to establish the register until the termination of hostilities. A specialised placing and follow-up service in the employment exchanges has been started under the interim scheme and will be developed for the purpose of dealing with the postwar problem.

#### Health Propaganda

Mr. G. C. HUTCHINSON asked the Minister how many posters in the series entitled Coughs and Sneezes Spread Diseases had been issued by his department for publication; and what had been the cost to the public of this advertising campaign.—Mr. BROWN replied: In the current campaign which began last October, 152,170 posters and vehicle bills have been issued at a total cost of £12,600.

## MEDICINE AND THE LAW

### The Encephalograph again

THE use of the electro-encephalograph at a criminal trial in England is not unknown. An instance was noted in our columns last year.<sup>1</sup> It is still, however, novel enough to attract attention in the popular press, where it may even create the impression that a foolproof automatic machine for the determination of insanity has become a forensic substitute for medical witnesses and the verdict of a jury. Last week it was employed at the trial of Derek Lees-Smith, a 20-year-old student, charged with the murder of his mother at her flat in London. The dead woman was an American. It has been stated that, when the news of her death reached the United States, instructions were sent here that one of the electro-encephalographs provided by the Rockefeller Institute should be used to test her son's brain reactions. Dr. John Hill and Dr. William Sargant gave evidence on his behalf. They knew that, before he killed his mother, he had drunk four pints of mild beer. They gave him this quantity of mild beer and observed that his sugar content was lowered. In that condition his abnormality became aggravated. Tested by the "brain-writing machine," the impulses from his brain were found to be erratic and definitely abnormal when the blood-sugar was reduced. Charts of these tests were studied by the jury when they retired to consider their verdict. They found the accused guilty of the murder of his mother, but insane at the time when he killed her. He was therefore ordered to be detained during the King's pleasure, a result which may have much the same consequences as would have followed a simple verdict of "guilty." In the latter event the execution of a capital sentence would have been improbable; under either alternative presumably he would receive treatment and supervision at an institution from which he would be released as soon as the treatment was found to be successful.

Mr. Justice Asquith explained to the jury the famous McNaghten rules which this year celebrate their centenary. Those rules, laid down by the judges in answer to questions put to them by the House of Lords after debates in March, 1843, state the evidence necessary to establish a plea of insanity. It must be proved that, at the time of committing the offence, the accused was labouring under such a defect of reason as not to know the nature and quality of his act, or, if he did know it, he did not know that what he was doing was wrong. The medical witnesses at the Old Bailey agreed that he was abnormal. They also said that, when he killed his mother, Lees-Smith knew what he was doing and he knew he was doing wrong. In view of the evidence to this effect Mr. Justice Asquith was obliged to tell the jury that he could not advise them that the McNaghten rules applied. In other words his summing up indicated a simple finding of "guilty of murder." Juries, however, do not always follow the judicial lead; nor do they have to give reasons for their decision. Their verdict of "guilty of murder but insane at the time" is not one against which the accused is likely to appeal. A reporter has written of the jurors in the Lees-Smith case as unnamed pioneers who will always be remembered in English legal history. Their fame may not be so enduring. There were brave men before Agamemnon and there have been other jurors before these who took a more lenient view than the letter of the law might perhaps have prescribed.

1. *Lancet*, 1942, II, 459.

## Letters to the Editor

### PREVENTION OF VENEREAL DISEASE

SIR,—The attitude of Dr. Shakespear Cooke and Dr. Sequeira, expressed in their criticisms of recent outspoken comments by the Archbishop of Canterbury on the subject of venereal disease and its prevention, seems to me not a little unjust, while their own views on prevention appear peculiarly narrow and unworthy of our profession at a time when it is, at long last, developing a wider interest in social obligation.

I am fully aware of the ignorance of many of the clergy on this vast and complex problem. But who is responsible for that ignorance, an ignorance which is shared by the community as a whole? Doctors, we must admit, have signally failed in their function as teachers of health, in the education of the laity (of children, adolescents, parents, teachers and others and, in war-time, of young men and women in the Services) in that simple but necessary knowledge of physiology and hygiene which might appropriately be called "natural morals." Having failed to accept their educational function, to recognise the contribution which sound biological teaching at all ages might make and the importance of providing right conditions for health, they have had to fall back (and then for the most part only in times like the present when incontinence and VD become more rife) on crude instructions in the use of the preventive packet and the ablution shed, while the Church falls back on uninformed exhortations to chastity, and the Ministry of Health is compelled by the emergency to introduce Regulation 33B and to employ the daily press to broadcast "ten plain facts."

Lack of biological teaching; lack of open, sensible discussion on sex in relation to the individual and society; the isolation of the VD problem from other problems of sexual education; failure to insist on the very high proportion of instances in which VD is acquired during phases of irresponsibility and excitement due to alcohol; failure to explain the beauty of the marital relationship and parenthood as a function of citizenship—some part of all of these must be laid at the door of our profession and our profession must take the lead in making amends for past omissions. Havelock Ellis was condemned in his earlier years for outspoken writings of sex, but those days are past and before he died he was acclaimed throughout the world as a philosopher in these matters to whom we owe a very great debt. How many practitioners, how many teachers of medical students, I wonder, have read his *Psychology of Sex* and *Sex in relation to Society*, or given serious thought to the teaching which in turn they might have given to others had they taken the trouble to inform themselves better in regard to one of our greatest problems in human betterment and social hygiene?

As in our other major problems—such as housing, nutrition, industrial fatigue and cleanliness—the education of the people, their teachers and those who govern them must play a first and essential part. We doctors have an opportunity now (to borrow a phrase from Simon's preface to his *English Sanitary Institutions*) to do some "pioneering forward . . . towards the day when statecraft and medical knowledge should sincerely take counsel together for the Health of the People." We do not assist the task if we decry the pronouncements of others who are very willing to help us and who see a moral duty in the provision of right conditions for health. The multiplication of VD clinics and the widespread issue of prophylactics are not the ultimate answer of science. They are an expression of our failure to attack the ultimate causes—social, educational and economic—of these preventable diseases.

Oxford. JOHN A. RYLE.

### MORPHIA IN OBSTETRICS

SIR,—Your annotation will not, I hope, tempt those obstetric surgeons who are beginning to do caesarean sections under local regional anaesthesia (incomparably the safest technique for both mother and baby) to use morphia preoperatively unless they so control its use as not to allow more than about 20 minutes to intervene between the dose and the delivery. Given thus, morphia

does not affect the respiration of the neonate; but if the interval is longer, experience has taught me that in a certain number of cases there occurs a state of apnoea which may be disconcertingly long, and which, though nearly always recovered from by a mature baby, may kill a premature baby from primary apnoea or—after an interval—from atelectasis or pneumonia. But even in an apparently fully recovered mature baby my paediatric colleagues would, I think, agree that there is liable to be a residuum of effects that may spoil the perfection of the baby and may contribute to infant morbidity and mortality. It is not likely, when so much human material is available for observation, that clinicians would be influenced by the interesting laboratory results you quote of the young of morphinised rabbits showing dangerous morphia-effects when born naturally but none when delivered by caesarean section. Moreover, the persistence of intra-uterine rhythmic respiratory movements of the rabbit foetus after mother-rabbit had been given great doses of morphia, though interesting, may be a false analogy; for is it not possible that these movements may not be under the same central control as true respiration and would not, therefore, be affected in the same way by morphinisation of the medulla? One would like to hear, on the last point, the opinion of that great master of the subject, Sir Joseph Barcroft.

Harley Street, W.1.

EARDLEY HOLLAND.

### ACQUIRED CHARACTERS AND INHERITANCE

SIR,—There are few circumstances that can justify a writer indulging in criticism of the manner in which an editorial article assesses his work. One such circumstance would clearly seem to be the definite evidence that the writer of the article only imperfectly acquainted himself with the work on which he passed judgment. Such evidence is my excuse for writing on the subject. In reference to the well-known squatting facets developed on tibia and astragalus you write (*Lancet*, March 13, p. 342):

These facets, Wood Jones thinks, are the response of the organism to a habit continued over many generations and are now heritable. The point is not established: we are not told what happens to the children of squatting and faceted Oriental parents who are brought up from infancy to sit on chairs.

I am tempted to wonder if the reviewer would have considered the point established had I told him what did happen, but that is beside the main point, for he continues:

In view of the capacity of the human organism to develop false joints (e.g. at the site of fractures) proof is required that these facets are not freshly developed in every individual as he learns to squat.

This is a remarkable statement. On p. 46 I have pointed out how J. A. Thomson had made exactly the same statement in 1908 and I added:

"This is the more in need of explanation since the work of Havelock Charles, from which Thomson must have gleaned his information, lays particular stress on the fact that the squatting facets are present in the Punjabi foetus by at least the 8th month of intrauterine life."

If critic after critic, during a period of over half a century, is permitted to ignore plain statements of fact and make capital out of such ignorance, it seems well-nigh useless to point out—as has been so repeatedly done—that the disconcerting postural callosities of the wart hog and of the ostrich, as well as the squatting facets of man and many other such things, are developed in embryonic life.

One of your objections to my remarks concerning hair tracts is that it is difficult to see how such things as hair tracts can have any selective value. The strength of my argument lies in this very fact: "it is their very triviality that makes them so important" (p. 92). They have no selective advantage whatever; they are not caused by selection but by use. My claim that they are produced by the oft repeated toilet of the animal's coat sounds only mildly teleological compared with the reviewer's "most plausible suggestion" that they are produced (apparently by genes) to "contribute to the efficiency of the toilet of the skin, to the removal of ectozoa and the prevention of disease."

I had fancied that I had devoted over much space (pp. 20-23) to showing that to the end of his life Charles Darwin never made up his mind if evolution had been brought about in the main by (a) the inheritance of acquired characters—use and disuse, &c., or (b) the action of "natural selection" on fortuitous variations. He appealed to both agencies at different times throughout the whole of his writings. It is therefore somewhat disconcerting to be told of "Darwinism" that "at present it still holds the field." One may well ask which item of Darwin's dual creed is implied in the term "Darwinism."

These criticisms are of questions of interpretation or of oversight: they do not involve any implication of misrepresentation. It is rather different however with the reviewer's statement: "Wood Jones frankly admits that he is encouraged in his Lamarckian views by the illogical use of orthodox teaching on natural selection to bolster up Nazi and Fascist philosophies of life." I fancied that no statement could be clearer than that on page 6 in which I stated that though present conditions had influenced the form in which the little book is presented they had nothing whatever to do with the aegis of the thesis presented in it.

Manchester.

F. WOOD JONES.

\* \* We regret our misreading of the second sentence of Prof. Wood Jones's preface, which is as disarming as the concluding sentence of his book is provocative. Writing of the modern geneticist who solves problems of heredity "by manipulating hypothetical balls—called genes" he quotes the Chinese proverb that "it is useless to speak about the sea to a frog that lives at the bottom of a well"—enough to make any reviewer forget a preface.—ED. L.

#### PLANNING AND THE MPU

SIR,—May I call your attention to the implications of the fact that the body with which the Minister proposes to hammer out the future of medicine in this country contains no representative of one of the largest medical societies in the profession—namely, the Medical Practitioners Union. This body has existed for 29 years, has from 5000-6000 members, has conducted a weekly medical journal throughout its existence, and is so far influential that many non-members of the Union have urged the BMA to come to some agreement with it, notably the group of panel committees known as group G. If it be true, as the BMA says, that "now, as perhaps never before, there is need for unity within the medical profession" and that "what is necessary now is that the medical profession should have confidence in those that will represent them in preliminary discussion" it is surely unwise to exclude a body which is certainly not without influence, and which also represents a type of organisation—that of the trade union—which is not otherwise exemplified in the profession. How can the members have any confidence in a body which excludes its leaders? I ought perhaps to make it clear that the MPU has repeatedly expressed its desire to join with other professional bodies in presenting a united front. It is clear enough that the BMA does not want to sit round one table with representatives of the MPU, and that it fears that its own prestige might be diminished by thus admitting that the MPU had any significant status in the profession. But this is still a sectional interest, however big the section claims to be, and if it is allowed to have its way the implication is that sectional interests are to be allowed to prevail against the great cause of unity in the profession. The MPU is also placed in a very difficult position by being thus excluded from any effectual share in conference with the Minister. It is obviously possible for it to ally itself with political rather than professional interests and so seek to make its opinions felt through non-professional channels. Does the profession at large really wish the MPU to be driven into this position? Or the MPU can seek to build up its own numbers by attacking the BMA policies, which would not be very difficult, and so divide the profession outside the conference room. This would give a chance to our political enemies (of whom we shall have many, unless we submit to direct municipal and political control) to take advantage of our divisions. Can we not all agree, not only that a united front is really essential

but also that it cannot possibly be obtained by excluding the MPU from the conference table? I write in all honesty as a member of that union, more anxious for the building up of a national medical service, which shall give both public and profession a fair deal, than for any sectional interest whatsoever. But I feel that the MPU ought to have at least three representatives on this committee, in proportion to its size and influence.

Sevenoaks.

GORDON WARD.

#### EARLY DIAGNOSIS OF WOUND INFECTION

SIR,—In your issue of March 20 (p. 255) McClean, Rogers and Williams, reporting on methods for detecting the bacterial enzymes of gas-gangrene organisms state:

In view of the difficulty of rapid bacteriological diagnosis, it seemed worth while to explore the possibility of detecting the possession of actively proliferating pathogenic organisms at a stage when the infection cannot be recognised by clinical or ordinary bacteriological examination.

The methods suggested have not yet been put to the practical test on cases at the casualty hospital, and they would appear to require specially trained staff. A much readier method was used in the last war.

"In the early days of the European war one saw collections of gas in the muscle of limbs which had been injured by bullets and shrapnel. These gas collections one found associated with anaerobic infection of the wounds, and though at operation in many of these cases the surgeon failed to detect collections of gas, the bacteriologist always found anaerobic organisms in his culture from the tissue or foreign body removed. One was able in this way to demonstrate that radiographs provided within a few minutes the earliest positive evidence of gas gangrene. Thus operative procedures could be conducted immediately to the great benefit of the patients." (Brailsford, *Radiology of Bones and Joints*, 1935.)

Many of the patients returning from Dunkirk and a number of air-raid casualties were found by radiography to have localised or spreading gas-gangrene infection before there was any clinical evidence of it. Radiography has the advantage that it can be repeatedly and rapidly applied without unduly disturbing the patient, and from such serial radiograms the localisation and activity of the process can be determined. One could expect the gas bubbles to be formed concomitantly with the enzymes and they can be distinguished in the depth of the tissues before material containing the latter is available. The bubbles in the early stages may be obscured if the limb is covered by a plaster case; but, even through it, I have been able to recognise a more advanced stage before it was possible on clinical evidence to say that it existed (*Brit. med. J.* 1940, i, 247).

Birmingham.

JAMES F. BRAILSFORD.

#### Infectious Disease in England and Wales

WEEK ENDED MARCH 13

*Notifications.*—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1907; whooping-cough, 1864; diphtheria, 794; paratyphoid, 4; typhoid, 4; measles (excluding rubella), 19,799; pneumonia (primary or influenzal), 1315; puerperal pyrexia, 160; cerebrospinal fever, 86; poliomyelitis, 5; polio-encephalitis, 1; encephalitis lethargica, 2; dysentery, 78; ophthalmia neonatorum, 88. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on March 10 was 2344, including scarlet fever, 534; diphtheria, 259; measles, 799; whooping-cough, 257; enteritis, 88; chickenpox, 62; erysipelas, 10; mumps, 28; poliomyelitis, 2; dysentery, 28; cerebrospinal fever, 16; puerperal sepsis, 14; enteric fevers, 9; german measles, 14; osteomyelitis, 1.

*Deaths.*—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 20 (1) from measles, 18 (7) from whooping-cough, 24 (0) from diphtheria, 57 (9) from diarrhoea and enteritis under two years, and 69 (7) from influenza. The figures in parentheses are those for London itself.

Manchester reported 6 deaths from diarrhoea, Birmingham 5. The number of stillbirths notified during the week was 241 (corresponding to a rate of 36 per thousand total births), including 21 in London.

## Obituary

## FREDERICK GYMER PARSONS

D SC LOND., FRCS, FSA

THE death of Professor Parsons on March 11 at the age of 80 marks the passing of one of the oldest British anatomists, as well as of a man of much personal charm. In the field of anatomy he stood out not only for many solid contributions to anatomical science but also for a great deal of unobtrusive work on behalf of the Anatomical Society and of anatomical teaching. He had been a member of that society since 1899, and had acted as its secretary, treasurer and president.

Frederick Gymer Parsons was born in 1863 and qualified in medicine when he was 23 from St. Thomas's Hospital, where he was Grainger scholar, taking the surgical fellowship three years later. His academic life was spent entirely at St. Thomas's, where he started his career as lecturer in biology, soon becoming lecturer in anatomy and holding the chair a score of years. His earliest scientific work was in comparative anatomy, and he achieved distinction by intensive studies of mammalian muscle and of the structure and function of joints. Much of this work was published in the *Journal of Anatomy* and the *Proceedings* of the Zoological Society, his conclusions being summarised in a series of outstanding Hunterian lectures delivered in 1897-99. Later he turned his attention to physical anthropology. He made important observations on the modern English femur and clavicle and their variations, and systematic studies of collections of crania such as those at Hythe and Rothwell. His records of the skeletal remains of the early Anglo-Saxon population form an important basis of reference for other workers, and in 1928 he brought out an atlas showing the contours of 66 Anglo-Saxon skulls collected from different parts of the country. During the last war, he seized the opportunity offered by prisoners of war to ascertain facts about the racial constitution of the population of Germany, showing that, except in the coastal districts and along the valley of the Rhine, the so-called "Nordic" element is very slight. But it was in its bearing on the constitution of the present population of this country that Parsons's main interest in physical anthropology centred. In 1921 appeared his paper on the Long Barrow Race and its relationship to the modern inhabitants of London, later expanded in *The Earlier Inhabitants of London*. Presiding over the anthropology section of the British Association meeting at Leeds in 1927 he spoke of "The Englishman of the Future," concluding that certain changes taking place in the shape of the skull—particularly in the increase of the proportional height—must be regarded as an evolutionary process.

To the teaching of anatomy Parsons made many contributions, notably his work for many years as secretary of the Anatomical Committee of London, and the publication (with his friend, William Wright) of a practical dissecting manual (1912). In this book he sought to relieve the medical student of cumbersome topographical detail and to focus his attention on the important features of human anatomy. He also taught anatomy at Hunter Street and examined for ten or more universities. In the life of the medical school he was for long the central figure, many of its activities being developed on his initiative and with his support. As friend and adviser his opinion was sought by colleagues and pupils on all manner of problems, administrative or personal. He had in full measure the balanced outlook on life, informed with an acute sense of humour, by virtue of which he put difficult situations in proper perspective, both for himself and for those who sought his advice. His life-long association with St. Thomas's led him to make a special study of its history, of which the results were published in three volumes, completed in 1936. The story was worthy of its object and the amazing conquest of obstacles after the removal of the hospital from the Borough to Surrey Gardens is portrayed with a skill and fervour that must command the admiration of other schools.

When he finally retired from the hospital Parsons settled down at Princes Risborough. He had a house

built in a beautiful situation on the slopes of the Chilterns, and with his garden, his country walks, and his interest in local archaeology he seemed to revel in his retirement. Military exigencies compelled him to leave the home which he had made, and soon after the beginning of the war he went to live in Thame. But, as always, he accepted the situation philosophically and found happiness in his new surroundings without any regrets. His wife, née Mary Parker, died in 1915, and he leaves two sons.

Captain THOMAS PICTON MYLES, RAMC, who died in India on Nov. 3, was the son of Colonel C. D. Myles, late RAMC retd. Thomas Picton was born in 1912 and graduated MB from the University of Cambridge in 1937. After holding house-appointments at Sheffield Royal Infirmary and St. James' Hospital, Balham, he joined the RAMC in the same year and took his DOMS in 1939. He served in France at the beginning of this war.

## Notes and News

## Royal Society

THE following have been elected to the fellowship: Sir SHANTI BHATNAGAR, DSc, director of scientific and industrial research, India; P. A. BUXTON, MRCS, director of the department of entomology, London School of Hygiene and Tropical Medicine, and professor of entomology in the University of London; IVAN DE BURGH DALY, MD, professor of physiology, Edinburgh; Vice-Admiral Sir JOHN EDGEELL, hydrographer of the Royal Navy; A. J. EWINS, DSc, director of research, Messrs. May and Baker Ltd.; ARTHUR FELIX, DSc, bacteriologist, Lister Institute; ALEXANDER FLEMING, MB, FRCS, professor of bacteriology in the University of London at St. Mary's Hospital; J. J. FOX, DSc, Government chemist; W. M. H. GREAVES, astronomer royal for Scotland; S. C. HARLAND, plant breeder; G. A. R. KON, DSc, research professor of chemistry in the University of London at the Royal Cancer Hospital (Free); ANDREW McCANCE, DSc, director and general manager, Messrs. Colville's, Motherwell; WILDER PENFIELD, MD, director of the Montreal Neurological Institute; G. E. PILGRIM, DSc, formerly superintendent of the geological survey of India; R. E. STRADLING, DSc, chief adviser, research and experiments department, Ministry of Home Security; CHARLES SYKES, superintendent of the metallurgy department of the National Physical Laboratory; J. L. SYNGE, ScD, professor of applied mathematics, Toronto; G. F. J. TEMPLE, DSc, professor of mathematics in the University of London at King's College; A. L. DU TORR, DSc, lately consulting geologist to the De Beers Consolidated Mines; SOLLY ZUCKERMAN, DSc, MRCS, professor of anatomy, University of Birmingham.

On Thursday, July 15, at 4.30 PM, Prof. Warrington Yorke, FRS, will deliver a Croonian lecture to the society. He will speak on recent developments in chemotherapy with special reference to tropical medicine.

## Royal College of Surgeons of England

The following lectures will be given at the college, Lincoln's Inn Fields, W.C.2, at 4 PM, during April and May:

*Thomas Vicary lecture.*—Sir Hugh Lett, anatomy at Barber Surgeons' Hall (April 2).

*Hunterian lectures.*—Mr. W. H. Bowen, etiology of appendicitis (April 5); Mr. H. T. Roper-Hall, premaxillary cysts (April 7); Mr. L. H. Savin, the surgery of non-magnetic intraocular foreign bodies (April 9); Mr. J. Cosbie Ross, injuries of the urinary bladder (April 12); Dr. Raymond Greene, frost-bite and kindred conditions (April 14); Mr. S. M. Cohen, traumatic arterial spasm (April 16); Mr. J. E. A. O'Connell, the vascular factor in intracranial pressure and the circulation of the cerebrospinal fluid (April 19); Mr. O. S. Tubbs, the effect of ligation on infection of the patent ductus arteriosus (April 28); Dr. Graham Weddell, cutaneous innervation (April 30 and May 3); and Mr. H. E. Griffiths, the treatment of the injured workman (May 5).

*Arris and Gale lectures.*—Prof. H. A. Harris, the anatomy of posture in industry (May 10), the clinical anatomy of the veins (May 14), and the relationship of the lymphatic system to the arterial and venous systems.

*Bernhard Baron research lectures.*—Colonel John Beattie, changes in the peripheral vascular system after hemorrhage (May 19), and the value of sulphhydryl compounds as detoxicating agents (May 21).

*Arnott demonstrations and museum lecture-demonstrations.*—Dr. A. J. E. Cave, osteology of the shoulder girdle and upper limb (April 27 and 29, May 4), osteology of the pelvic girdle and lower limb (May 6, 11 and 13), mechanism of the foot (May 18), visceral bones (May 20), the thoracic operculum (May 23).

**University of Cambridge**

On March 13 the following degrees were conferred by proxy :

*MChir.*—W. M. Beattie.  
*MB, BChir.*—H. R. A. Michelmore, B. H. Burns and H. W. Gordon.

**University of Dublin**

On March 16, at the school of physic, Trinity College, the following degrees were conferred :

*MD*—H. H. Balch.  
*MB, BCh, BAO*—D. M. Bamber, G. H. A. Chamberlain, R. H. C. Conyngham, A. W. D. Cowan, J. D. O'Neil Donnellon, A. C. V. Maltby, Mary D. Moriarty, O. D. Nightingale, Bernard Novis, T. F. Roche, P. H. Seaton, Cyril Watson and Brownie A. T. Welsh.

**National University of Ireland**

The degree of MD has been granted to Dr. Sylvester Boland.

Dr. J. F. Cunningham has been appointed lecturer in gynaecology at University College, Dublin.

**University of Glasgow**

Mr. Roland Barnes has been appointed Frederick Young lecturer in orthopaedics in the university. For the past two years Mr. Barnes has been in charge of the orthopaedic department of an EMS hospital in Lancashire.

**Royal Society of Medicine**

At 10 AM, on Saturday, April 3, Mr. H. E. Griffiths will give a demonstration to the section of orthopaedics of this society. The meeting will be held at the Albert Dock Seamen's Hospital, Alnwick Road, London, E.16.

**Lecture on Blast**

On Thursday, April 1, at 2.30 PM Surgeon Rear-Admiral C. P. G. Wakeley will give a lecture at Chichester County Hall on blast injuries in total war. Medical practitioners of Sussex and East Hants are invited to attend.

**London County Council**

*Hospital and medical services committee.*—Miss Esther Rickards's name should have been included in the list of medical men and women appointed to this committee, of which she is, in fact, vice-chairman.

**Medical Pension and Scholarships**

The council of Epsom College will in July award a France pension of £30 per annum to a necessitous medical man, fully fifty-five years of age, who has been registered for five years.

The council will also award St. Anne's scholarships to girls attending Church of England schools. Candidates must be fully nine years of age, and must be orphan daughters of medical men who have been in independent practice in England or Wales for not less than five years. The value of each scholarship is dependent upon the means of the applicant and the locality and fees of the school selected. Educational grants will also be available from the Sherman Bigg fund for boys and girls. These grants are not restricted to orphans, or to members of any religious denomination, but candidates must be of public school age and in need of help.

Forms of application for the pension, scholarships and grants can be obtained from the secretary's office, Epsom College, Surrey, and must be returned by April 30.

**No Deaths among Immunised Children**

Since 1941, over 36,250 children under 15 have been immunised against diphtheria in the county districts of Northants. During that period only one of those children contracted the disease, and the attack was not severe enough to result in death. On the other hand, among over 19,400 other children in the same county districts who had not been immunised, there were 101 cases of diphtheria and 15 deaths. Among 8000 children under five years of age who had been protected, not a single case of diphtheria occurred; while among 9200 children under five who had not been immunised, there were 36 cases and 11 deaths.

The Ministry of Health has also been informed that 46% of children under the age of five have now been immunised in the county districts of Northants, including Kettering borough, and 74% of those aged between five and fifteen. The percentage for all ages up to fifteen is 65%—the target being 75%.

**Science and the Citizen**

At a conference on this subject organised by the British Association and held in London last week-end the medical speakers included Sir Henry Dale, PRS, Prof. W. E. le Gros Clark, FRS and Dr. Douglas McClean. Sir Henry, in the opening address, spoke of the need for scientific education: "It is time for us to say boldly and clearly that tinkering and patching are not enough, and that to enable Britain to play its part in the civilisation now in making, nothing will suffice short of a recasting of our schemes of education which will give to science its proper and central place at every stage—in elementary, secondary, university and adult education." Sir Lawrence Bragg, FRS, said that unfortunately science had not been regarded as an essential part of a balanced education, but it was much easier to give a popular scientific lecture to young people than to their parents. Mr. H. G. Wells advocated the burning of textbooks and the constant refreshment of supplies; he was shocked at the staleness of those used by students and kept by public libraries.

**RECRUITMENT OF MOHS.**—The Minister of Health reminds medical officers in the employment of a local authority who have been granted deferment by the Central Medical War Committee that this applies only to the post which they then hold. If a medical officer applies for another post he renders himself liable to recruitment.

**Appointments**

COOK, C. A. E., LDS, RCS : school dentist for Berkshire.  
HARTLEY, R. H. R., MRCS : part-time medical registrar at the Woolwich Memorial Hospital.  
KETTLEWELL, H. B. D., MB CAMB. : examining factory surgeon for Cranleigh, Surrey.  
NUTTALL, J. R., MD MANC., FFR, DMR : temp. medical director of national radium centre at the General Infirmary, Leeds.  
PARKER, J. N., MB MANC., DPH : temp. district TO for Hyde and Macclesfield.  
SPITTA, R. H. D., MD DURH. : consulting bacteriologist to St. George's Hospital, London.  
THOMPSON, J. A. D., MB EDIN. : examining factory surgeon for Chipping Campden, Glos.

**Births, Marriages and Deaths****BIRTHS**

BAILEY.—On March 14, the wife of Dr. Eric Bailey, of Woodford Green—a son.  
FLEMING.—On March 15, in Glasgow, the wife of Dr. James Fleming—a son.  
JOYCE.—On March 12, at Newbury, the wife of Major J. B. Joyce, RAMC—a son.  
LAMB.—On March 14, at Guildford, the wife of Surgeon Lieut.-Commander F. H. Lamb, RN—a son.  
MACKINNON.—On Feb. 23, Dr. Joan MacKinnon (née MacDonald), wife of Dr. Alastair MacKinnon, of Leeds—a daughter.  
PRYS-JONES.—On March 15, at Denbigh, the wife of Dr. T. B. Prys-Jones—a daughter.  
QUINTON.—On March 14, at Tonbridge, the wife of Lieutenant J. F. Quinton, RAMC—a son.  
ROBIN.—On March 14, in London, the wife of Mr. Ian G. Robin, FRCS—a daughter.  
TREVAN.—On March 3, the wife of Dr. J. W. Trevan, of Eversley Road, S.E.19—a daughter.  
TRIPP.—On March 10, at Dartford, the wife of Dr. G. F. Tripp—a daughter.  
WHITE-COOPER.—On March 17, the wife of Dr. W. R. White-Cooper, of Dartmouth—a son.

**MARRIAGES**

BARTON-THOMAS.—On March 12, at Arlesey, Edward Cecil Barton, Lieut.-colonel, The Royal Sussex Regiment, to Gwendolen Margaret Gwladys Thomas, MRCS.  
PRATT-KNIGHT.—On March 16, at Glasgow, Thomas Arthur Pratt, MD, to Dorothy Knight.

**DEATHS**

BISHOPP.—On March 19, in London, Mabel Kate Bishopp, MRCS.  
JACK.—On March 16, at Durham, James Jack, MC, MB GLASC.  
MACPHERSON.—On March 18, at St. Martins, Balbeggie, Perthshire, John Duncan Graham Macpherson, MB EDIN., colonel RAMC, aged 68.  
PRITCHARD.—On March 16, at Bitterne, Southampton, Norman Pallister Pritchard, MC, MA CAMB, MRCS.  
SHEKLETON.—On March 16, Richard Auchmuty Shekleton, MD DUBL, aged 74.  
WILKINSON.—On Nov. 22, in Algiers, as the result of enemy action, Frances Mildred Haig Wilkinson, MB EDIN. (Sœur Maria Borgia of the White Sisters of Africa), aged 30.

*The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.*

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## REFERENCES AND ABBREVIATIONS

*Institutions and Corporations with the right to the prefix Royal will be found under that prefix, with the exception of Hospitals, which will be found under that heading, and Medical Societies, which are separately indexed under Societies. All Universities are indexed under the word Universities. (A) = Annotation, (C) = Correspondence, (LA) = Leading Article, (ML) = Medico-legal, (NI) = New Invention, (NP) = New Preparation, (O) = Obituary, (P) = Parliament and (R) = Review.*

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